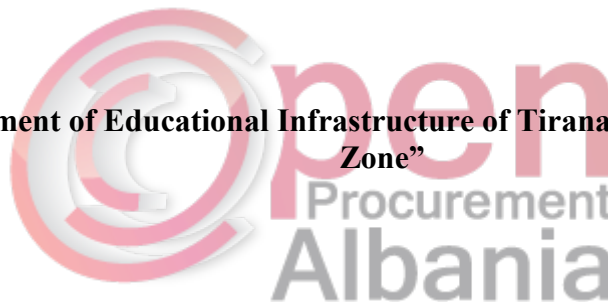


MUNICIPALITY OF TIRANA

**STANDARD DOCUMENTS OF PUBLIC-PRIVATE  
PARTNERSHIP FOR CIVIL WORKS CONTRACTS**

**International Open Procedure**

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4  
Zone”**



**Tirana 2017**

## ANNOUNCEMENT OF THE CONTRACT

### I Contracting Authority

#### Section 1 Name and Address of the Contracting Authority

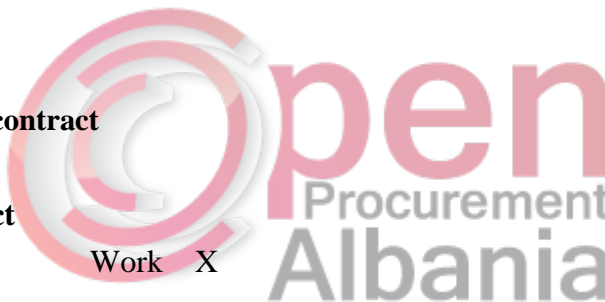
Name Tirana Municipality  
Address Boulevard “Deshmoret e Kombit”  
Tel/Fax 00 355 4 22 56 799  
E-mail [prokurimet@tirana.gov.al](mailto:prokurimet@tirana.gov.al)  
Website [www.tirana.gov.al](http://www.tirana.gov.al)

#### 1.2 Type of contracting authority and activity of major activities :

Central Institution  Independent institution  
Local government unit

#### Section 2 Object of contract

##### 2.1 Type of Contract



##### 2.2 Brief Description of the concession/public-private partnership contract

**Object of the contract:** “On improvement of Educational Infrastructure of Tirana Municipality for Design, Financing, Building, Furniture, Maintenance, Supervision and Technical Control of four educational objects in Tirana 4 zone”

Municipality of Tirana in the capacity of "Contracting Authority ", invites Economic Operators to participate in an international procedure of Concession/Public Private Partnership for detailed design and implementation of construction of four education objects in Tirana 4 Zone, furniture and their ordinary and extraordinary furniture maintenance, supervision and technical control in line with procedures and terms defined in these tendering documents, as well as terms of the contract. The evaluated cost of the project is 1.427.925.976 (one billion four hundred and twenty seven million nine hundred and twenty five thousand nine hundred and seventy four) leke without VAT. The Contracting Authority has envisaged a payment of the invested amount for the concessionary in the course of a 7 year period from the moment of the handing-in of the object, as well as envisages the reimbursement for a time value of money, i.e. an income margin at

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

maximum of 6,28 % per year for the remaining value. The concessionary shall cover with own incomes the entire investment for designing, building, furniture, equipment of laboratories, maintenance, supervision and technical control, as well as functionality of these objects. The education objects shall be build and be functional in a deadline of about 18 (eighteen) months from the day of signature of the contract. After the construction and functioning of the educational objects, the concessionary/PPP will maintain them for a 7 (seven) year period. After the construction, the Contracting Authority will pay the concessionary/PPP a defined annual amount until the full payment of the invested amount.

The Contracting Authority will implement an open procedure in line with article 22 of law no. 125/2013, changed “On Concessions and Public Private Partnership”. The Contracting Authority shall take into consideration only the bids of those economic operators of Union of Economic Operators who have passed the minimal limits, defined in the qualification criteria.

There are planned 3 types of schools for Tirana 4 Zone in a total of four schools, 2 schools of the type 4, 1 school of type 2 and one school of type 1.

With the construction of these educational objects in Tirana 4 Zone, the objective of Contracting Authority is to solve the problems made evident as a result of the insufficient number of schools in Tirana Municipality. The construction of these educational objects will put an end to the crowded schools beyond their normal capacity and eliminate the two-shift learning in schools

The Contracting Authority will offer a surface of about 29351.5 meter square respectively : two educational objects are located in Administrative Unit no. 8 and one education object in Administrative Unit no. 2 and one object in Administrative Unit of Dajt.

Concession/PPP for the Contract is open to Economic Operators and Unions of Economic Operators of any country that meet the following terms and criteria :

1. **Type of Contract:** Concession/Public Private Partnership (PBOTM)
2. **Resource of Financing:** Municipality of Tirana and Ministry of Education, Sports and Youth (Contracting Authority)

### **2.3 Duration of the contract or deadline for execution :**

Duration of the Concession/PPP Contract shall be 7 (seven) years and 18 (eighteen) months.

### **2.4 Location of the object of this contract :**

Administrative Unit no.2, Administrative Unit no. 8 and Administrative Unit of Dajt.

### **Section 3 Legal Economic, Financial and Technical Information**

**3.1 Admission Criteria** according to Annex 9.

**3.2 Warranty of the Bid** (applicable in case of procurement procedures with a higher value than the high monetary limit, in case this is required by the contracting authority) :

Economic Operator in a concession/public private partnership procedure presents the Form of Bid Warranty, when required, according Annex 3.

The value required for the bid warranty is equal to 2% of the envisaged value of the project or estimated at 28.558.519 (twenty eight million five hundred and fifty eight thousand five hundred and nineteen) leke without VAT.

**3.3** Based on item 7 of CoMD 150, dated 22.03.2007 “On Organization and Functioning of the Agency for Treatment of Concessions changed to CoMD 191, dated 13.03.2012, envisages that the Winning Concessionary shall pay for this Agency the following obligations as following :

a) for concessionary projects up to 5 000 000 (five million) euro, the payable amount is 5 000 (five thousand ) euro.

b) for the concessionary projects over 5 000 000 (five million) euro up to 15 000 000 (fifteen million) euro, the payable amount is 10 000 (ten thousand )euro.

c) for concessionary projects up to 15 000 000 (fifteen million) euro up to 50 000 000 (fifty million) euro, the payable amount is 20 000 (twenty thousand) euro.

ç) for concessionary projects over 50 000 000 (fifty million) euro, payable amount is 30 000 (thirty thousand) euro.

### **Section 4 Procedure**

**4.1 Type of procedure :**

Open **X**

Limited

With negotiation

With  
preliminary  
announcement

**4.2 Criteria for the selection of the winner:**

No.	Criteria	Result Max.	Minimal Threshold/ Passing Result

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

TC1	General Idea and Concept of the project	5	1
TC2	Selection of architectonic typology of schools  <i>-establishment of the object on the ground</i>  <i>- relation with the urban context and public space</i>  <i>-relation between external and internal space</i>	10	3
TC3	Solution of organization of envisaged functions  <i>-solution offered for functional organization</i>  <i>- planning solution and natural light</i>  <i>- scheme for movement of the disabled</i>  <i>-integration of the kindergarten with the nine year school</i>	10	3
TC4	Concept of school as a community center	10	3
TC5	Innovative techniques in the field of energy saving	5	1
TC6	The used materials	10	3
	<b>TOTAL TECHNICAL CRITERIA</b>	<b>50</b>	
FC1	Economic Offer for design, building, furniture and maintenance	30	
FC2	Economic offer for maintenance until the end of the contract	5	
FC3	Economic offer with the income margin	15	
	<b>TOTAL FINANCIAL CRITERIA</b>	<b>50</b>	
	<b>TOTAL</b>	<b>100</b>	

**4.3 Deadline for submission of bids or requests for participation :**

**Date: 16/01/2018 Time 11:00 :**

Place :www.app.gov.al

**When the bid is required electronically, the economic operators shall submit the offer electronically on the official website of PPP at www.app.gov.al**

**4.4 Deadline for opening of bids of requests for participation :**

**Date 16/01/2018 (dd/mm/yyyy) Time 11:00**

Place: www.app.gov.al

**Information to be communicated during the public opening of bids submitted electronically shall be communicated to all the Economic Operators that have submitted the offers, based on their request.**

**4.5 Bid Validity Period: 300 (three hundred) days**

**4.6 Language (-s) of compilation of bids or requirements for participation :**

Albanian **X**                      English **X**  
Other \_\_\_\_\_

**Section 5 Additional Information**

**5.1 Documents with payment :**

Yes                                      No **X**  
*If yes*  
Currency \_\_\_\_\_                      Price \_\_\_\_\_

This price covers the current costs for copying and distributing the DSC/PPP to Economic Operators. The interested economic operators have the right to control the DSC/PPP after their purchase.

**5.2<sup>i</sup>** Value of the tariff shall be paid by the economic operator in case of a complaint at the Public Procurement Commission : \_\_\_\_\_ Leke (amount in letters).

**5.3 Additional Information** (place, office and ways of withdrawing SDC/PPP)

**Vo:** Documents uploaded on the PPA website (feasibility study, design tasks, etc) which will be attached to the standard documents of concession are as a reference for the economic operators participating in the PPP/concession procedure.

**Date of delivery of this announcement 24/11/2017**

<sup>1</sup> Added with Decision of Council of Ministers No. 401 dated 13.5.2015

## II. INSTRUCTIONS FOR THE BIDDER

### 1. Introduction

(Contracting Authority has decided to implement the project for \_\_\_\_\_. Selection of the Bidding Winner shall be carried out based on a competition procedure (type of procedure) according to the qualifying and assessment criteria specified in this document. The duration of the concessionary / ppp contract \_\_\_\_\_ from entry into force.

#### 1.1 Further information

##### General Description

##### a. GEOGRAPHICAL POSITION

##### b. HYDROLOGICAL CONDITIONS (in case of concession of power stations)

##### c. CONNECTION WITH ENGINEERING INFRASTRUCTURE

##### d. HYDROTECHNIC CONDITIONS (in case of concession of hydro power station

##### e. KUSHTE TE TJERA TE LIDHURA ME OBJEKTIN

#### 1.2 *(only for the non-required proposals)*

The concessionary project \_\_\_\_\_ is an required proposal of the Contracting Authority. Based on VKM no. 575, dated 10.7.2013 “On approval of rules for assessment and granting of the concession/public private partnership”, company \_\_\_\_\_ has profited a bonus of about \_\_\_\_\_ the total of points or the project is assessed \_\_\_\_\_leke.

1.3 These instructions ("Instructions for the Bidder") as well as “Invitation for Bid” is addressed to all juridical subjects of their unions, aiming to participate in the competition procedure.

1.4 Expenses: Winning Bidder shall cope with the expenses related to the preparation and submission of his bid and any other expense as envisaged in these documents in lien with article 25 and article 29 of law 125/2013 “On concessions and PPP”.

1.5 The contracting authority has the right to interrupt this competition procedure. The bidder has no right to ask for compensation for costs or losses .

## 2. Documents of Competition Procedure

### 2.1 Content

**2.1.1 Type of project and technical requirements, competition procedure, contract terms and legal, economic and financial requirements are defined in the documents of the competition procedure which contain the following:**

ANNEXES

Annex 1: Bid Form

Annex 2: Form of the Bid Invitation of the Limited or with Negotiation with Announcement Procedure

Annex 3: Form of Bid Warranty

Annex 4: Form of Confidential Information

Annex 5: Declaration on fulfillment of Technical Specifications by the Economic Operator

Annex 6: Declaration on Conflict of Interest

Annex 7: Form of the works completion assessment

Annex 8: Declaration of availability of machineries

Annex 9: Form on Certification of Qualification/Participation

Annex 10: Declaration on the judicial state

Annex 11: Evaluation Criteria

Annex 12: Self-Declaration for foreign bidders

Annex 13: Draft-implementation and technical specifications

Annex 14: Bill of Quantities

Annex 15: Disqualification Announcement

Annex 16: Form of Announcement of the Winner

Annex 17: General Terms of the Contract

Annex 18: Special Terms of the Contract

Annex 19: Announcement of the Contract Signature

Annex 20: Form of the Contract Warranty

Annex 21: Form of the Complaint to the Contracting Authority

Annex 22: Form of the Power of Attorney

**2.1.2.** Each bidder shall take into consideration instructions, criteria, terms, specifications, deadlines and entire information in the documents in the competition procedure. In case the bidder:

does not complete the entire documents and information of the competition procedure; or

ii) presents an offer which is not in compliance with the terms and requirements of the documents of the competition procedure.

The contracting authority shall define that the bid is not in line with requirements of the documents of the competition procedure and will refuse the bid.

**2.2 Explanations on the Standard Documents of the Competition Procedure:**

**2.2.1** The bidder who asks for explanations or changes in the documents of the competition procedure shall present a request through the electronic procurement system. All the answers with the respective explanations shall be announced to all the stakeholders.



### **2.3 Changes in the documents of the competition procedure:**

- 2.3.1.** Any time before the deadline of the submission of bids, if the Contracting Authority makes changes in the documents of the procedure, it shall also postpone the deadline of the submission of bids according to the law. Contracting Authority may for any reasons, upon its initiative, or in answer to the requests for changes by one bidder, change the documents of bidding procedure.
- 2.3.2** All changes carried out by the Contracting Authority shall be published on the PPA website. The changed documents shall be considered as the documents of the competition procedure for this selection competition procedure.
- 2.3.3.** In order to let sufficient time to bidders to make respective changes in their offer, the Contracting Authority shall upon its initiative postpone the submission of bids. In this case the Contracting Authority, according to law “On Concession and public-private partnership” shall publish the new deadline for submission of bids on the PPA website.

### **BID: PREPARATION**

**The bid shall include the following documents :**

Bid Form shall be completed in line with the model attached in Annex 1 of DSK/PPP.  
Bid Warranty Form, when required shall be filled in line with the model attached in Annex 3 of DSK/PPP.

- c) Documents related to the object of concession/public private partnership (*sketches, projects, etc*)

\_\_\_\_\_,  
\_\_\_\_\_,  
\_\_\_\_\_.

An Economic Operator shall present only one Bid.

Any fake data shall consist of a legal reason for the Contracting Authority to disqualify any time the Bidder. If this is discovered or announced after the signing of the contract, the Contracting Authority has the right to put an end to contract unilaterally and pay the compensation for the current losses. According to the Criminal Code of the Republic of Albania, the submission of fake information, compilation of fake or forged documents, as well as any declaration or any other data that does not reflect the truth, is considered a criminal act.

The bidder shall use only Documents of the Competition Procedure, without making any change to their content.

## **2 Bid warranty:**

- 2.2.1** As part of his technical bid, the bidder shall present the Bid Warranty, if necessary, according to the Bid Warranty Form (Annex 3), up to 2% of the project value proposed by the Bidder. The Bid Warranty, if necessary, must be presented in the form of a deposit or warranty, issued from a bank or insurances company licensed by the state to carry out such activity.

**2.2.2** The bidder shall guarantee that the Bid Warranty is value for a 300 day period from the completion of the bid validity. Hence, the bid shall be guaranteed for 300 days from the end of the deadline for its submission. For motivated reasons, the Contracting Authority may asks for the prolongation of the validity period of Bid Warranty, if there has been any, in case certain circumstances influence the postponement of the bid evaluation deadline of the respective bid or in the submission of the Contract Warranty, or in any other case affecting the postponement of the of any obligatory deadline. Failure to postpone the validity period of the Bid Warranty, when required, consists of a reason for disqualification of the Bidder.

**2.2.3** The Bid Warranty, if required, shall be submitted together with the offer before the expiring of the deadline for submission of bids. Every offer unaccompanied with the Bid Warranty shall be refused by the Bid Evaluation Commission.

Bid warranty shall be presented in the name of :  
the company, in case the bidder is only one company; or  
ii) in the name of the leading company in case the Bidder is a temporary union of companies.

**2.2.4** Upon request of the non-winning bidder, the Contracting Authority shall return him the Bid Warranty, if required, as soon as possible, but not later than 30 days after the completion of the bid validity period or any prolongation of its deadline.

**2.2.5** Bid Warranty of the Winning Bidder, if required, shall be returned to him after the submission of the Contract Warranty to the Contracting Authority.

**2.2.6** Bid Warranty shall be kept by the Contracting Authority, if required, in cases when the Bidder:

- ) withdraws his offer during the competition period without end of the bid validity deadline;
- i) does not present a Contract Warranty (in case it is declared the winner);
- ii) does not sign the concessionary agreement (in case if it declared the winner within the specific time limits in the Form of the Announcement of the Winner (Annex 16
- iii) has declared fake data in his bid

v) if he is declared winner and refuses the payment according to point 1.4. above

**2.3 Power of Attorney:** Every Bidder (or member of the Temporary Union, when the Bidder is such) shall submit a notarial power of attorney according to the form defined in Annex 22, that shows that the person (persons) that have signed the Bid have the right to sign it.

**2.4 Bid Validity Period :**

Bids shall be valid for 300 days starting from the moment of end of “time deadline for submission of offers”. An offer with a validity shorter than the defined deadline shall be refused by the Bids Evaluation Commission, as unacceptable.

The Contracting Authority may ask the Bidder to prolong the Bid Validity Period. The request of the Contracting Authority and answer of the Bidder shall be in writing. In

case of a prolongation of the Bid Validity Period, even the Bid Warranty Deadline , if required, shall be prolonged in line with point 3.2.2.

## **2.5 Form an signing of Bid**

- 2.5.1** Every bidder shall prepare and submit the offer on the Public Procurement Agency (PPA) website. Detailed information on the uploading of the bid is found in the manual of use, which is published at <https://www.app.gov.al>.
- 2.5.2** The bidder, who is declared the winner of the competition, shall present to the Contracting Authority the original bid. The original bid shall be in print or written in ink which cannot be erased. Person or persons who have right of signature (authorized upon the submitted power of attorney as part of the Technical Bid, in line with item 3.3. Shall sign the Bid by:  
Signing the original bid  
and  
ii) Writing the initials on each page of the original documents accompanying the economic bid.
- 2.5.3** The bid shall not have changes, erases or additions, excluding the cases when corrections are signed by the person or persons with the right of signing the bid. The original bid shall be identical to the bid uploaded on the PPA website.

## **SUBMISSION OF ORIGINAL BID**

### **4.1. Form and signature of the bid**

- 4.1.1.** In line with CoMD No. 268, dated 18.4.2012 “On electronic completion of competition procedures of the concession” and CoMD No. 575 dated 10.7.2013, “On approval of the rules of evaluation and concession/public private partnership”, the bid shall be submitted electronically in line with instructions of the Public Procurement Agency. A more detailed information about this procedure shall be found on the official website [www.app.gov.al](http://www.app.gov.al).
- 4.1.2** Contracting Authority is not accountable to every Bidder for any claim or complaint on unclear points on the way of submission of Bid, despite the case when a bid is not assured through the right manner due to lack of proper infrastructure by the Contracting Authority.
- 4.1.3** In any case, the Bidder shall submit **electronically** all the obligatory and necessary documents for presentation of their bid.
- 4.1.4** The bidder declared winner shall submit the original bid to the Contracting Authority. The original bid shall be placed inside an envelope/box, closed and sealed. On the envelope/box shall be reflected the name and address of the bidder with the note Bid for the Project “\_\_\_\_\_”.

Original bid shall be submitted in the following address :

To:	(Contracting Authority)
To the	
attention of:	Bids Evaluation Commission
Address:	

## **4.2 Deadline for submission of Bids**

**4.2.1** Bids shall be submitted on the PPP website within date \_\_\_\_\_, time \_\_\_\_\_. The bidder declared winner shall be informed in writing by the Contracting Authority for the deadline of submission of original bid.

## **OPENING AND EVALUATION OF BIDS**

### **5.1 Opening of Bids**

#### **5.1.1.**

Bids Evaluation Commission makes the identification of bidders and opening of bids submitted on the PPA website after the completion of deadline for submission of bids.



### **5.2 Evaluation of Bids**

**5.2.1** After the bid opening, Bids Evaluation Commission shall review it to define whether the bid is acceptable, if the required documents have been submitted, whether the required documents to be signed by the bidder have been duly signed and whether the Bid is regular.

**5.2.2** The evaluation of the Contracting Authority will be based on the data and content of the Bid by not addressing to other resources. Nevertheless, if necessary, the Bids Evaluation Commission shall require other explanations from the Bidder that do not consist of a change in the essence of the Bid. Explanations shall be in writing or/and reflected in the respective minute. Likewise, in special occasions, the Contracting Authority reserves the right to include also different experts who may help in treatment of those issues that may cause difficulties to the Bids Evaluation Commission.

#### **5.2.3. Offer shall be considered invalid if :**

- bidder has not submitted the Bid Warranty, if required;
- i) bid contains fake data ;
- iii) has not filled one or all the requirements of the bid for the competition procedure.

5.2.4 Bids Evaluation Commission considers a bid valid if it contains small deviations which do not change materially or do not deviate from the characteristics, terms and the requirements, defined in the documents of selection procedure, or mistakes that can be corrected without affecting its content.

5.2.5 If more than one financial bid has the same value or same points than the winner shall be decided by cast, in the presence of the bidders.

5.2.6. Bids Evaluation Commission compiles final classification that shall be announced publicly and communicated to the Bidders. After the final classification, every bidder shall require the administrative review of the selection process, when believes that an action carried out by the Contracting Authority and Bids Evaluation Commission runs contrary to the requirements of Law No. 125/2013 “On Concessions and public private partnership” and CoMD no. 575, dated 10.7.2013 “On approval of evaluation rules and granting of concession/public private partnership” by using the form of Complaint about the Competition Procedure defined in Annex 21.

5.2.7 Upon completion of complaint procedure, the Bids Evaluation Commission prepares the final report of bids evaluation and proposes the Chairman of the Contracting Authority the results obtained by each bidder.

### **5.3 Invalidity and Failure of the Competition Procedure**

Competition Procedure is considered unsuccessful when :

- None of the bids meets the requirements of the invitation for the competition procedure;
- Contracting Authority, due to lack of economic profitability of bids or the project itself, declares the closure of the competition procedure;
- Or when there are no participants in the competition.

### **5.4 Illegal actions**

In line legislation of elimination of conflict of interest and ethics in public administration, the Contracting Authority refuses a bid, if the Bidder presenting it :

- ii) has given or is about to give to a current or previous employee of the Contracting Authority a gift consisting of money or not, as an effort to affect in an action or decision, or process of competition procedure; and/or
- ii) is in a situation of conflict of interest in this procedure, e.g. a bidder is related to a physical or juridical person, who has been assigned by the Contracting Authority to offer consulting services during the preparations of projects, specifications or documents during preparation of projects, specifications or other documents related to the competition procedure or related to members of the Bids Evaluation Commission
- iii) has submitted fake documents/information related to the requests presented in the Standard Documents of Competition Procedure.

Contracting Authority informs in writing the bidder and Public Procurement Agency for refusal of the bids, as well as reasons of this refusal and makes the respective note in the report of the competition procedure.

## **5.5 Definiton of the Winning Bidder and Signing of the Contract**

**5.5.1** Following the end of the complaint deadline, defined in item 5.2.6, Contracting Authority informs the Bidder, whose offer is chosen as the best, through sending of the Winner’s Announcement, as envisaged in the Winner’s Announcement Form. A detailed copy of this announcement shall be published at the Public Announcements Bulletin. During the signature, Contracting Authority asks the Winning Bidder to present the Warranty Contract.

Form of Contract Warranty shall be signed and submitted according to item 5.5.3.

The warranty of the Contract may be submitted in the type of ig:

- Unconditioned banking warranty or
- i) through an insurance police

**5.5.2** Contracting Authority and Winning Bidder shall negotiate in confidence the terms and final deadlines of the Concessionary/Public Private Partnership Contract, taking into account that the Winning Bidder will be required to sign the Concessionary Contract according to Special and General Conditions of the Contract signed by him in every page and submitted as part of the Technical Bid, changed (if applicable) during the negotiation process of the Concessionary/Public Private Partnership Contract.

**5.5.3** In case that within a time limit \_\_\_\_\_ from the date of the Winner’s Announcement and deadline defined in the Decision of Council of Ministers becomes clear that if the Winning Bidder (for unjustified reasons) will not submit the Contract Warranty and/or will not sign the Special and General Conditions of the Contract, the Contracting Authority will keep the Warranty Bid to the Winning Bidder, if required, and will invite other Bidders, according to the positions in the positions of final classification, until it receives the Contract Warranty and Special and General Conditions signed on every page by the Bidder, according to the position, or refuse all the remaining bids.

**5.5.4.** Contracting Authority shall publish in the Public Announcements Bulletin the name of Concessionary and main terms of the Concessionary Contract within 30 days from the signature of the contract.

**Annex 1**

*[Annex to be filled by the economic operator]*

**BID FORM**

Name of the bidder \_\_\_\_\_

For: *[Name and address of the contracting authority]*

\* \* \*

Procurement Procedure : *[type of procedure]*

Brief Description of the contract : *[ object]*

Publication (if applicable): Public Announcements Bulletin *[Date]* *[Number]*/ No. Reference on PPA website

\* \* \*

Referring to above-mentioned procedure , we, the undersigned, declare that:

Total price of our bid is [currency and value of the bid]; without VAT;

1. Total price of our bid is [currency and value of the bid]; without VAT

No	Criteria	Measuring Unit	Bid
1.			
2.			
3.			
<b>Sum</b>			
<b>Reserve Fund</b>			
<b>Sum</b>			
<b>VAT</b>			
<b>TOTAL SUM</b>			

Signature of the bidder \_\_\_\_\_

Seal \_\_\_\_\_

Note:

1. Prices shall be expressed in the Currency \_\_\_\_\_ (required in the tender documents)

## Annex 2

*(Annex to be filled by the Contracting Authority )*

### INVITATION FOR BID <sup>1</sup>

Municipality of Tirana invites bidders to present offers for the following works:

Municipality of Tirana in the capacity of "**Contracting Authority** ", invites Economic Operators to participate in an international procedure of Concession/Public Private Partnership for detailed design and implementation of construction of four education objects in Tirana 4 Zone, furniture and their ordinary and extraordinary furniture maintenance, supervision and technical control in line with procedures and terms defined in these tendering documents, as well as terms of the contract. The evaluated cost of the project is 1.427.925.976 (one billion four hundred twenty seven million nine hundred twenty five thousand nine hundred and seventy six) leke without VAT. The Contracting Authority has envisaged a payment of the invested amount for the concessionary in the course of a 7 year period from the moment of the handing-in of the object, as well as envisages the reimbursement for a time value of money, i.e. an income margin at maximum of 6,28 % per year for the remaining value. The concessionary shall cover with own incomes the entire investment for designing, building, furniture, equipment of laboratories, maintenance, supervision and technical control, as well as functionality of these objects. The education objects shall be build and be functional in a deadline of about 18 (eighteen) months from the day of signature of the contract. After the construction and functioning of the educational objects, the concessionary/PPP will maintain them for a 7 (seven) year period. After the construction, the Contracting Authority will pay the concessionary/PPP a defined annual amount until the full payment of the invested amount.

The Contracting Authority will implement an open procedure in line with article 22 of law no. 125/2013, changed “On Concessions and Public Private Partnership”. The Contracting Authority shall take into consideration only the bids of those economic operators of Union of Economic Operators who have passed the minimal limits, defined in the qualification criteria.

There are planned 3 types of schools for Tirana 4 Zone in a total of four schools, 2 schools of the type 4, 1 school of type 2 and one school of type 1.

With the construction of these educational objects in Tirana 4 Zone, the objective of Contracting Authority is to solve the problems made evident as a result of the insufficient number of schools in Tirana Municipality. The construction of these educational objects will put an end to the crowded schools beyond their normal capacity and eliminate the two-shift learning in schools

The Contracting Authority will offer a surface of about 29351.5 meter square respectively : two educational objects are located in Administrative Unit no. 8 and one education object in Administrative Unit no. 2 and one object in Administrative Unit of Dajt.

Concession/PPP for the Contract is open to Economic Operators and Unions of Economic Operators of any country that meet the following terms and criteria :

#### **2.5 Location of the object of the contract:**

Administrative Unit No. 8, Administrative Unit No. 2 and Administrative Unit of Dajt.



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

The deadline for execution of the contract. Duration of the PPP concession contract will be 7 (seven) years and 18 (eighteen) months .

The bid shall be submitted electronically on the PPA website

[www.app.gov.al](http://www.app.gov.al)

before

**Date of opening: 16.01.2018, time 11:00**

**When the offer is required electronically, the economic operators shall submit the offer electronically on the official PPA website [www.app.gov.al](http://www.app.gov.al).**



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<sup>1</sup> This annex is applicable for the limited and procedure with negotiation with preliminary announcement

**Annex 3**

*[Letter with the Bank logo / Insurance Company]*

*[ Annex to be submitted by the economic operator when is required by the Contracting Authority]*

**BID INSURANCE FORM**

[Date \_\_\_\_\_]

To: *[Name and address of the contracting authority]*

In the name of : *[Name and address of the insured bidder]*

Procurement procedure *[type of procedure]*

Publication *(if applicable)*: Public Announcement Bulletin *[Date]* *[Number]/ No. Reference on PPA website*

Referring to above-mentioned procedure,

We certify that *[name of the insured bidder]* has paid a deposit at *[name and address of the bank / insurance company]* with an amount of about *[currency and value expressed in letters and figure]* as a condition for insuring the bid, submitted by the above-mentioned economic operator.

We take responsibility of transferring the account of *[name of the contracting authority]* value of the guaranty, within 15 (fifteen) days from your simple first written request, without asking for explanations, with the condition that the request should mention the failure to meet one of the following conditions:

The bidder has withdrawn or changed the bid, after the final deadline of bids submission or before the final deadline, if determined in the bid documents;

The Bidder has refused to sign the procurement contract when the contracting authority requires such action;

The Bidder has not submitted the guaranty of the Contract, where the bid has been declared as the winner or has not met one of the other conditions before the signature of the Contract defined in tender’s documents.

This warranty is valid ( ) days from the date of completion of bid submission deadline on the PPA website.

[Bank Representative / Insurance Company]

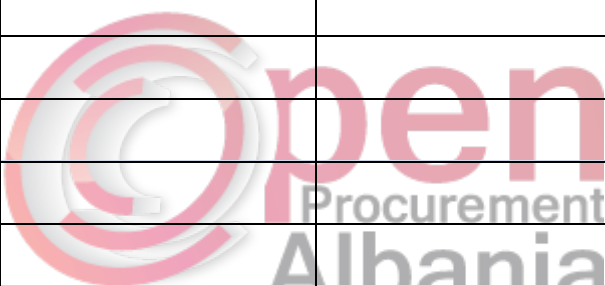
**Annex 4**

[ Annex to be filled by the Economic Operator]

**LIST OF CONFIDENTIAL INFORMATION**

(Mark the information you wish to remain confidential as following:)

Type, nature of information to be kept confidential	Number of pages and points of bid documents you wish to be kept confidential	Reasons why this information shall remain confidential	Deadline to keep this information confidential



**Annex 5**

[Annex to be filled in by the Economic Operator]

**DECLARATION OF COMPLETION OF REQUIREMENTS OF  
STANDARD DOCUMENTS OF PUBLIC PRIVATE CONCESSION / PARTNERSHIP**

Statement of the economic operator participating in the concession / public private partnership procedure that will be held on \_\_\_\_\_ by the Contracting Authority \_\_\_\_\_ subject to \_\_\_\_\_ me limit fund \_\_\_\_\_

I, the undersigned \_\_\_\_\_ in the capacity of the economic operator

\_\_\_\_\_ declare that:

We meet all the technical specifications set forth in the Concession / Public Private Concession documents and we accept them without reservation and no objection. We declare under our legal responsibility that we agree with all the technical specifications given and complete them as defined in the Concession / Public Private Partnership documents. We meet all the legal, financial and economic requirements as well as the technical specifications set out in the standard tender documents, and we certify this with certificates and documents submitted together with this statement.

Our offer is valid for the period specified in the standard document for the competitive procedure.

We will not participate as bidders in more than one bid for this competitive procedure.

We authorize the contracting authority to verify the information / documents attached to this offer.

In the event that our offer is accepted in, we will make the contract security, as provided in the standard tender documents of the competitive procedure.

If we will be announced the winners of the competitive procedure, we agree to sign the Contract under the terms of the contract.

Date of submission of statement \_\_\_\_\_

Bidder Representative

Signature

Seal

## Annex 6

[ Annex to be filled by the Economic Operator ]

### **DECLARATION** **On conflict of interests**

Declaration of the participating economic operator in the public procurement procedure to be held on \_\_\_\_\_ by the Contracting Authority \_\_\_\_\_ with object \_\_\_\_\_ limit fund \_\_\_\_\_.

Conflict of Interest is the state of conflict between public duty and private interests of an official, in which he/she has private interests, direct or indirect that may affect or seem to affect in unfair performance of its public tasks and responsibilities.

Based on article 21, item 1 of Law No. 9367, dated 07.04.2005, the categories of the following officials defined in Chapter III, Section II are absolutely forbidden to profit directly or indirectly by the signing of contracts with a public institution :

- President of the Republic, Prime Minister, Deputy Minister, Ministers or Deputy Ministers, Members of Parliament, Judges of Constitutional Court, Judges of Supreme Court, Head of Supreme State Audit, Attorney General, Judges and Prosecutors of First Instance Court and Court of Appeal, Ombudsman, Members of Central Election Commission, Inspector General of High Inspectorate of Declaration and Control of Assets and Conflict of Interests, Members of Regulatory Entities (Supervising Council of Bank of Albania, including the Governor and Deputy Governor; competitiveness, telecommunication, energy, water supply, insurances; bonds; media), Secretary Generals of central institutions, as well as any other official in every public institution, which is at least at the same level with director generals, heads of public administration, who are not part of civil service.

For middle level directors, according to articles 31 and officials envisaged in article 32 of chapter III, section 2 of this law, the banning according to item 1 of this law, due to private interests of the official envisaged in this point is implemented only for signature of contracts in the field of territory and jurisdiction of the institution where the official works. This banning is implemented also when the party is a subordinated institution.

When the official is in the capacity of the chairman of vice chairman of the municipality, commune or regional council, member of the respective council or is a high level official of a local government unit, the banning due to private interests of the official, envisaged in this item, is implemented only for the signature of contracts, according to the occasion, with the municipality, commune or regional council, where the official exercise these functions. This banning is implemented also when party in the contract is a public institution subordinated by this unit (article 21 item 2 of Law No. 9367, dated 07.04.2005).

The bans envisaged in article 21 item 1, 2 of Law No. 9367, dated 07.04.2005, with the respective exclusions, are implemented at the same level also for other persons related to the official, who in line with this law are: the spouse, partner, being of age children, parents of the official's spouse and partner.

I, the undersigned, \_\_\_\_\_, in the capacity of a juridical person \_\_\_\_\_ declare under my personal responsibility:

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

I am aware of the requests and bans envisaged by the Law No. 9367, dated 07.04.2005 “On prevention of conflict of interests in exercise of public functions”, changed, as well as by-legal acts issued for its implementation by the High Inspectorate of Declaration and Control of Assets”, as well as Law No. 9643, dated 20.11.2006 “On Public Procurement”, changed.

In compliance with them I declare that no official, listed in Chapter III, Section II of Law No. 9367, dated 7.4.2005, and in this declaration does not have private interests, directly or indirectly with the juridical person that I represent.

Date of submission of the declaration \_\_\_\_\_

**Name, Surname, Signature**

\_\_\_\_\_

**Seal**



**Annex 7**

[Annex to be submitted by the Economic Operator]

**EVALUATION FORM**

**(This form shall be accompanied by the Technical Control Act and IPR)**

Contracting Authority/Investor	
Address/Tel.	
Name of the head/Administrator	
<b>CERTIFY THAT</b>	
Contracting Authority/Investor has signed a contract with	
Name of the operator NIPT/  Union of operators NIPT-S/  Sub-contractors NIPT-s	
Addresses	
Object of the contract	
Date of the beginning of contract	Date of the end of the contract
Value according to the contract	The realized value
% of the union of the Economic Operators and description of works carried out by each member	
Subcontractors	
Assessment	In letters)
	Filled
	Not filled
<b>Signature</b>	
<b>Seal of the contracting authority</b>	

**Annex 8**

[Annex to be filled by the Economic Operator]

**ON THE AVAILABILITY OF MACHINERIES**

Economic Operator: \_\_\_\_\_

**Declare that I own the technical equipments and other physical assets to complete the contract:** \_\_\_\_\_

Owned				
Type of the machinery	Place	No. of Permit	No. Chassis	Others
1				
2				
3				
4				
5				

and

Rented					Deadline of the contract
Type	Plate	No of permit	Nr. Chassis	No. Leasing Contract (notary)	
1					
2					
3					
4					
5					
6					

• add/erase other lines if necessary .

We authorize the contracting authority to certify the information on this table.

**CONTACT PERSON (for this offer)**

Name:

Address:

No. Telephones:

Fax:

E-mail:

Signature, seal



## Annex 9

[Annex to be filled by the Contracting Authority]

### 1. GENERAL CRITERIA OF ACCEPTANCE/QUALIFICATION

Candidate/Bidder shall submit:

A document certifying that (your company):  
is not under a bankruptcy process,

- a) is not convicted for criminal violations, in line with article 45/1 of LPP,
- b) is not convicted with an absolute court decision regarding the professional activity, licensed by the National Registration Center.

The above-mentioned requirements are met with the submission of the Extract of Trade Registry about the Data of the Subject, Historic Extract of the Company, issued by the National Registration Office, as well as self-declaration of the company, according to Annex 10 “Declaration on Judicial State”.

A document certifying that (your company):  
has paid the fiscal obligations,

- a) has paid all the social insurances obligations issued by the Taxes Administration.

General Criteria for Acceptance shall not change by the Contracting Authorities. These criteria (item1,2) shall be certified through documents issued not prior to three months from the opening bid day.

3. Economic Operator shall be registered in the respective professional registries of the state where they were founded, certifying their legal personality – the candidates shall submit a copy of the extract on the history of the subject issued by the National Registration Center.

Candidate/Foreign Bidder shall certify that meets all the abovementioned criteria. If the abovementioned documents are not issued in their country, then he shall present a written declaration. If the language used in the procedure is Albanian, then the documents in foreign language shall be accompanied with a certified translation into Albania.

In case of unions of economic operators, every member of the group shall submit the abovementioned documents.

**Nevertheless, if the offer is submitted by an union of economic operators, there shall be submitted :**

Notarial certified agreement testifying the official establishment of union of economic operators ;

- a. Special Power of Attorney.

## 2. SPECIAL QUALIFICATION CRITERIA

1. To certify that economic operators are qualified, the bidder shall present:

- a. *Bid warranty, according to Annex 3;*
- b. *Declaration on completion of Technical Specification, according to Annex 5;*
- c. *Declaration on Conflict of Interest according to Annex 6;*
- ç. *Description of the offer filled and duly signed according to Annex 1;*
- d. *Evaluation form according to Annex 7;*
- e. *Declaration on availability of machineries according to Annex 8.*
- f. *Attestation confirming the payment of all obligation of electricity payment of the power contracts under his name in Albania.*

2. Candidate/Bidder shall submit :

### 2.1. Legal capacity of the economic operator

According to general criteria of acceptance and qualification .

### 2.2. Economic and Financial Capacity:

- a) To certify a sustainable positive activity, the economic operator shall submit a Certified Copy of Balance Sheets of the last 3 (three) years (2014,2015,2016), presented at the respective authorities of the Tax Paying Branch, confirmed by this authority and accompanied by the Act of Expertise of the Authorized Accountant.
- b) Copy of the declaration of annual turnover during the last three years (2014, 2015,2016) issued by the respective authority, average amount which shall not be less than 80 % of the value of the project, respectively : **1.142.340.780** (one billion one hundred forty two million three hundred forty thousand seven hundred eighty) **Leke without VAT**.
- c) Attestation for payment of local taxes for Tirana Municipality envisaged by Local Power for 2016, 2017;
- d) In case of union of economic operators, each member of the group shall submit the attestation issued by the respective authority in which has been registered at NCR.
- e) The bidder shall demonstrate through respective documents that owns or has at disposal active liquidities, immovable properties without burden, credit lines, as well as other financial means sufficient to meet the monetary flow of the construction for the contract for a five month period, estimated not less than 400.000.000 (four hundred million) leke, taking into account the engagement of the applicant for other contracts.

### 2.3 Technical Capacity :

**Regarding technical and professional ability, the Economic Operator shall meet the following minimal requirements set by the Contracting Authority :**

**Successful realization of at least:**

### **Experience in Construction**

Successful experience in execution of

Similar works for an object with a value not less than 30% of the amount of respective categories of the contract of concession/PPP and in concrete : **307.045.858** (three hundred seven million forty five thousand eight hundred fifty eight) leke without VAT, realized in the last three years .

**or**

Similar works up to a limit where the total monetary value of works all together carried in the last three years is not less than the double of the value calculated for the respective categories of the concession/PPP contract and in concrete : **2.046.972.390** (two billion forty six million nine hundred seventy two thousand three hundred and ninety) leke without VAT, realized in the last three years. .

The completion of one of these terms makes the offer valid.

**Evaluation of the successful experience of the Economic Operator shall be carried out based on the declaration of the following documents:**

For contracts realized with public entities, the economic operator shall present the following documents :

Declaration according to annex No.7, accompanied with :

Contract

Final Interim Payments Report ;

Certificate of handing in.

For Contracts realized in the private sector, the economic operator shall present the following documents:

Declaration according to annex No. 7, accompanied with:

Contract;

Final Interim Payment Report;

Certificate of handing in of the object;

Tax paying bill of each interim payment report .

*The abovementioned requirements in case of a union of economic operators shall be met by all members of the union regarding the percentage of their participation in the union.*

## **2. Experience in maintenance**

The economic operator or union of economic operators shall submit as following :

Similar services with the object of concession/PPP with a value not less than 10% of the value of the services envisaged in the project and concretely: **25.115.342**(twenty five million one hundred fifteen thousand three hundred forty two) leke without VAT realized in the last three years.

*To certify this the Economic Operator shall present :*

- a) When a similar service is performed with state institutions, the economic operator shall certify it by presenting the signed contract with the institution, accompanied by the situation for the services performed and the certificate issued by the State Institution for the complete and successful realization of this the contract, where the service duration is defined, the value of the service realized.
- b. When a similar service is performed with private entities, the economic operator shall certify this service by presenting the respective sales tax invoices (where the dates, amounts and services provided are clearly stated).

## **3. Experience in Designing**

The economic operator or the merger of economic operators shall submit the following:

1. Similar services realized during the last three years of the economic operator's activity, not less than 20% of the estimated value of the services provided in the project, and **5.056.649** (five million fifty six thousand six hundred and forty nine) Leke.

When the contracts are concluded with state institutions, the bidder must submit the contract related to the Institution accompanied by the certificates from the institution with which these contracts have been successfully signed, with the date, value and services realized.

When the contracts are concluded with private entities, the bidder must submit the sales tax invoices (where the dates, amounts, and services realized, signed and stamped by both parties) are clearly stated.

## **4. Experience in Furnishing and Placement of Furniture, Furnishings and Laboratory Equipment**

The economic operator must provide evidence of previous supplies, similar to the procurement object, carried out over the last three years, with a value not less than 20% of the estimated value of the experiment envisaged in the project or **22.948.286** (twenty million nine hundred

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

and forty eight thousand two hundred and eighty six) leke without VAT and that has been realized over the last three years.

When the contracts are executed with state institutions, the bidder must submit the contract related to the institution accompanied by the certificates from the institution with which these contracts have been successfully signed, with the date, value and services realized.

When the contracts are executed by private entities, the bidder must submit the sales tax invoices (where the dates, amounts, and services realized, signed and stamped by both parties) are clearly stated.

**Professional License related to the services object of the contract :**

**Professional Licenses of the company (valid) for design (issued by MZHUT) including the categories :**

- 2 / a (Architectural design for civil-industrial objects - tourist- works of art in infrastructure.)
- 2 / b (Architectural design for sports facilities)
- 2 / d (Landscape design, landscaping of green areas, parks and parks)
- 3 / a (Civil-industrial - tourist buildings of masonry and skeleton made of reinforced concrete up to 5 floors.)
- 3 / c (Facilities with high degree of difficulty – reinforced concrete - metal - 2. lands and slopes with low sustainability.)
- 4 / a (Plumbing installation.)
- 4 / b (Thermotechnical installations - ventilation - air conditioning.
- 4 / c (Electricity line - telephone - radiotelephone - intercom - alarm system - television etc, for civil, industrial, tourist facilities)
- 6 / a (Local roads, secondary urban roads and secondary interurban roads.)
- 8 / a (Basically geodetic - plans in all scales)
- 8 / b (Photogrammetric - cartographic - topographical design.)
- 9 / a (Study / Geodetic engineering assessment of the site for civil-economic objects up to 5 floors.)
- 10 / c (Electricity generation and distribution plants - solar - wind etc.)
- 10 / e (Electric Distribution Network - low voltage - medium voltage lines.)
- 11 / a (Local road signals, secondary urban roads and secondary interurban roads)

*Clarification: For licenses issued after the entry into force of Decision No. 943 dated 28.12.2016 "On Amendments and Amendments to Decision No. 759, dated 12.11.2014, of the Council of Ministers' On the Professional Licensing of Individuals and Legal Persons that will carry out activities in the field of study and design in construction and supervision and inspection of construction works, "Participating Economic Operator must submit a **valid Professional Company License** (issued by MZHUT), valid, including the above categories with the corresponding changes in the name.*

**2. Economic Operator shall present Professional Licenses of the main staff responsible for the implementation of the project in the following categories, accompanied with CV, individual working contracts (valid), as well as the following staff shall have experience at least for 5 years in the respective sectors.**

- Architect Designer with Cat 2 / a / b / d (2 / a (Architectural design for civil-industrial objects - tourist-artwork in infrastructure, architectural design for sport facilities, landscaping, landscaping green areas, parks and parks)
- Construction Designer with Cat 3 / a / c (Civil-industrial - tourist buildings of masonry and skeleton with reinforced concrete up to 5 floors, High difficulty facilities - reinforced concrete-metal - 2nd trowel and low persistence slope.)
- Installation Designer Cat 4 / a / b / c ((Kitchen Installation, Thermotechnical Installations - Ventilation - Air Conditioning, Electricity Line - Telephone - Radiotelephony - Interphone - Alarm System - TV etc for civil, industrial, tourist facilities)
- Railways-Road Designer with Cat 6 / a. (Local roads, secondary urban roads and secondary interurban roads.)
- Geodetic Designer Cat 8 / a / b (Geodetic Basis - Ramps on All Scales, Photogrammetric - Cartographic - Topographic Design).
- Geological Engineering – Hydrogeological Designer with Cat 9 / a (Survey / geological engineering assessment of land for civil-economic objects up to 5 floors)
- Designer of the Power Generation and Distribution Plants with Cat. 10 / c / e (Electricity generation and distribution plants - solar - wind etc., Electric distribution network cabins - low voltage - medium voltage lines.)
- Traffic Signal Designers with Cat11 / a (Local road signs, secondary urban roads and secondary interurban roads)

***A designer shall not be engaged at the same time in the staff of two companies participating in the PPP/concession procedure***

**4. Professional licenses related to the execution of works contracts:**

o The company's license valid for the following categories:

- NP - 1 A (excavation works on earth)
- N.P - 2F (Civil and industrial constructions).
- NP-3 C (Reconstruction and Maintenance of Civil and Industrial Buildings)

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- NP-11A (Buildings for N / Stations, transformer booms, medium voltage lines and power distribution)
- NP-12A (Environmental Engineering Works)
- NS1-A (Works for demolition of buildings)
- NS-2C (Hydro-sanitary Plants, Kitchens, Washers, Maintenance)
- NS-3A (Lifting Conveyor System)
- NS-4E (Masonry and related finishing works, finishes of wood, plastics, metal and glass finishes and finishes of technical construction)
- NS-8A (reinforced concrete constructions, metal and wood structures)
- NS-9C (Special Structural Works)
- NS-12 A (Technological, thermal and air conditioning plants)
- NS-13A (Implementation of telephone lines and telecommunication systems)
- NS-14A (domestic, electrical, telephone, radiotelephone, TV, etc.)
- NS-18A (Topogeodic Works).
- NS-19A (Noise-Isolation Systems for Infrastructure Projects)

according to the model issued by MoPWT;

3. Bidder candidate shall define with a declaration from administrator of the company four technical directors of works in a object (each technical director shall have a 5 (five) year period of work experience reflected in the relevant CV) included in the company's license and declare that they will be present during the entire time of works in the respective objects, accompanied by the following documentation:

- i. Respective CV
- ii. Working Contract (respective)
- iii. Diploma

4. An average employment of at least 250 (two hundred and fifty) persons, for the period October 2015 - October 2017 certified by ;

4.1 Attestation issued by Social Insurances or Taxes Administration, where is specified the number of employees for each month, for October 2015 - October 2017

4.2 Payrolls of the employees according to the format required by the applicable legislation for the period October 2015 - October 2017 accompanied by the forms for declaration of social security and health insurance.

5. The participating economic operator shall have in the staff and in the payrolls of the company for at least in the last six months, certified by a valid working contract, diploma and CV the following:

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Architect 2 (two)

- Civil Engineer 2 (two)
- Hydro-technical Engineer 1(one)
- Topographic Engineer /Geodesist 1(one)
- Environmental Engineer 1(one)
- Mechanical Engineer 1(one)
- Geologic Engineer 1(one)
- Electrical Engineer 1(one)

5.1 To have in the staff of employees reflected in the payrolls of the company in the last six months at least **40 (forty) employees** equipped with qualification attestations of technical security from ISHTI or other equivalent institutions, where shall be at least :

Group I- 10 (ten) employees

Group II-24 (twenty-four) employees

Group III- 2(two) employees

Group IV-2 (two) employees

Group V- 2 (two) employees



**(For the abovementioned employees shall be submitted respective qualification attestation of technical security)**

- *The bidding Economic Operator shall have as employees at least 4 (four) heavy equipment drivers. For these workers, there shall be presented a valid working contract, driving licenses (valid), issued by the respective institutions and be in the payrolls of the company in the last six months, for heavy equipment workers shall also submit the driving licenses, where three of them shall be for automachine drivers, three for excavators, issued from the respective institutions)*

To have as employees and reflected in the payrolls of the company:

- a. Engineer – Energy Auditor 1 (one) person (equipped with Energy Auditing Certificate)
- b. Certified fire-fighter expert 1 (one) person



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- (For the energy efficiency engineer, the following proof documents must be provided: Work contract (valid for at least the anticipated construction period), Certificate of Power Efficiency, Diploma for firefighter expert certificate of firefighter expert and the Contract of employment (valid for at least the estimated construction period)
  
  - The bidding economic operator must have 1 (one) medical practitioner, confirmed by the submission of a doctor's order, diploma, CV, workbook and work contract of the physician with the economic operator valid for the construction period and appear on the payroll of the company for at least the last six months.
6. The company must present the ISO 9001- 2008 (Quality Management System) Certificate (valid).
  7. The association must present the ISO 14001-2004 (Environmental Management System) Certificate (valid).
  8. The association should submit a certificate OHSAS 18001-2007 (Occupational Health and Safety Management System) (valid)
  9. The company must present a certificate PAS 99-2012 (Integrated Management System) (valid)
  11. The association must present an ISO 27001-2013 (Information Security Management System) certificate (valid)
  12. The company must submit a certificate ISO 50001-2011 (Energy Management System) (valid)
  13. The company must present an ISO certificate EN 3843-2-2006 (Welding Handling Quality Management) (valid)
  14. Participating Economic Operators in this Concession / PPP Procedure should submit product certifications conforming to European Standards for the respective items as follows:
    - 1.Students bench) low cycle, secondary EN 1729-1: 2006, EN 1729-2: 2006
    - 2.School student low, middle and high cycle EN 1729-1: 2006, EN 1729-2: 2006
    - 3.Cupboard / Bookshelves EN 14073-3: 2004:
    4. Teachers' chairs EN 1335-1: 2000, EN 1335-2: 2009, EN 1335-3: 2009
    - 5.Writing Board (black board) EN 71-3: 2014
  15. Certificates are required to be valid at the time of tender procedure and be accompanied by an Albanian translation, notarized in the form required for Albanian economic operators. In case of merger of economic operators it is sufficient for one member of the union to have the above certificates.
  16. Participating Economic Operators must have at least 1 (one) certified wood engineer certified by a diploma, CV and contract (valid for at least the estimated investment period) at their staff and result in a payroll for the last six months .
  17. The bidding entity must declare the guarantee of the goods which should be not less than one year.
  18. Operator shall have in the technical staff included in the payrolls for the last six months a telecommunication or electronic engineer, employed, certified by
    - CV,
    - Working Contract,
    - University Diplomas.

**19. Attestation for technical equipments at the disposal that may be put at the disposal of the economic operator for the execution of the contract ( annex 8)**

<i>Machineries</i>	<i>Quantity</i>	<i>Situation</i>
Towing truck (capacity for each truck a minimum of 15(fifteen) tons and maximum 22(twenty two) tones	5 pieces	Owned or rented
Backhoe loader with tires	2 piece	Owned or rented
Auto crane with a basket	1 pieces	Owned or rented
Moto generator	3 pieces	Owned or rented
Excavator with rubber 0.5 (m3)	2 pieces	Owned or rented
Small truck with a holding capacity of minimum 2 tones and maximum 5 tones	4 pieces	Owned or rented
Auto concrete machinery	3 piece	Owned or rented
Small backhoe loader/mini backhoe loader	2 pieces	Owned or rented
Tank truck for water	3 pieces	Owned or rented
Towing truck (holding capacity minimum 3.5 (three point five) tones and maximum 5 (five) tones per each truck)	5 pieces	Owned or rented
Generator	3 pieces	Owned or rented
Mini-excavator	2 pieces	Owned or rented
Concrete auto pump	2 pieces	Owned or rented
Milling machine for asphalt	1 piece	Owned or rented
Geodetic optical measuring device for geodetic works	2 pieces	Owned or rented
Truck with crane	2 piece	Owned or rented
Concrete-form maker	1500 m2	Owned or rented
Jackhammer	4 pieces	Owned or rented
Concrete Vibrator	3 pieces	Owned or rented
Water tank (500 L each)	4 pieces	Owned or rented
Metal scaffold (H shaped) completed with protective parapets and protective mesh for façade works	1500 m2	Owned or rented
Asphalt cutter	1 piece	Owned or rented
Welding machine	2 pieces	Owned or rented
Water tank	1 piece	Owned or rented
Concrete fabrication machine	1 piece	Owned or rented
Asphalt compactor rubber roller with vibrant compression	2 pieces	Owned or rented
Asphalt compactor for vibrant compression	1 piece	Owned or rented
Tower crane min 30 ml holding at least 850 kg in 35 ml distance	2 pieces	Owned or rented
Asphalt paving machine	1 piece	Owned or rented

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Bitumen spraying machine	1 piece	Owned or rented
Soil compacting machine (fuel or electric engine)	1 piece	Owned or rented
Mortaring pump	1 piece	Owned or rented

Submission of workers and personnel protection equipment at work as follows:

- Head protection minimum 100 pieces
- Safety connector for work pieces with a minimum height of 10 pieces
- Portable fire extinguisher with a capacity of 5-7 liters each minimum 10 pieces
- Light floodlights at night minimum 10points –
- Fastest set of at least 10 pieces
- Minimum security warning table for 20 items

a) *For vehicles registered in public registers, the document certifying the registration of the vehicle (traffic permit), plus the certificate of technical control and validation of the vehicle (valid), and the secured means of rent shall be submitted, the document certifying the registration of the vehicle his / her plus the certificate of technical control and vehicle insurance (valid) shall be accompanied by the relevant rental / supply contract, valid for the whole period of performance of the contract subject to this procurement. In the case of other means must be clearance acts or purchase tax bills.*

b) *For documents not evidenced in public registers, documents proving their ownership must be submitted.*

c) *For leased vehicles to be presented the relevant notarial contract of rent specifying the scope of the contract and its term.*

*For the concrete production plant, in case it is owned, the property act accompanied by an environmental permit issued by NLC must be submitted. If the economic operator has a lease agreement, the leaseholder's act accompanied by the environmental permit issued by the NLC must be submitted. The rental contract must be notarized, specifying the scope of the contract and its term*

(a) *The economic operator must submit a photograph of each declared means where it is visible and the vehicle's license plate.*

b) The Contracting Authority reserves the right to verify and control at any time up to the termination of the contract the technical equipment and equipment declared under Annex no. 8. (Declaration by the Bidder's Administrator).

c) The above machines are not engaged in other contracts and are not declared in the procedures announced by the contracting authority, the Municipality of Tirana. (Declaration by the administrator of the bidder where to declare and the location of the assets owned or rented for verification purposes).

d) (option) A site visit will be organized up to date 10.01.2018 so that Economic Operators can be familiarized with local conditions. The interested Economic Operator must confirm in advance its intention in writing to attend this visit. During the visit, additional information and explanations will be provided. All costs of Economic Operators associated with site visit should be covered by them. Without prejudice to the foregoing, and with the costs of its own risks, an economic operator may visit the site of the site at any time, if such is possible. To arrange a visit to the site, please send a letter to the Tirana Municipal Procurement Directorate.

**Vo: Economic Operators participating in the concessionary/PPP procedure shall offer the Contracting Authority three supervision companies, and three technical supervisor (physical or juridical person), in case of winning this procedure, the Contracting Authority shall have the right to select who will supervise the works, and carry out the technical control of the objects. For the supervision companies, the Economic Operator shall present the following documents :**

• Professional license for "Surveillance and Surveillance of Enforcement Works" valid, including the following categories (according to the model issued by the MPWT) or valid cooperation agreement with licensed companies or engineers for these categories:

- NP-1 (excavation works on land)
- N.P - 2 (Civil and industrial constructions.
- NP-3 (Reconstruction and Maintenance of Civil and Industrial Buildings)
- NP-11 (Constructions for N / Stations, transformer, medium voltage lines and power distribution)
- NP-12 (Environmental Engineering Works)
- NS-1 (Works for demolition of buildings)
- NS-2 (Hydro-sanitary Plants, Kitchens, Washers, Maintenance)
- NS-3 (Lifting Conveyor System)
- NS-4 (Masonry and related finishing works, finishes of wood, plastics, metal and glass finishes and finishes of technical construction)
- NS-8 (reinforced concrete constructions, metal and wood structures)
- NS-9 (Special Structural Works)
- NS-12 (Technological, thermal and air conditioning plants)
- NS-13A (Implementation of telephone lines and telecommunication systems)
- NS-14 (domestic, electrical, telephone, radiotelephone, TV, etc.)
- NS-18 (Works of Topography).
- NS-19 (Noise Isolation Systems for Infrastructure Projects)

*Clarification: For licenses issued after the entry into force of Decision No. 943 dated 28.12.2016 "On Amendments and Amendments to Decision No. 759, dated 12.11.2014, of the Council of Ministers' On the Professional Licensing of Individuals and Legal Persons which will carry out activities in the field of study and design in construction and supervision and*

*inspection of construction works ", the participating economic operator should submit a valid Professional Surveillance and Surveillance Application License, including the categories of above with the relevant changes in the name.*

**As well as**

- **Experience in works supervisions**

1. Services similar to the procurement object with a value of 40% of the estimated value of the services provided in the project and concretely **4.673.321** (four million six hundred seventy three thousand three hundred and twenty one) leke without VAT, realized during the last three years.

To prove this Economic Operator must submit:

a) When a similar service is performed with state institutions, the economic operator shall certify by submitting the signed contract with the institution, accompanied by the situation for the services performed and the certificate issued by the State Institution for the complete and successful realization of this the contract, where the service duration is defined, the value of the service realized.

b) When similar service is carried out with private entities, the economic operator shall certify this service by presenting the relevant sales tax invoices (where the dates, amounts and services rendered clearly stated).

**(For foreign operators, the documents shall be presented in line with the legislation of the Republic of Albania. In case of failure to issue the documents in the country of origin as defined in the General and Special Criteria, the abovementioned requirements shall be arranged according to the legislation in their country of origin, i.e the foreign economic operator shall submit equivalent documents with them or a written declaration. In case of the submission of the bid or documents envisaged in the Special Criteria of Qualification, in a different currency from the one applied in the Republic of Albania, the economic operators shall be subject of the exchange rate declared by the Bank of Albania on the day of the publication of the procedure on the PPA electronic system.**

**All documents shall be the original or certified copies. Cases of failure to submit a document, or submission of face, irregular documents are considered as reasons for disqualification.**

**Annex 10**

*[Annex to be filled by the Economic Operator]*

**DECLARATION ON JUDICIAL STATE**

Declaration of the economic operator participating in the procurement procedure to be held on \_\_\_\_\_ by the Contracting Authority \_\_\_\_\_ with the object \_\_\_\_\_ limit fund \_\_\_\_\_.

I, the undersigned, \_\_\_\_\_ in the capacity \_\_\_\_\_ of the economic operator \_\_\_\_\_ declare that :

Economic operator \_\_\_\_\_ is not convicted for criminal offenses, in line with article 45/1 of LPP,

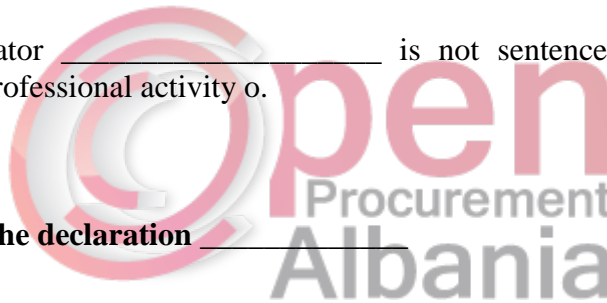
Economic Operator \_\_\_\_\_ is not sentenced by an absolute court decision related to the professional activity o.

**Date of submission of the declaration** \_\_\_\_\_

**Representative of the bidder**

**Signature**

**Seal**



**Annex 11**

*[Annex to be filled in by the Contracting Authority]*

**EVALUATION CRITERIA**

Bids will be evaluated on the basis of the following criteria, and the winner will be considered the bidder who has more points based on the evaluation criteria.

The Bid Evaluation Commission will evaluate the Technical and Financial Bids, based on the following criteria:

**EVALUATION OF BIDS**

Evaluation criteria are as following:

No.	Criterion	Result Max.	Minimal Threshold/ Passing Result
TC1	General Idea and Concept of the project	5	1
TC2	Selection of architectonic typology of schools  <i>-establishment of the object on the ground</i>  <i>- relation with the urban context and public space</i>  <i>-relation between external and internal space</i>	10	3
TC3	Solution of organization of envisaged functions  <i>-solution offered for functional organization</i>  <i>- planning solution and natural light</i>  <i>- scheme of movement of the disabled</i>  <i>-integration of the kindergarten with the nine year school</i>	10	3
TC4	Concept of school as a community center	10	3
TC5	Innovative techniques in the field of energy saving	5	1
TC6	The used materials	10	3

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

	<b>TOTAL TECHNICAL CRITERIA</b>	<b>50</b>	
FC1	Economic Offer for design, building, furniture and maintenance	30	
FC2	Economic offer for maintenance until the end of the contract	5	
FC3	Economic offer with the income margin	15	
	<b>TOTAL FINANCIAL CRITERIA</b>	<b>50</b>	
	<b>TOTAL</b>	<b>100</b>	





## TECHNICAL CRITERIA

### **TC1: General idea and concept of project - 5 points (minimum threshold / crossing result - 1 point)**

Bidders will be assessed on the basis of the concept of the project presented and the set of ideas that generate the final form of the object and the spaces around it. Bidders must present a detailed elaboration from the original idea to the final solution of the project. The concept of the project will be assessed on the basis of the relationship and interaction of the exterior with the interior.

### **TC2: School architectural typology solution - 10 points (minimum threshold / passing score - 3 points)**

Architectural typology is related to the layout of objects in horizontality and verticality, and the submitted offers will be evaluated taking into consideration the following elements:

- planning the field of the objects, taking into account the orientation to the light, the shade where necessary, the organization of yards and playgrounds.
- urban context and public space relations where the project ideas presented will be evaluated for the proposed architecture report with the existing construction on the ground as well as the role that it will play in revitalizing existing public spaces and shaping new spaces - between exterior spaces and interior spaces where assessment will be made on the basis of the solution offered for a better interaction between the internal functions of schools (classrooms, corridors, laboratories, etc.) with external functions (courtyards, playgrounds , recreational spaces, etc.)

### **TC3: Predicted Function Organization Solution - 10 points (minimum threshold / crossing result - 3 points)**

Bids will be evaluated for the organization of the functions contemplated in the design task, based on the following elements:

- the solution offered to the functional organization where the organization scheme of the teaching facilities, classes, laboratories as well as all supporting spaces will be evaluated
- planned planimetry and natural light where internal organization will be evaluated as compared to diurnal, shadowing and orientation of indoor spaces to minimize noise from surrounding environments
- Disability Scheme for Persons with Disabilities which will assess the scheme of access of these persons to the external and internal environment of the school
- integrating the kindergarten with the 9-year school

### **TC4: Concept of School as a Community Center - 10 points (minimum threshold / passing score - 3 points)**

Income will be assessed with the aim of multifunctionality of school facilities. Project ideas will be evaluated as to how much the community service will be after-office post-office structures. Projects should provide solutions that give the opportunity for certain parts of the premises to be used by the community separate from the learning environments.

**TC5: Innovative techniques in the field of energy saving - 5 points (minimum threshold / crossing result - 1 point)**

Bids will be evaluated for the proposed energy efficiency scheme and proposed energy saving techniques, including heating, cooling and aspiration systems, as well as the proposed layers for perimeter walls, floors and terraces.

**TC6: Used Materials - 10 points (minimum threshold / crossing result - 3 points)**

Project ideas will be accompanied by a preliminary estimate where the proposed building materials will be evaluated for their quality, need for maintenance, durability, aesthetics and durability to fire and atmospheric agents.

**TC: TECHNICAL RESULT – maximum 50 points**

$$TC_i = TC1_i + TC2_i + TC3_i + TC4_i + TC5_i + TC6_i$$

**FINANCIAL CRITERIA**

**FC1: Economic bid for design, building, construction, furniture and supervision – maximum 30 points**

Result for the economic bid for design, construction, furniture, supervision and technical control is calculated as following :

$$FC1_i = 30 \times C/C_u$$

where:

FC1<sub>i</sub> = Total points for economic offer

C = price of the lower bid

C<sub>u</sub> = price of next bid

When the economic bid surpasses the limit fund, the offer will be excluded as non-responsible.

**FC2: Economic bid for maintenance until the end of contract – max 5 points**

Result for the economic bid for maintenance until the end of the contract is calculated as following :

$$FC2_i = 5 \times CM/CM_u$$

Where:

FC2i = Total points for economic offer

CM = price of the lower bid

CMu = price of next bid

**FC3: Economic bid for income margin – max 15 points**

Result for the economic bid for income margin (max 6.28%) is calculated as following :

$$FC3i = 15 \times MF/MFu$$

Where:

FC3i = Total points for economic offer

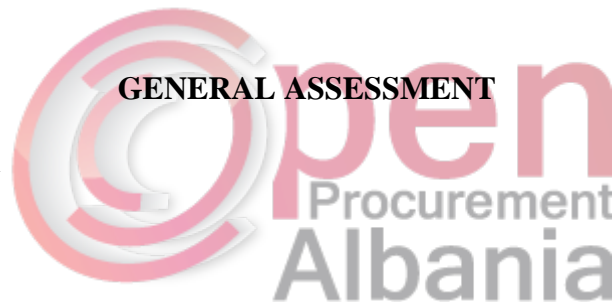
MF = price of the lower bid

MFu = price of next bid

**FC: FINANCIAL RESULT – max 50 points**

$$FCi = FC1i + FC2i + FC3i$$

$$\text{Total points} = TCi + FCi$$



**Annex 12**

[Annex to be filled by the Foreign Economic Operator ]

**SELF-DECLARATION OF FOREIGN BIDDERS**

For participation in procedures for concession/PPP of “\_”

Date

For : [Date]

[Name of bidder /Leading Member of Interim Union) declare and guarantee that on the date of this letter [Name of bidder /Leading Member of Interim Union] and each member of the Interim Union (if necessary)

- (a) have not been subject of bankruptcy or liquidation procedures;
- (b) not convicted for criminal violation;
- (c) not convicted with an absolute court decision related to professional activity
- (d) capital/assets are not subject of Bailiff Office or under burden ;
- (e) has met all the fiscal obligations ;
- (f) has completed all the social insurances obligations

**Respectfully**

Signature of the Authorized Person

Name and Position of signatory

Name of Bidder/Head of Temporary Union

Address



BASHKIA  
TIRANË

## Tirana Municipality

### GENERAL DIRECTORATE OF PUBLIC WORKS

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1.

2.

3.

4.

5.

DESIGNING TASKS

6.

7. FOR REALIZATION OF STUDY AND DESIGN

“New construction of Type 1 school in Administrative Unit no. 8  
(Site 8/1)



**8. TABLE OF Contents**

<u>9.</u>	<u>DESIGNING TASK</u>	<u>45</u>
<u>10.</u>	<u>1..... GENERAL DATA AND EXISTING SITUATION OF THE OBJECT</u>	<u>47</u>
<u>11.</u>	<u>2. ....GENERAL DESIGNING REQUIREMENTS FOR SCHOOL CONSTRUCTION</u>	<u>71</u>
<u>12.</u>	<u>Main space</u>	<u>2.1</u> <u>72</u>
<u>13.</u>	<u>Teaching classes</u>	<u>2.1.1</u> <u>72</u>
<u>14.</u>	<u>Laboratories</u>	<u>2.1.2</u> <u>Error! Bookmark not defined.</u>
<u>15.</u>	<u>Furniture</u>	<u>2.1.3</u> <u>Error! Bookmark not defined.</u>
<u>16.</u>	<u>Laboratories</u>	<u>2.1.4</u> <u>Error! Bookmark not defined.</u>
<u>17.</u>	<u>Working space</u>	<u>2.1.5</u> <u>83</u>
<u>18.</u>	<u>Music and dancing halls</u>	<u>2.1.6</u> <u>Error! Bookmark not defined.</u>
<u>19.</u>	<u>Social space</u>	<u>2.2</u> <u>89</u>
<u>20.</u>	<u>Libraries</u>	<u>2.2.1</u> <u>89</u>
<u>21.</u>	<u>Multi-purpose space</u>	<u>2.2.2</u> <u>Error! Bookmark not defined.</u>

<u>22.</u>	<u>2.2.3</u>
<u>Space for physical education</u>	<u>97</u>
<u>23.</u>	<u>2.3</u>
<u>Administrative space</u>	<u>98</u>
<u>24.</u>	<u>2.3.1</u>
<u>Headmaster’s Office / Deputy Headmaster’s Office</u>	<u>79</u>
<u>25.</u>	<u>2.3.2</u>
<u>Secretariat / administration rooms</u>	<u>98</u>
<u>26.</u>	<u>2.3.3</u>
<u>Teachers’ room</u>	<u>99</u>
<u>27.</u>	<u>2.3.4</u>
<u>Assisting Staff</u>	<u>100</u>
<u>28.</u>	<u>2.4</u>
<u>Other facilities</u>	<u>100</u>
<u>29.</u>	<u>2.4.1</u>
<u>Hygiene-sanitary venues</u>	<u>100</u>
<u>30.</u>	<u>2.4.2</u>
<u>Office of the physician</u>	<u>Error! Bookmark not defined.</u>
<u>31.</u>	<u>2.4.3</u>
<u>Office of the psychologist</u>	<u>Error! Bookmark not defined.</u>
<u>32.</u>	<u>2.5</u>
<u>Communication spaces, entrances, staircase, corridors, halls</u>	<u>Error! Bookmark not defined.</u>
<u>33.</u>	<u>2.5.1</u>
<u>Corridors</u>	<u>Error! Bookmark not defined.</u>
<u>34.</u>	<u>2.5.2</u>
<u>Staircase</u>	<u>Error! Bookmark not defined.</u>



<u>35.</u>	<u>Elevator</u>	<u>2.5.3</u>
	<u>Error! Bookmark not defined.</u>	
<u>36.</u>	<u>Hall</u>	<u>2.5.4</u>
	<u>Error! Bookmark not defined.</u>	
<u>37.</u>	<u>Storeroom, additional corners</u>	<u>2.5.5</u>
	<u>Error! Bookmark not defined.</u>	
<u>38.</u>	<u>Wardrobe</u>	<u>2.5.6</u>
	<u>Error! Bookmark not defined.</u>	
<u>39.</u>	<u>3</u>	<u>FURNITURE AND EQUIPMENT</u>
	<u>Error! Bookmark not defined.</u>	
<u>40.</u>	<u>Antropometry and furniture dimensions</u>	<u>3.1</u>
	<u>Error! Bookmark not defined.</u>	
<u>41.</u>	<u>4</u>	<u>SPECIAL REQUIREMENTS</u>
	<u>Error! Bookmark not defined.</u>	
<u>42.</u>	<u>Design for people with disabilities</u>	<u>4.1</u>
	<u>Error! Bookmark not defined.</u>	
<u>43.</u>	<u>School as a Community Center</u>	<u>4.2</u>
	<u>Error! Bookmark not defined.</u>	
<u>44.</u>	<u>Thermal Amenity (Temperature)</u>	<u>4.3</u>
	<u>Error! Bookmark not defined.</u>	
<u>45.</u>	<u>Definitions and Terminology</u>	<u>4.3.1</u>
	<u>Error! Bookmark not defined.</u>	
<u>46.</u>	<u>Improvement of thermal amenity</u>	<u>4.3.2</u>
	<u>Error! Bookmark not defined.</u>	

<u>47.</u> .....	<u>4.3.3</u>
<u>Active control of temperature</u> .....	<u>Error! Bookmark not defined.</u>
<u>48.</u> .....	<u>4.3.4</u>
<u>Temperature and humidity levels</u> .....	<u>Error! Bookmark not defined.</u>
<u>49.</u> .....	<u>4.3.5</u>
<u>Isolation standard</u> .....	<u>Error! Bookmark not defined.</u>
<u>50.</u> .....	<u>4.3.6</u>
<u>Thermal bridges</u> .....	<u>Error! Bookmark not defined.</u>
<u>51.</u> .....	<u>4.3.7</u>
<u>Requirements of U values (W/m<sup>2</sup>K)(thermal transmittance coefficient)</u> .....	<u>Error! Bookmark not defined.</u>
<u>52.</u> .....	<u>4.3.8</u>
<u>Windows and Doors</u> .....	<u>Error! Bookmark not defined.</u>
<u>53.</u> .....	<u>4.3.9</u>
<u>Passive control of temperature</u> .....	<u>Error! Bookmark not defined.</u>
<u>54.</u> .....	<u>4.4</u>
<u>Visual Amenity</u> .....	<u>152</u>
<u>55.</u> .....	<u>4.5</u>
<u>Sound Amenity</u> .....	<u>154</u>
<u>56.</u> .....	<u>4.6</u>
<u>Colors and their usage</u> .....	<u>Error! Bookmark not defined.</u>
<u>57.</u> .....	<u>4.6.1</u>
<u>Meaning of colors</u> .....	<u>Error! Bookmark not defined.</u>
<u>58.</u> .....	<u>4.6.2</u>
<u>Use of colors</u> .....	<u>Error! Bookmark not defined.</u>

<b>59.</b>	<b><u>5..... PLANT DESIGN AND INSTALLATIONS</u></b>	<b>Error!</b>
	<u>Bookmark not defined.</u>	
<b>60.</b>	.....	<b>5.1</b>
	<u>Standards for electrical projects .....</u>	<u>Error! Bookmark not defined.</u>
<b>61.</b>	.....	<b>5.2</b>
	<u>Mechanical plant.....</u>	<u>Error! Bookmark not defined.</u>
<b>62.</b>	.....	<b>5.3</b>
	<u>Fire protection installation .....</u>	<u>Error! Bookmark not defined.</u>
<b>63.</b>	.....	<b>5.4</b>
	<u>Sanitary cold water supply system .....</u>	<u>Error! Bookmark not defined.</u>
<b>64.</b>	.....	<b>5.5</b>
	<u>Sanitary hot water system .....</u>	<u>Error! Bookmark not defined.</u>
<b>65.</b>	.....	<b>5.6</b>
	<u>Sewerage system .....</u>	<u>Error! Bookmark not defined.</u>
<b>66.</b>	.....	<b>5.7</b>
	<u>Plant for draining of rain and waste waters .....</u>	<u>Error! Bookmark not defined.</u>
<b>67.</b>	.....	<b>5.8</b>
	<u>Heating, Ventilation and air-conditioning (H.V.A.C) .....</u>	<u>Error! Bookmark not defined.</u>
<b>68.</b>	.....	<b>5.9</b>
	<u>Fire protection plant .....</u>	<u>Error! Bookmark not defined.</u>
<b>69.</b>	.....	<b>5.9.1</b>
	<u>Passive Protection .....</u>	<u>Error! Bookmark not defined.</u>
<b>70.</b>	.....	<b>5.9.2</b>
	<u>Active Protection.....</u>	<u>Error! Bookmark not defined.</u>



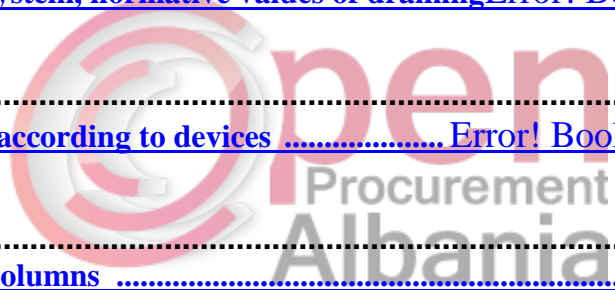
<u>71.</u> .....	<u>5.9.3</u>
<u>Terms and graphic definitions of signal charts technical symbols</u>	<u>Error! Bookmark not defined.</u>
<u>72.</u> .....	<u>5.9.4</u>
<u>Terms and terminology of construction elements, distances, rescue ways, evacuation of smokes and active tools of fire alert-detection and extinguishing</u> .....	<u>Error! Bookmark not defined.</u>
<u>73.</u> .....	<u>5.9.5</u>
<u>Classification of fire dangel level</u> .....	<u>Error! Bookmark not defined.</u>
<u>74.</u> .....	<u>5.9.6</u>
<u>Hand-held (vessels) fire extinguisher</u> .....	<u>Error! Bookmark not defined.</u>
<u>75.</u> .....	<u>5.9.7</u>
<u>Half-portable system (hydrants, naspot) of fire extinguishing</u> .....	<u>61</u>
<u>76.</u> .....	<u>5.9.8</u>
<u>Fire Sprinkler System</u> .....	<u>Error! Bookmark not defined.</u>
<u>77.</u> .....	<u>5.9.9</u>
<u>Pressured Plants and water reserve for fire extinguishing</u>	<u>Error! Bookmark not defined.</u>
<u>78.</u> .....	<u>5.9.10</u>
<u>Distribution network, main installation and design components</u>	<u>Error! Bookmark not defined.</u>
<u>79.</u> .....	<u>5.9.11</u>
<u>Smoke and evacuation control system</u> .....	<u>Error! Bookmark not defined.</u>
<u>80.</u> .....	<u>5.9.12</u>
<u>Graphic presentation of additional necessary documents in drafting Mechanical Project of Fire Protection</u> .....	<u>Error! Bookmark not defined.</u>
<u>81.</u> .....	<u>5.9.13</u>
<u>Role and duties of staff in recognizing, maintaining and using fire extinguisher tools and action in case of a fire</u> .....	<u>Error! Bookmark not defined.</u>

defined.

<u>82.</u> .....	<u>5.9.14</u>
<u>Standards, norms and international and national normatives</u> Error! Bookmark not defined.	
<u>83.</u> .....	<u>5.10</u>
<u>Cold hydro/sanitary (H/S) water supply plant</u> ..... Error! Bookmark not defined.	
<u>84.</u> .....	<u>5.10.1</u>
<u>Use of cold sanitary water</u> ..... Error! Bookmark not defined.	
<u>85.</u> .....	<u>5.10.2</u>
<u>Need for cold hydro/sanitary water</u> ..... Error! Bookmark not defined.	
<u>86.</u> .....	<u>5.10.3</u>
<u>Methods of primary water supply and provision of reserve water</u> Error! Bookmark not defined.	
<u>87.</u> .....	<u>5.10.4</u>
<u>Pumping station</u> ..... Error! Bookmark not defined.	
<u>88.</u> .....	<u>5.10.5</u>
<u>Distribution network and components of design and installation</u> Error! Bookmark not defined.	
<u>89.</u> .....	<u>5.10.6</u>
<u>Pipes materials and installation and design components of internal network</u> Error! Bookmark not defined.	
<u>90.</u> .....	<u>5.10.7</u>
<u>Filtration of sanitary water</u> ..... Error! Bookmark not defined.	
<u>91.</u> .....	<u>5.10.8</u>
<u>Design and installation of hot sanitary water</u> ..... Error! Bookmark not defined.	
<u>92.</u> .....	<u>5.10.9</u>
<u>Parameters of hot sanitary water</u> ..... Error! Bookmark not defined.	
<u>93.</u> .....	<u>5.10.10</u>
<u>Needs for hot sanitary water accordign to standards</u> ..... Error! Bookmark not defined.	



<u>94.</u> .....	<u>5.10.11</u>
<u>Preparation of hot sanitary water .....</u>	<u>Error! Bookmark not defined.</u>
<u>95.</u> .....	<u>5.10.12</u>
<u>Dimensioning of hot sanitary water .....</u>	<u>Error! Bookmark not defined.</u>
<u>96.</u> .....	<u>5.10.13</u>
<u>Network Distribution, installation components .....</u>	<u>Error! Bookmark not defined.</u>
<u>97.</u> .....	<u>5. 11</u>
<u>Sewerage and wastewater plant .....</u>	<u>Error! Bookmark not defined.</u>
<u>98.</u> .....	<u>5.11.1</u>
<u>Classification of drained waters .....</u>	<u>Error! Bookmark not defined.</u>
<u>99.</u> .....	<u>5.11.2</u>
<u>Dimensioning of draining system, normative values of draining</u>	<u>Error! Bookmark not defined.</u>
<u>100.</u> .....	<u>5.11.3</u>
<u>Values of draining units according to devices .....</u>	<u>Error! Bookmark not defined.</u>
<u>101.</u> .....	<u>5.11.4</u>
<u>Dimensions of draining columns .....</u>	<u>173</u>
<u>102.</u> .....	<u>5.11.5</u>
<u>Ventilation of draining networks.....</u>	<u>174</u>
<u>103.</u> .....	<u>5.11.6</u>
<u>Treatment of drained waters .....</u>	<u>Error! Bookmark not defined.</u>
<u>104.</u> .....	<u>5.11.7</u>
<u>Materials of pipes and main components of draining .....</u>	<u>Error! Bookmark not defined.</u>
<u>105.</u> .....	<u>5.12</u>
<u>Heating, ventilation and air-conditioning system (H.V.A.C) ..</u>	<u>Error! Bookmark not defined.</u>



<b>106.</b> .....	<b>5.12.1</b>
<b><u>Meteorological data and external conditions of the environment</u></b> .Error! Bookmark not defined.	
<b>107.</b> .....	<b>5.13</b>
<b><u>Designing Conditions</u></b> ..... Error! Bookmark not defined.	
<b>108.</b> .....	<b>5.13.1</b>
<b><u>Designing Norms and recommended values of temperatures of premises</u></b> Error! Bookmark not defined.	
<b>109.</b> .....	<b>5.14 Air-</b>
<b><u>conditioning plant</u></b> ..... Error! Bookmark not defined.	
<b>110.</b> .....	<b>5.14.1</b>
<b><u>Heating</u></b> ..... Error! Bookmark not defined.	
<b>111.</b> .....	<b>5.14.2</b>
<b><u>Typology of heating plants</u></b> ..... Error! Bookmark not defined.	
<b>112.</b> .....	<b>5.14.3</b>
<b><u>Heating system</u></b> ..... Error! Bookmark not defined.	
<b>113.</b> .....	<b>5.14.4</b>
<b><u>Cooling</u></b> ..... Error! Bookmark not defined.	
<b>114.</b> .....	<b>5.14.5</b>
<b><u>Ventilation – Fresh air</u></b> ..... Error! Bookmark not defined.	
<b>115.</b> .....	<b>5.15</b>
<b><u>Thermal power station and mechanical equipments</u></b> ..... Error! Bookmark not defined.	
<b>116.</b> .....	<b>5.15.1</b>
<b><u>Thermal power stations</u></b> ..... Error! Bookmark not defined.	
<b>117.</b> .....	<b>5.15.2</b>
<b><u>Mechanical equipments</u></b> ..... Error! Bookmark not defined.	

118. 6..... CONSTRUCTION 177

119.....6.1  
Standard for the construction project .....177

120.....7.  
ACCESSIBILITY FOR THE DISABLED/ARCHITECTURAL BARRIERS Error! Bookmark  
not defined.



## **MATERIALS TO BE PRESENTED BY PROCUREMENT ENTITY**

1. The Designing tasks for each educational object
2. Feasibility Study for pre-university educational infrastructure

## **METHOD OF PROVIDING COMPLETE PROJECT**

- a. Schematic and conceptual phase of design, which will be completed by companies participating in the competition:*



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Concept of the object
- Genplan of the object and external organization, staircase 1-500
- Distributive scheme, organization of school spaces
- Plan of all proposed floors with furniture, scale 1-200
- At least a A-A elevation scale 1-200
- Facades of the object, scale 1-200
- At least 4 render images of the external venues, 2 render images of internal space
- At least 1 axinometric drawing
- Report on the project
- Complete IPR of construction-installation and furniture of the object
- Methodology of works implementation

***b. Project implementation phase which will be completed by winning companies:***

Project of “New Construction of Type 1 school in Administrative Unit No.8 ( Site 8/1) shall consist of :

- Plan of the structure establishment, which will be compiled in cooperation with General Directorate Territory Planning and Development in Tirana Municipality.
  - Technical Architectonic and Constructive Report.
- Architectonic project: Facades, object plan, furniture plan, terrace plan, etc.
- Object construction project: Plan of structures and details, plan for foundations, etc.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- The movement plan for the disabled
- Project Implementation of hydrosanitary and sewerage systems
- Project implementation of electrical installation, telephone and internet network accompanied with the certified license of the designer
- Project Implementation of heating system, fire protection approved by Fire and Rescue Directorate of Tirana Region Prefecture
- Project for arrangement and green spaces of the yard, project of sports venues
- Technical Specifications for categories of works and furniture of the project
  - Detailed schedule of works according to categories.
  - Architectural details, layers, doors/windows, furniture etc
    - Construction Materials to be used
    - Geological Report
    - Seismicity Report
  - Report of Assessment of Impact on Environment (VNM)

The entire material prepared for the project implementation phase will be submitted in six printed copies and electronically in CD.

**121.**

122. Likewise, the designer shall present :

- Licence of the designing company + extract of Trade Registry

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Licences of designing engineers, licence of environmental expert + notarial declaration of the designing engineers
- Plan of settlement of the object at scale 1 : 1000 A3 form (original copy);

### *VERSION 1*

#### **Preparation of the Interim Payment Report**

Total cost of the intervention will be defined in the final IPR of the object that will be prepared based on the implementation project, technical specification, taking into consideration special requirements of the Municipality regarding accepted standards and prices per unit according to the **Technical Manual of Prices in force or Technical Analysis of prices for categories not included in the manual.**

### 123.

### *VERSION 2*

#### **Preparation of the Interim Payment Report**

##### *IPR of the object*

The final IPR of the object that will be prepared based on the implementation project, technical specification, taking into consideration special requirements of the Municipality regarding accepted standards and prices per unit according to the **Technical Manual of Prices in force or Technical Analysis of prices for categories not included in the manual.**

##### *Cost of construction and installations*

The total cost of the construction-installation and furniture will be based on the final IPR of the object providing the implementation company with the prices of every category envisaged in this IPR. This IPR shall be within the limit fund envisaged by the Contracting Authority. This cost will be exactly part of the general bid, thus, the project quality will be compared to the implementation quality within the same limit fund.

### 124.

## **Standards**

### *Design Standards*

The Project will be drafted in line with all norms and standards of designing envisaged by the legislation in force. The design shall take into consideration the respect of standards, even during the implementation. The Designer is responsible for the accuracy and respect of all the respective norms and

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

standards. The Designer may recommend also the introduction of new standards of harmonization with EU norms, as well as the best international practices of design and implementation. Recommendations shall contain feasibility and profitability elements of the Albanian practice and financial limits for the project. During the drafting of the project, there shall be considered all the norms approved for the disabled, eye problem person, etc. The project shall envisage the necessary infrastructure for this category.

Technical infrastructure details for this category will be presented by the Designer in special sheets of the project.

### Recommendations for the designer

- The Project will be drafted in close cooperation with the task force in Tirana Municipality for consultations and supervision of designing process.
- The designer shall use and review all the existing information in relation with the zone where the school will be built. Necessary data for the design, such as situation of the existing water supply and sewerage systems, illumination, high voltage cabins, regulatory plan of the zone, etc, shall be provided by the designer through request for information in the respective institutions.

- The designer shall use preliminary studies and data of Tirana Municipality.

- Quality of study shall meet the required standard

125. Calculation, technical specifications and IPR

126. **The technical report accompanying the project shall contain :**

- Technical report of the architectonic design
- Technical report of the constructive design including report on calculation of all structures (foundations, staircase, slabs, beams, etc), as well as engineering measures, security in the object during construction works. Attached to the report will be also the respective annexes with all the calculation including computer method of calculations for potential controls by the investor
- Seismic report of the soil (general description in case of no study)
- Technical Specification for each category of works

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Full IPR of implementation works
- Geological report and physical-mechanical characteristics of the earth including physical-mechanical characteristics of soil and layers in the foundations of the new and existing object
- Recommendations and proposals for special cases

### **Presentation of drawings**

Drawings of the project implementation phase will be presented in a A3 version, readable and at the minimum consisting of the following sheets:

1. Topography of the existing situation updated with current constructions (formal and informal) and respective report
2. General plan of the object at Sc. 1:200; 1:500
3. Plan of floors in the object at Sc. 1:100, 1:50
4. New Facades in 2 D and 3D Sc.1:100
5. Elevation of the building (on both sides) Sc.1:100
6. Plan of foundations Scale1:100
7. Elevation of the foundations and details Sc.1:20; 1:10
8. Detailed Plan of Structures Sck.1:100; Shk.1:50
9. Plan of school furniture Sc.1:100
10. Plan of sewerage system Sc. 1: 100
11. Manholes and other details of sewerage system Sc.1:10, 1:20
12. Plan of water supply system Sc. 1: 200, 1:100

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

13. Axonometric schemes of water supply, details of hydrosanitary equipments Sc.1:100
14. Manholes and other details of water supply system Sc.1:20, 1:10
15. Plan, axinometry and heating system details Sc.1:100
16. Plan and details of fire protection system Sc.1:100
17. Plan of boiler room, construction, details Sc.1:100;1:50
18. Plan and details on lighting, installation of lights in the ceiling, installation of main box sc.1:100;1:50
19. Plan of power distribution scheme in the entire object, Sc. 1:100
20. Plan of telephony, internet network Sc.1:100; 1:50
21. Plan of external lighting and its details Sc.1:100; 1:50
22. Plan of sports venues, green spaces and details Sc.1:100; 1:50.
23. Plan of surrounding wall, type and details of placement of benches Sc.1:100; 1:50.
24. Plan of superficial waters draining and respective details sc. 1:100; 1:50.

Each sheet of the object construction drawing shall be provided even the tables of specification for each material, steel, concrete, bricks, etc.

## **REFERENCES**

### **General References**

- Existing Guidelines for Albanian schools that are now used as reference by planners, designers and supervisors of work areas;
- Law on Education of MoES;

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- ISO Norms of Construction;
- Other Albanian Laws, including Law on Protection of Environment, Law on Territory Planning, Regulations on Fire Protection, Law on Construction, Guideline on Technical Conditions of construction objects for movement of the disabled, technical regulation for saving of thermal energy and thermal protection in buildings;
- New curriculum on general education
- Different standard projects for construction of schools in Albania
- Other guidelines prepared in advance from the consultant .

### Specific References

- CoMD no.319, dt 12.04.2017, “On approval of designing standards in schools design”
- 127.  
CoMD no.98, Dt. 06.02.2013, “On approval of List of Harmonized Albanian Standards of referring character for presumption of conformity for construction product
- 128.
  - ISO Norms for Constructions
- CoMD No. 68, datë 15.2.2001, ”On approval of Standards and Technical Conditions of design and implementation of construction works”.
- CoMD, No. 1503, Dt. 19.11.2008, “On approval of regulation “For exploitation of spaces by the disabled”.

### 129.

- Order of Ministry of Interior No. 425, Dt. 24.07.2015 “On acceptance, administration of technical and graphic documents of the fire protection and rescue project and issuance of technical acts”
- Order of Ministry of Interior No. 424, Dt. 24.07.2015 “On approval of technical rules for fire protection and rescue in residential buildings”

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Law No. 152/2015 “On fire protection and rescue service”.

**130.**

- Law No.107/2014, Dt. 31.07.2014 “On Territory Planning”

**131.**

- Law No. 69/2012, Dt.21.06.2012 “On pre-university education system in the Republic of Albania”.
- CoMD No. 408, Dt. 13.05.2015 “On approval of territory development regulation”.

**132.**

- CoMD. No. 626, Dt. 15.07.2015 “Normative of designing of residences”.

**133.**

- CoMD No 628, Dt. 15.07.2015 “Technical rules of designing and construction of roads”.

**134.**

- CoMD No, 691, Dt. 29.07.2015 “Inter-sectorial strategy for decentralization and local government”.

**135.**

- CoMD. No.38, Dt. 16.01.2003 “On approval of norms, rules and terms of design, construction, production and preservation of heat in buildings”.

**136.**

- Normative provisions on Pre-University Education System, MoES, Tirana, 2013.



- **Zevi, B. Architectura-Zevi, Il Nuovissimo Manuale Dell Architetto.**

**137.**

- **Neufert, E. & P. Architectural Standard**

*Electrical*

- CEI 0-2 Guideline for definition of documents
- CEI 11-35 Guideline of execution of substations
- CEI 11-1 Electrical systems for alternative voltages higher than 1 kV.
- CEI 11-17 Plants of Production, Transport and Electrical Power Distribution
- CEI 11-20 Plants for Production of Alternative Energy, groups of electrogenerators connected in networks of I and II category.
- CEI 11-25 Short circuit currents in three-phase alternative systems. Their calculations.
- CEI 11-26 Short circuit currents, calculation of effects. Definitions and calculation methods
- CEI 17-13/1 Security of equipment of low voltage use (low voltage boxes)
- CEI 31-30, 31/33, 31/35 Electric constructions of equipment installed in zones risking explosion due to gas presence. Classification of dangerous zones .
- CEI 64-8/1 Use of electrical plants in nominal voltages not higher than 1000 V alternative and 15000 V direct.
- CEI 81-10/1-4 Protection from atmospheric discharges (lightning).
- CEI 103-1/1 a 103.1/16 Plant of internal telephony

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- CEI in CT 210 (electromagnetic compatibility) and CT 211 (exposure of man toward electromagnetic fields).
  - UNI EN 12464-I Internal lighting system of labor posts
- UNI Standard 9795 – Fixed systems of detection and automatic signal and fire alarm.
  - UNI EN 1838 Lighting equipments. Emergency lighting .
- CEI EN 50173-1 Information Technology – General cabling system - Planning and criteria of installations within internal venues .
  - IEC 60076-11 Use of dry three-phase transformers .
    - IEC 103-1 / N PABX central.
  - 60617/1-2 CEI EN Symbols– Graphics used for diagrams, etc.
  - CEI 3-8 Abbreviations and symbols for sketches in plans
    - CEI electrical users 64-8/1-2-3-etc.
- CEI / UNI Products applied for design, construction, testing in plants and installation of materials, components and electrical equipments.

*Mechanics*

- UNI/EN 12845 General Norms of Fire Protection;
  - UNI 10779 Hydrants network. Designing, installation and use;
- EN 671 Fixed Systems of Fire Protection. Anti-fire flexible pipes;
  - EN 54-1 System of detection and alert – Introduction;
  - EN 54-3 System of detection and alert – Alert Equipments;
  - EN 12723 Pumps – General Terms of pumps and installations,
- 138. definitions, quantity, symbols and units;
  - EN 60529 Protection Scale (Code IP) (IEC 60529:1989);
- ISO 65 Steel pipes with threads in line with Standard ISO 7-1;
  - EN 12094 Gas extinguishing systems;
  - EN 1356 Foam extinguishing systems;

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- UNI 9994-1 Portable vessels;
- UNI EN 12416-2 Dust system;
- UNI EN 13565-2 Foam System;
- UNI ISO 15779 Aerosol extinguishing system.

### *Constructive*

- EC0 Bases of structures design
  - EC1 Loads in structures
  - EC2 Design of r/c structures
  - EC7 Geotechnic design
  - EC8 Seismic Design of Structures
- Technical Conditions of Design KTP -1978
- Technical Conditions of Design for anti-seismic constructions KTP-N.2-89



### **TERMS**

Terms used in this designing tasks are referred to terminology defined in Law No. 69/2012, Dt.21.06.2012 “On pre-university education system in the Republic of Albania”.

#### Architectural/Engineering Terms

- Acoustic Amenity: Acoustic Conditions in which schools and its users may act in maximal efficiency.

- Administrative spaces: Physical space of school dedicated to administrative activities.

**139.**

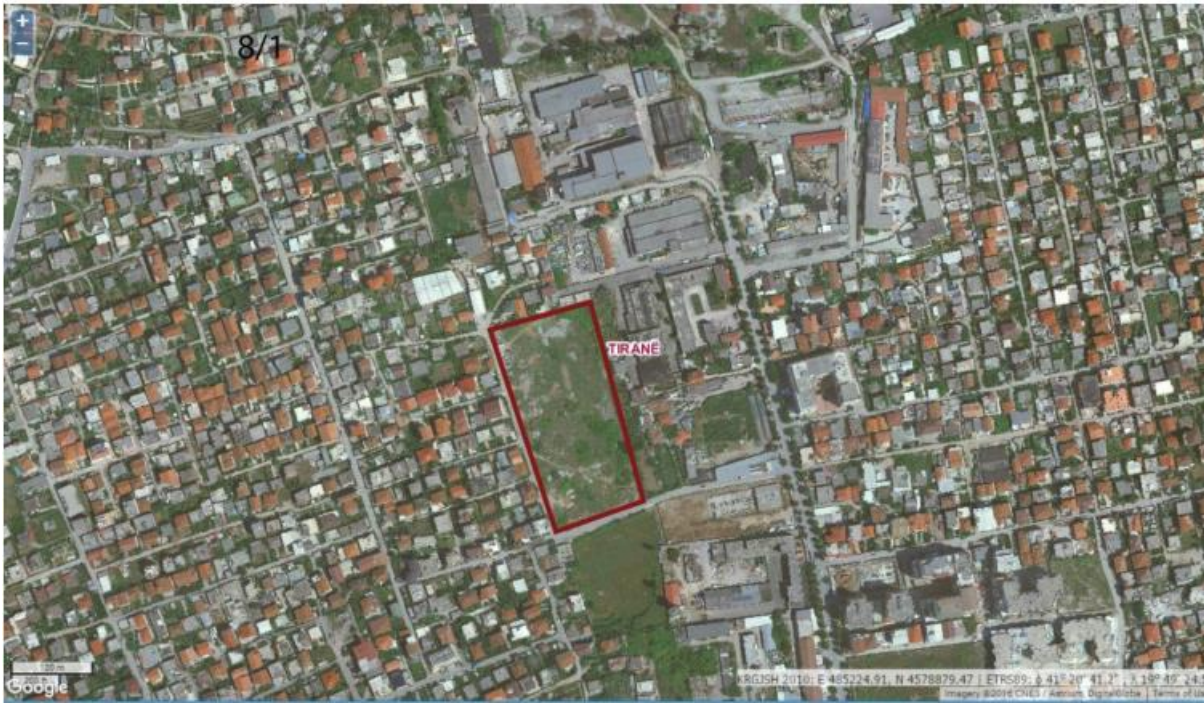
- Movement spaces: Defined space for horizontal and vertical movement inside the building, such as halls, corridors and scales.
- Climate amenity: Environmental conditions in which school and its users may act in maximal efficiency
- Education spaces : Physical space of school dedicated to education activities .
- Hygienic environment: General Conditions of hygiene in school affected by level of comfort and health of users that depend on physical and sanitary conditions of the buildings, water supply and sewerage systems which enables efficient and secure functions of school buildings.
- Orientation: Orientation of school building (part of education spaces) influenced by natural climate factors, such as sun and wind direction .
- Location of school building: Land surface where the education buildings are situated.
- Additional Spaces: Physical spaces in school buildings dedicated to support of educational and administrative activities.

**1. GENERAL DATA AND EXISTING STATE OF THE OBJECT**

140. Location. The proposed site no. 8/1 for construction of type 1 and type 4 school is located near “May 5” str., Administrative Unit No. 8, referred to Feasibility Study "*Improvement of educational infrastructure in Tirana Municipality*" November 2016)

**Description of Site:** Site 8/1 is located in a relatively quiet zone with easy access to the site. The road infrastructure may be problematic. Surface about 17,510 m<sup>2</sup>.

“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”



141. Picture 1 Location of site 8/1 according to feasibility study

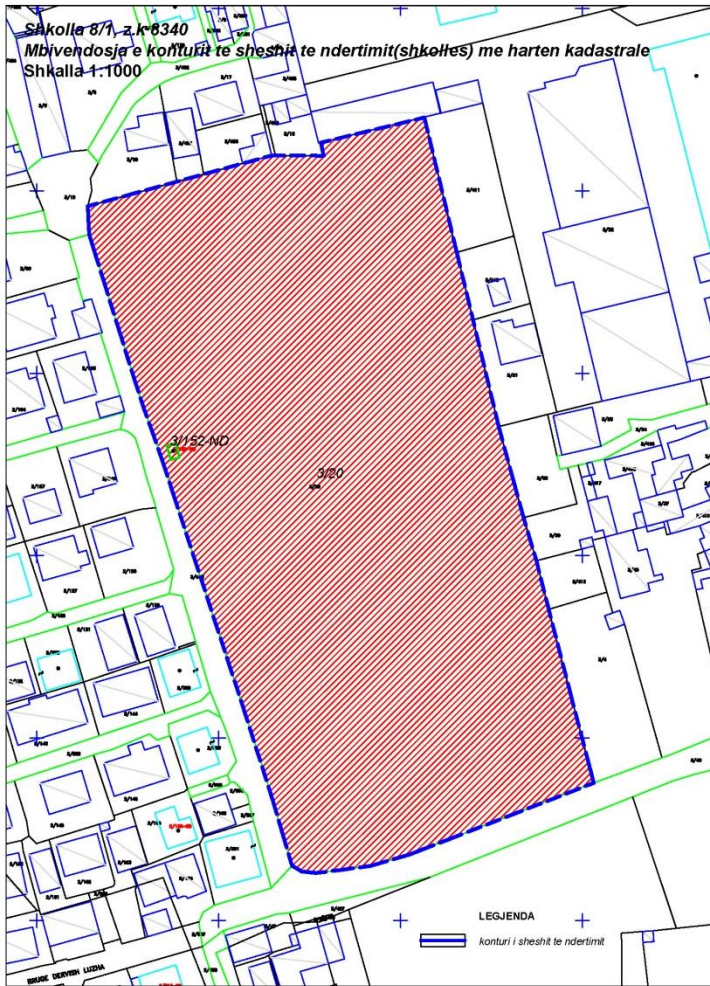
142. Picture 2 - Photo from site 8/1



143.

**144.**

**145. Picture 3 – Cadastral Map of site 8/1**



## 2. GENERAL DESIGN REQUIREMENTS OF SCHOOL CONSTRUCTION

146.

In this territory will be built:

147. A. **School for nine-year elementary education (Type 1)**

148. Construction of these objects will meet the needs for educational objects in this zone, as well as will affect the reduction of students’ number in existing schools that are located in the borders of this unit.

149. **The nine-year elementary education school** shall be equipped with all the necessary academic venues (teaching classes, including laboratories of physics, chemistry, biology, informatics, etc), gym with supporting spaces, administrative space, social space, etc. The object shall have an installed central heating system and fire protection system. Great attention shall be paid to organization of school yard. The external venues shall be systematized, including respective functional venues, sports premises, green spaces and external lighting.

150.

### 151. **Functionality**

152. During the school building design, there shall be created a balance between functionality and cost efficiency. This balance shall be achieved with different means, such as

### 153. **Rational dimensions of spaces :**

- (i) Zones adapted to movement: movement spaces shall not be more than 25% of the fruitful built surface. They shall be adapted according to school users, they must be functional and respect the security demands;
- (ii) Optimal number of spaces: at first the number of spaces is calculated according to exploitation. In small schools, where the acceptable norm cannot be achieved, in particular for special teaching spaces, shall be considered creation of multi-purpose spaces;
- (iii) Maximal compatibility: spaces shall have a maximal compatibility that would make them suitable for different subjects and changes, in cases when it meets their functional requirements;
- (iv) Grouping of spaces: spaces shall be grouped in blocks according to function and interface. This would provide an easy identification of their corresponding activities and spaces, an easy communication between different spaces, without obstacles in movement and reception zones, an easy observation of spaces and an optimal exploitation of land at disposal;
- (v) Integration of needs: establishment of spaces within the school shall follow the fundamental necessities, such as sanitary and hygiene rules, regulations of functional comfort and security, as well as acoustic, visual and climate amenity.

154. **Flexibility**

155. Designer shall design sufficient spaces for flexibility in order to enable :

- (i) school staff to get used to schools venues and different teaching methods; and

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- (ii) to enable planners to adapt the buildings for future needs of the school that correspond with the potential curricula and future program. a) Required flexibility for buildings (and furniture) that enables many teaching methods for normal classes (frontal teaching, work in groups, teaching through seminars, etc), laboratories and specialized halls (practical work in half groups, whereas demonstration in full groups), as well as multi-purpose spaces and sports areas (possibility of grouping several classes).

156.

### 157. 2.1 Main spaces

Referred to Feasibility Study "Improvement of educational structures in Tirana Municipality" (November 2016), **Type 1** school belong to nine-year elementary education for urban zones with 20 classes.

For realization of the project according to school typology and locations, referred to "Guideline for schools design – norms and standards" of Ministry of Education and Sports, shall be taken into consideration the following parameters :

Basic education, classes 1-9, age 6-17 year-old;

Number of cycles (parallel): 2

Number of Classes: 20

Number of students /class 30

Total number of students 600

The above-mentioned data are summarized in Table 4.



Table 4<sup>1</sup>

Type	Location	Cycle	No. classes	St/Class	No. st. total
Type 1	Urban	Basic education	20	30	600

### 158. 2.1.1 Teaching classes

The design of teaching classes shall be calculated for a  $1.94 \text{ m}^2 / \text{students} - 2.18 \text{ m}^2 / \text{students}$  surface (optimal) for regular teaching rooms and  $1.8 \text{ m}^2 / \text{students}$  per specialized teaching rooms. Minimal height of classes (floor-ceiling completed) shall be 2.8 m.

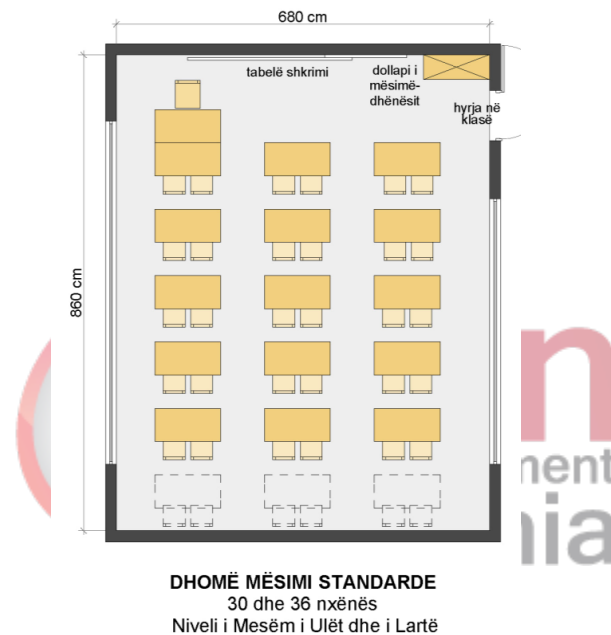
<sup>1</sup> Referred to Table no 2, page 44\_ Feasibility Study "Improvement of education infrastructure of Tirana Municipality", November 2016. Guideline for design of school buildings norms and standards" drafted by Ministry of Education and Science



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Teaching classes are the main venues in a school. They shall be very suitable for the performance of the teaching process. A special care shall be paid to determination of the shape, dimensions, lighting and natural ventilation, as well as furniture. The surface of a class depends on the number of students in a class and is about **58 to 65 m<sup>2</sup>** in the zones with high density of population (**class with 30-36 students**). Number and dimensions of benches in frontal rows (3 double benches) as in length rows .

**Surface of windows:** surface of windows is recommended to be 1/5 to 1/6 of floor surface, according to zones where the school will be built. For wide classes, in order to have a uniform lighting, the height of windows shall go up to the ceiling. The materials shall ensure the fire protection. From the floor up to 90 cm shall not be openable, and over 90 cm windows shall be openable only in vertical side, thus the object can be ventilated and does not allow jumping, i.e. boosting security.



Plan of the classes are advisable to be rectangular (with a proportions of sides about 2:3) and almost square **6.8 x 8.6 m**.

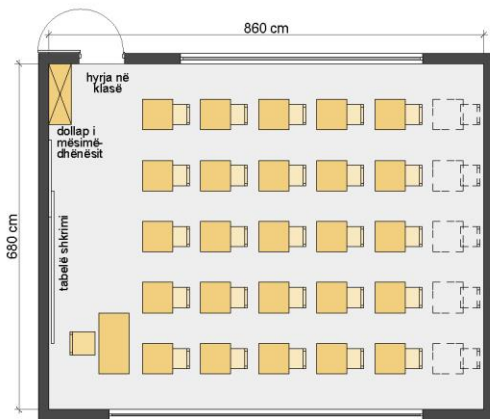
Depth of classes shall not pass 9m, nevertheless is obligatory that the student shall not be further than 6 meters from the window where the light comes. Classes shall minimally have two hours of direct light.

**Flexibility:** Designer shall design sufficient spaces for flexibility in order to enable the school staff to get used to schools venues and different teaching methods and planners shall adapt the buildings for future needs of the school that correspond with the potential curricula and future program.

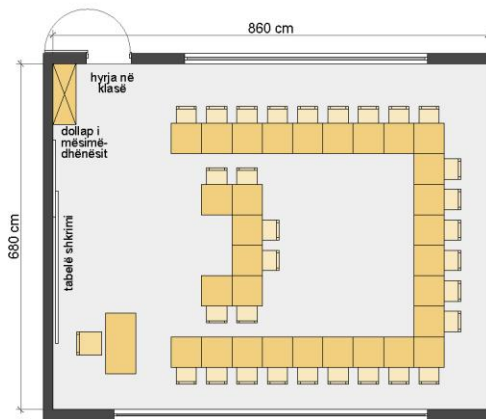
159. The required flexibility for buildings (and furniture) enabling numerous teaching methods (see picture below) for normal classes (frontal teaching, work in groups, teaching through seminars, etc),

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

laboratories and specialized halls (practical work in half groups, whereas demonstration in full groups), as well as multi-purpose spaces and sports areas (possibility of grouping several classes).



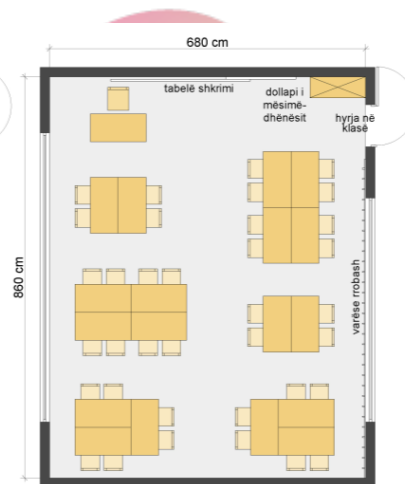
Mësimi frontal, 30 -36 nxënës  
Një tavolinë për një nxënës



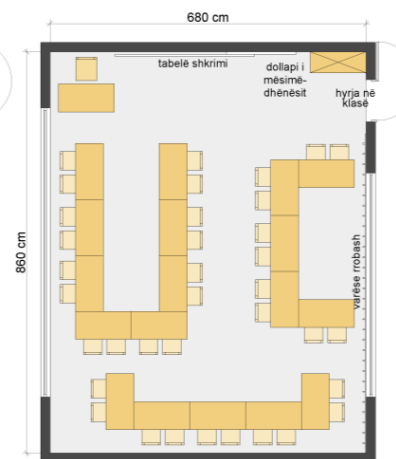
Mësimi punëtori, 30 -36 nxënës  
Një tavolinë për një nxënës



Mësimi frontal, 30 -36 nxënës  
Një tavolinë për dy nxënës

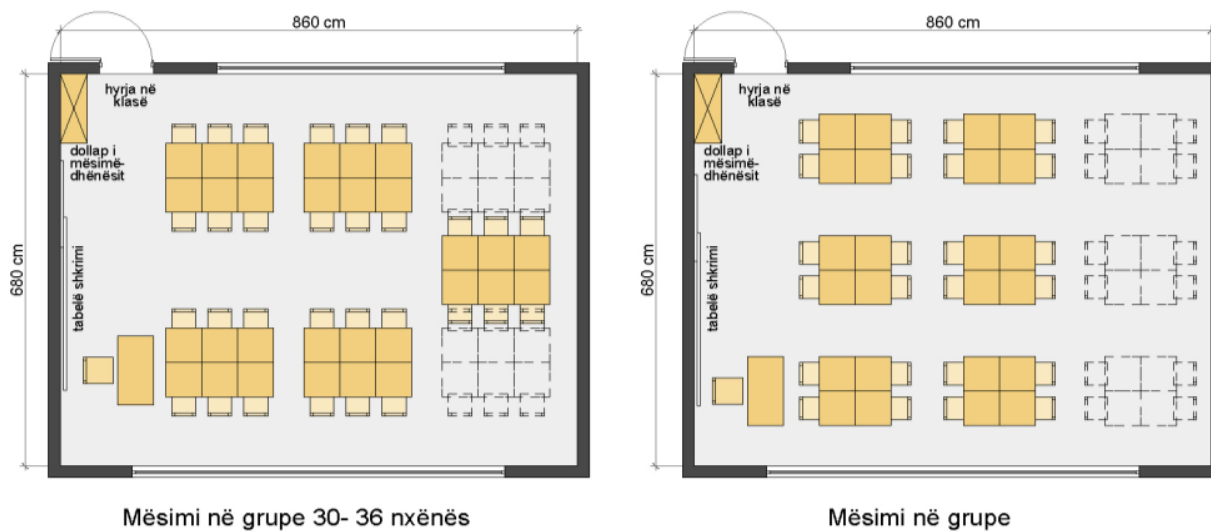


Mësimi në grupe



Mësimi punëtori

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”



Types of separation of spaces in the design program shall be developed in structures that can be easily modified to meet other requests in the future. Flexible planning is essential in the schools design in order to meet the constant evolution in the education thinking and techniques of construction technologies. The same will help the adaptation of school with new exploitations through changes in planning and allow completion of these changes without big costs. In this respect, a flexible plan shall also enable easy adaptations for developments in the future regarding space planning, construction of buildings, artificial lighting, techniques of ventilation and acoustics. A flexible building (for example with a big of movable walls is in general very expenses and can be justified only in case changes are necessary and essential. There are not many reasons to determine several divisions and changes will happen only once a year. **Visual angles and distances:** Often students complain that they are not able to see clearly the visual concretization means such as whiteboards and video-screens. Often the glow can cause difficulties in seeing clearly. Another important factor is the visual angle on which they see. Failure to see clearly may force students to stay in an uncomfortable position and this lack of comfort may cause loss of concentration. This is true for younger age students, whose eye angle distorts the image even in case of now powerful glow.

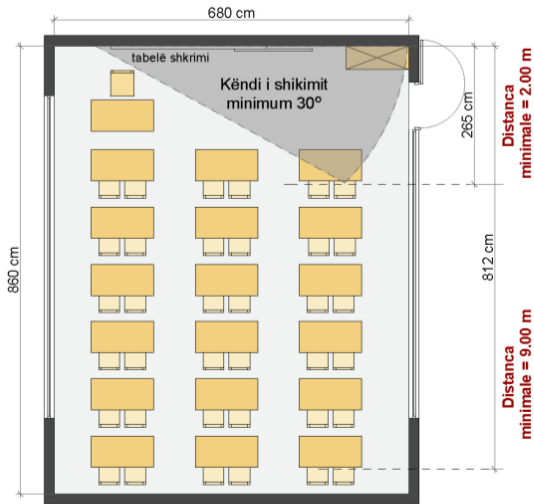
There exists evidence that students who sit where the eye angle is extreme or distance from the concretization mean is too big have lower results. If there exists the principle that students shall all have equal education rights, irrespective where they sit, then the designer shall pay attention to the arrangement of seats in order to :

- Maximal distance between the last row of students and writing board shall be about 9.0 m. Beyond this distance, it is difficult to read what is written and students force themselves to concentrate, to be able to understand the written text;
- Minimal distance between first row and writing board shall be about 2.0 m. Further, the first row students will not be able to see the entire writing board from an acceptable visual angle (see picture below);

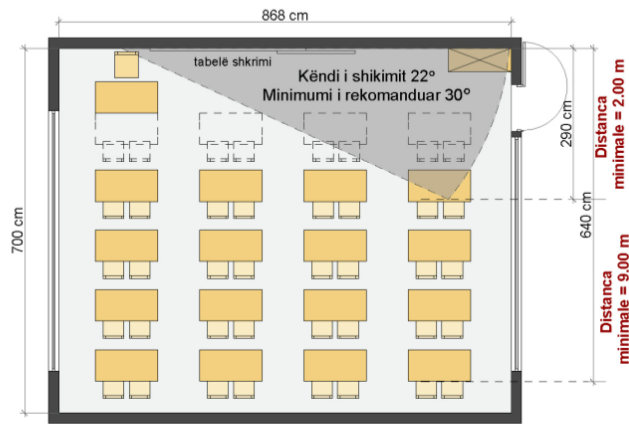
## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Minimal visual angle up to the writing board shall be  $30^\circ$  (see picture 1.3.6 below) so that the angle from which the concretization mean is seen does not alienate the understanding of what students see. Less than  $30^\circ$ , reading becomes difficult ;

- Main natural light shall be at maximum, coming from the left side of the students, in order that the shadow of their hand shall not fall on their work .



KOMODITETI PËR DHOMË MËSIMI  
ME 3 RENDE BANKASH  
(30-36 dhe 42 nxënës në raste të jashtëzakonshme)



KOMODITETI PËR DHOMË MËSIMI  
ME 3 RENDE BANKASH  
(32 dhe 40 nxënës në raste të jashtëzakonshme)



### Space of the table for each student

#### Width of the table for 1 student

6 to 10 year old	60 cm
10 to 18 year old	65 cm

#### Width of table for 1 student

6 to 10 year old	50 cm
10 to 18 year old	60 cm

#### Height of the table for 1 student

6 to 10 year old	65 cm
10 to 18 year old	74 cm

### Distance between two tables

#### Distance of table on the side :

Up to the table or maximal height equipment	55 cm
Up to walls, radiators or similar	20 cm
From the wall where the wardrobe is placed	70 cm

*Distance of table from each other*

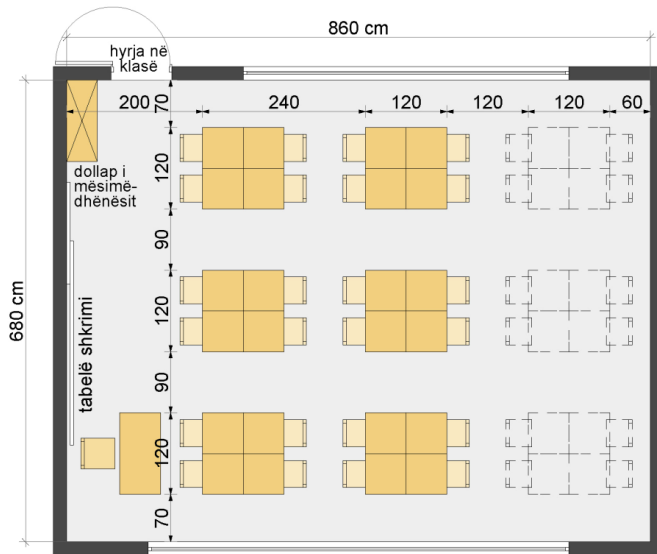
For tables with maximum 2 places close to each other  
10 to 18 year old

60 cm

For more than 2 places close to each other  
10 to 18 year old

65 cm

After the last row shall be envisaged some extra 5 cm .



- *Class furniture and their characteristics*

**General teaching class**

1. *Table for students, 2 students, dimensions: 1200 / 1300*

For tables for 2 students according to group age have the following dimensions:

First group : 1200 mm x 500 mm

Second group: 1300 mm x 600 mm

Material of working surface :

MDF board (Medium Density Fiber board).

Holding Construction :

Pipe skeleton in oval or parallelepiped shape. On both sides, outside of the table, a hook for hanging bags.

Made of plasticized or plated steel with a thickness of 1,5 mm.

## 2. Piled chairs

### Skeleton

Realized in aluminium, molded, plated, combined with a steel pipe and plastic cover, resistant to scratches and blows, vertical model on four legs that are piled, with a sliding base that moves by enabling the piling.

### Seat and back

Elaborated with plywood 8 – 10 mm thick in an anatomic shape, lacquered surface. The color depends of the interested person.

## 3. Universal double blackboard



Two-sided table that can be folded, where is possible to use chalk

Classical communication over 5 side (after being written on 5 sides)

Technical data are as following :

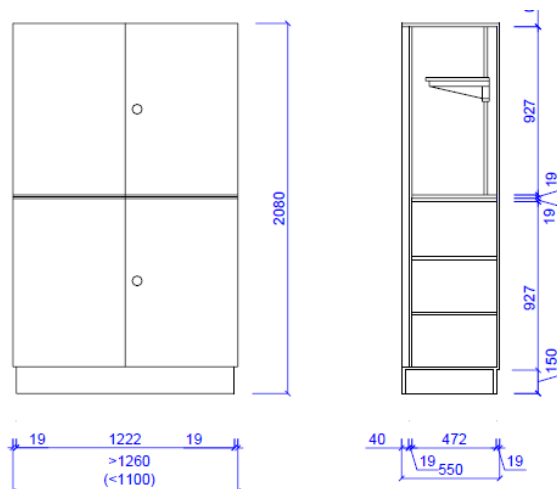
Traditional appearance mode

Chalk writing

Surface painted in green, magnetic

Easy to be wiped, thanks to extreme smooth structure of the surface

Aluminium frame with PVC gray corners



Scratchless surface and acid resistant

Matt green color, with a non-reflective surface

2 sided table that can be folded, enamelled on both sides

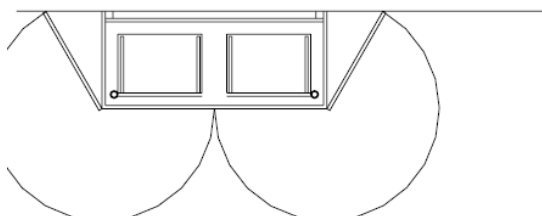
The delivery shall include also the chalk holder and mounting set .

Dimensions: 90 x (2 x 60) x 120 cm

100 x (2 x 75) x 150 cm

100 x (2 x 100) x 200 cm

## 4. Cupboard for the class



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Dimensions : about 950 x 500 x 2030 mm

Upper part of the cupboard (separations for establishment of equipment):

A double fixed floor (through a **shlice** system same as in the parket floors) which could serve as a separation between the back and lower part of the cupboard.

2 drawers with changeable heights with a screwed floor serving as a holding surface for the projectors or other equipment of the class (weight to be held is about 20-25 kg)

Composed of two cupboard parts.

For both parts of the cupboard two rotating folding roods 270 °, with a protection slat in closure

Removable base – 150 mm high

Made of melamin or MDF.

The body, separations of the drawers and doors are well-attached with the plastic on both sides with 1,0 mm– top base at least 1,5 mm.

All edging of the doors, body and separations of the drawers are coated on all side with a 3 mm plastic stripe.

Skeleton:

2 pieces of cupboard drawers with a changeable height movable in two pipes.

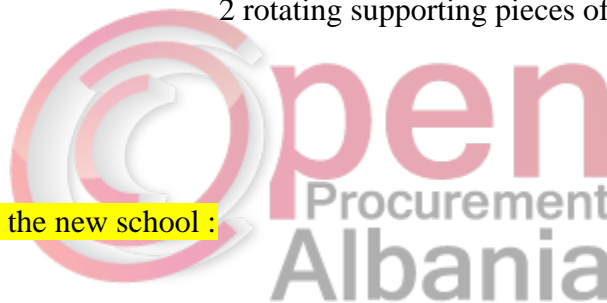
8 pieces of folding bolts made of metal – opening angle 270 degrees

161.

2 rotating supporting pieces of a cylinder at a big size.

### **2.1.2 Laboratories**

The designer shall envisage for the new school :



- 1 (one) laboratory of informatics
- 1 (one) laboratory of physics
- 1 (one) laboratory of chemistry
- 1 (one) laboratory of biology

For the calculation of space of these laboratory classes shall be considered the space for each student, as well as shall be calculated the additional venues for the equipment and pre-preparations.

- ***Furniture of laboratories and their characteristics***

162.      Laboratory of Chemistry

- *Students table for two places with sockets and tap*

Dimensions: total : about 1200 x 700 x 700 mm, out of which

Upper surface : about 1200 x 700 x 40 mm

Skeleton: about 1200 x 700 x 700 mm

Two hooks for bags

Upper surface:

Enamelled ceramic material (without whirligig, as an only plaque) with three raised edges.

Connection to the energy pillar is acid-resistant and from the mechanic point of view

The upper surface is attached to the metallic skeleton by anti-mould screws.

Acid resistant.

Under the upper surface for each student there exists a space for putting books realized with a plated aluminium metallic net with the dimensions : 350 x 350 x 120 mm.

Skeleton:



In the shape of a steel pipe, plasticified or plated, square (30 x 30 mm), with a shim 1,5 – 1,8 mm, realized to be mounted in the floor, composed of a plated frame (not made of pieces but as a whole) with two metallic leg; the metallic legs are equipped with seals of changeable heights to create a horizontal plane, independent from the floor level.

- *Laboratory table for teachers with socket and acid*

*resistant*

Dimensions: about 1800 x 750 x 900 mm

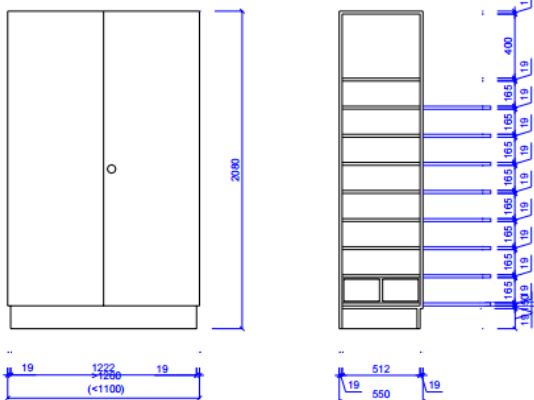
Upper surface :

Dimensions about 1800 x 750 x 40 mm, made of enamelled ceramic material, large surface with raised edges on all sides of the installed sink inside the upper surface (on the opposite side of the door leading to

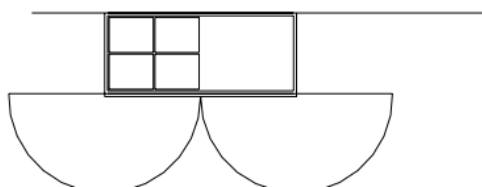


the laboratory) with an internal space of at least 510 x 360 x 300 mm, acid resistant with whirligigs resistant to acids.

- **Cupboard for preservation of chemistry lab equipment**



Dimensions: about 1260 x 550 x 2080 mm. Made of melamin coated with plastic and surrounding edges made of plastic stripes in a fixed of MDF manner. 1 melamin sheet or MDF (thickness min. 20 mm), separation of drawers of the cupboard with a changeable height, 8 melamin or MDF layers (thickness min. 20 mm), separation of drawers that can be fully opened with a protection cover of plastic material on all sides, 15 mm wide. 2 rotating doors with a protection slat against clashes. Lock with cylindrical rotating with big handle.



**Laboratory table resistant to acids**

Dimensions about 2300 x 1500 x 900 mm

**Upper Surface:**

Dimensions about 2300 x 1500 x 40 mm

With an enameled ceramic material on a large isolated surface and resistant to acids.

In the frontal part a sink (with internal space minimum 600 x 400 x 300 mm), on the left and right of the sink an inclined surface for removal of water drops. In the horizontal axis two sinks in the shape of a funnel (with an internal space at least 210 x 210 x 280 mm)

Skeleton of upper part where are put the chemicals.

Dimensions about 1800 x 350 x 700 mm.

Skeleton with six legs in the shape of a tube with two drawers fixed in the upper surface of the table; the upper edge of first drawer about 550 mm above the upper surface; in the lower part in the entire length and width between the metallic skeleton prepared on an installation edge about 150 mm high. Upper frame of the second drawer about 700 mm on the upper surface; on the side of the sink returned in its position about 300 mm. Both drawers are fixed and immovable with the metallic skeleton.

**Lower tallboy**

General dimensions (including the top base) about 2180 x 1380 x 860 mm

The height of top base 150 mm. Isolated on the ground.

4 tallboys each with 4 drawers and 3 holders for each drawer

4 tallboys each with a drawer division and a rotating door.

1 free space down the upper surface to place the washer of lab tools

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Down the frontal part of the draining sink a shelter and a rotating door. All metallic bolts shall be resistant to scratches and plastic coated.

### *Water supply*

In the frontal part of the sink a vertical exit about 300 mm high in a good external position, with the draining of cold water in a 200 mm distance from the vertical tube, with 3 draining valves; out of which one is for the hot water with battery of mixture (sink group) connected to hot water supply (central system of hot water with a small boiler -10 liters under the table type)

Sink in the shape of a funnel: with a simple valve in a vertical exit about 300 mm high, draining about 150 mm from the vertical axis; a double valve in a vertical pillar about 300 mm high, draining about 150 mm from the vertical axis,

Distance about 120 mm.

### **Laboratory of physics /biology**

#### ***Table for students for 3 positions with sockets***

Dimensions: total – about 1800 x 600 x 760 mm; out of which

Upper Surface : about 1800 x 600 x 25 mm

Skeleton: about 1800 x 450 x 730 mm

Data on height without including screws that serve for its regulation.

Free space: minimum of height 650 mm

Metallic legs are placed on the left (students view)

According to the accompanying plan-sketch

Free space: Minimum height 650 mm

Upper surface:

It is a melamin or MDF layer coming out on the skeleton from its long side; 75 mm

Skeleton: with a profile in the shape of tube or square, suitable to be mounted on the floor and composed of a frame plated construction (compact), without interruptions, with four metallic legs.

Metallic legs are equipped in the end with regulatory screws to create an independent horizontal axis from the floor level; metallic legs in the sector of installation sector with a distance of about

75 mm, covered from all sides with melamin or MDF plaques. The cover of box is movable from internal side in order to carry out the installation.

Six hooks for hanging school bags.

Electrical installations in the installations box:

From the teachers side: double socket 220 V, emergency stop button for power supply in all students tables, 4 sockets with free capacity, earthed socket. All sockets placed inside for 4 mm.

From the students side : a double socket 220 V

Students table is placed according to the plan of arrangements.

#### ***Sink with a sub-construction (with tallboy)***

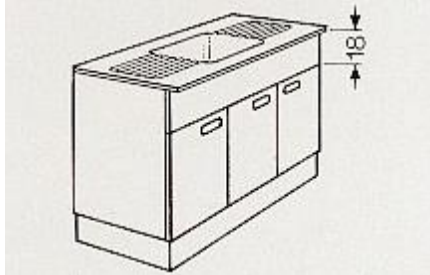
Laboratory sink with sub-construction with three doors (divisions) and an included dustbin.

Dimensions: length 1500 mm; width 560 mm; height 900 mm

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Upper surface:

Sink with a hole of a light space from inside with a length of 510 mm, width 360, depth 195 mm and with two parts for drying the vessels (left and right) with total dimensions with a length of 1300 mm, width 560 mm. The sink is made of stainless material.



Water supply: A vertical pillar about 300 mm high with a drain of 200 mm, equipped with a draining valve for cold and hot water (with a mixed battery)

Dresser :

Dimensions about 1500 x 500 x 860 mm; top base 150 mm high; divisions are 180 mm lower than the lower level of the upper surface; made of melamin or MDF.

Three rotating doors with protection slat against clashes.

### - *Collection cupboard of biology / physics*

Dimensions about 1050 x 560 x 2050 mm or 1200 x 560 x 2050 mm

Material: melamin or MDF.

2 bases of drawers with a changeable height.



7 bases of drawers that can be withdrawn outside up to half width (steel construction) easily to be removed for demonstration purposes. All bases of drawers with a 15 mm fixing slat on both sides and with a holding force of minimum 600 N  
2 rotating doors in two thirds of the height covered with glass and with rotating slats and three bolts each  
Lock with clip and rotating latch with a big handle.

### 163.      *Laboratory of informatics*

#### - *Students table for informatics with 2 positions (1600 x 800 mm)*

Tables of informatics are separated into tables for Desktops and table for Laptops

Dimensions of table for Desktop:

Total: about 1500 x 800 x 700 mm

Upper surface: about 1500 x 800 x 25 mm

Skeleton: about 1500 x 640 x 670 mm

Free space : minimum height 630 mm

2 hooks located in the inside for hanging bags of the students

1 channel under the table for passing cables and placing sockets

1 triple socket with a connection cable of minimum 1,5 m

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Work upper surface:

Melamin plaque; coated with plastic substance and plastic lateral stripe coming out on the skeleton,

Skeleton:

In the shape of tube, realized to be mounted on the floor, composed of a construction with a plated frame (without interruptions) with metallic legs; the metallic legs are equipped with screws for changing the height in order to provide an horizontal level not depending on the floor level.

Channel for installation of the cable that provides the current and for the network cable on one side of the length, with a cover that can be unscrewed and a separation line in this cable channel.

The entrance of the cable is possible on one of two ending parts of the installation box. The Cable exits through the gap to sensitizing devices placed on the table.

Under the left or right upper surface is the holding construction of central unit made of melamin with dimensions : 500 x 250 x 600 mm.

**- *Students chairs with changeable height***

Skeleton:

Vertical columns with a base of 5 crossed legs made of plated metal and with support on the floor with caps made of PVC (fixed) or with wheels.

Changeable height from 420 mm to 600 mm through an axis coated screw for the PVC cap type and 470 mm up to 670mm for the type with wheels.

The seat and back is made of pressed plywood material.

Color according to the orderer’s wish

**- *Movable one-sided table***

Dimensions : about 2000 x 1200 mm,  
Steel surface of gluing magnet without glow

**- UPS 1000VA Specifications**

<b>MINIMAL TECHNICAL CHARACTERISTICS</b>	
<b>“OUTPUT”</b>	
<b>“Power”:</b>	1000 VA
<b>“Power Factor”:</b>	≥0.8
<b>“Wave Form”:</b>	Sinusoidal
<b>Nominal Voltage:</b>	220-240 VAC
<b>Frequency:</b>	50 Hz +/- 5%

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

**“Volt, regul. (On+/-10% battery)”:**

**“Output Connectors”:**  $\geq$  (4) IEC 320 C13 (from the battery)

**“INPUT”**

**“Nominal Voltage”:** 220 - 240 VAC

**Frequency:** 50 Hz

**“Voltage Window :** 170 - 270 VAC

**Automatic Voltage Regulator “AVR”:** Yes

**“Input Connectors”:** (1) IEC 320 C14

**COMMUNICATION & MANAGEMENT**

**“Shutdown Software”:** Yes

**“Led Indicators”:** For all situations

**“Audible Indicators”:** For all situations

**Data Communication Connector “Data”:** (1) DB9 Serial or USB

**”Protection”:** Overload, Discharge, and Overcharge Protection

**BATTERIES**

**“Transfer time”:**  $\leq$ 4 ms

**“Back-Up Time”:**  $\geq$ 6 min. full charge

**“Battery Type”:** 12 V DC 7 Ah Lead-acid

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>ACCESSORIES</b>	
<b>“Power Cord”:</b>	(1) European IEC-C13
<b>“PC Power Cord”:</b>	(2) IEC 320 C13 - IEC 320 C14
<b>“Data Cable”:</b>	(1) DB9 Serial - DB9 Serial ose USB- USB
<b>WARRANTY</b>	
<b>“Warranty” period: 2 years</b>	

**164.** *Specification for computers (minimum one computer/student and one computer for the teacher)*

<b>MINIMAL TECHNICAL</b>	
	5400
<b>Min points for processor according to: cpu</b>	
<b>“RAM”:</b>	4 GB, min. DDR3 1600 MHz Non-ECC
<b>“HDD Size”:</b>	500 GB
<b>“Media sizes”:</b>	7200 Rpm SATA 6.0Gb/s
<b>“Disk subsystem controller”:</b>	Serial ATA 6.0 Gb/s
<b>“Graphics”:</b>	≥ 1 GB
<b>“Media Device”:</b>	DVD+/-RĒ
<b>“Slots”:</b>	Minimum (3) PCI/PCI-E, out of which (1) x16 PCI-
<b>COMMUNICATION &amp; MANAGEMENT</b>	
<b>“Ports”:</b>	Min. (8) USB out of which: a. min (2) USB before b. min (2) USB 3.0 (1) RJ-45, (1) audio in/out, (1) mic. and headphone, (1) VGA.
<b>“Networking”:</b>	(1) 10/100/1000 LAN Integrated Gigabit Ethernet Port.
<b>“Sound”:</b>	Integrated Sound Card
<b>“Speakers”:</b>	Internal or Built-in Monitor
<b>“Security Management”:</b>	Embedded Security TPM
<b>“Preinstalled Licensed O. S.”:</b>	OEM Windows 10 64-bit Professional
<b>“Keyboard”:</b>	Standart Keyboard QWERTY
<b>“Mouse”:</b>	Minimum 2 Button scroll Optical

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>“Power Supply”:</b>	220 V AC, 50 Hz
<b>ACCESSORIES</b>	
<b>“Power Cord”:</b>	European
<b>Recover CD :</b>	Recover CD/DVD ose Recover Partition
<b>MONITOR</b>	
<b>“Type”:</b>	
<b>“Size” :</b>	21”
<b>“Native Resolution”:</b>	1920 x 1080 at 60 Hz
<b>“Contrast Ratio Static”:</b>	1000:1
<b>“Display Port”:</b>	(1) VGA and at least (1) of ports DVI/HDMI/DP
<b>“Response Time”:</b>	≤ 5 ms
<b>“Energy Efficiency”:</b>	Energy Star
<b>“Power Supply”:</b>	220V AC, 50 Hz
<b>WARRANTY</b>	
<b>“Warranty” period:</b>	3 years

**1. Specifications for Laptop (min. two laptop/ laboratory)**

<b>MINIMAL TECHNICAL</b>	
	3400
<b>Min. points for the processor according to:</b> <a href="http://cpubenchmark.net">cpubenchmark.net</a>	
<b>“Chipset”:</b>	Intel ose Ekuivalent
<b>“RAM”:</b>	8 GB shared Dual Channel min. DDR3 1600 MHz
<b>“HDD Size”:</b>	500 GB
<b>“Media sizes”:</b>	7200 Rpm SATA
<b>“Graphics”:</b>	Integrated Graphics with 1 GB video memory
<b>“Media Device”:</b>	DVD+/-RW with DL Memory Card Reader
<b>“Display”:</b>	15.6” LED display, Anti Glare
<b>“Battery”:</b>	min 4-cell battery
<b>COMMUNICATION &amp; MANAGEMENT</b>	
<b>“Ports”:</b>	Min (3) USB ports out of which min. (1) USB 3.0 DisplayPort ose HDMI Out Integrated digital mics Integrated Web Camera Headphone jack/Microphone jack

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>“Networking”:</b>	10/100/1000 LAN (RJ 45) Wireless 802.11
<b>“Sound”:</b>	High Definition Audio2.0
<b>“Preinstalled Licensed O. S.”:</b>	OEM windows 10 64-bit Professional
<b>“Keyboard”:</b>	QWERTY
<b>“Pointing Device”:</b>	Touch pad & usb mouse
<b>AKSESORËT</b>	
<b>“Power Cord”:</b>	European
<b>“Recharger”:</b>	Yes
<b>Bag:</b>	Yes, from the producer. Suitable for laptops and other accessories
<b>“Recover” and “Drivers”CD/DVD:</b>	“Recover”, “Drivers” CD/DVD or Rec. Partition
<b>GARANCIA</b>	
<b>“Warranty” period:</b>	3 years

**2. Specification for Printer/scan/photocopy**

<b>MINIMAL TECHNICAL</b>	
<b>"Model":</b>	print/scan/copy
<b>“Print Speed” A4:</b>	≥18 ppm
<b>“Monthly duty cycle”:</b>	8000
<b>“Technology”:</b>	Laser ose LED
<b>“Print Quality”:</b>	600 x 600 dpi
<b>“Input Capacity”:</b>	150 sheets
<b>“Output Capacity”</b>	50 sheets
<b>“Media format”:</b>	A4
<b>“Memory”:</b>	≥32 MB
<b>“Min. optical scan resolution”:</b>	600 x 600 dpi
<b>"OS supported"</b>	Windows 7 and up (32 bit & 64 bit)
<b>“Toner”:</b>	Accompanied with Kit
<b>COMMUNICATION &amp; MANAGEMENT</b>	
<b>“Interface”:</b>	High Speed USB 2.0
<b>“Ethernet” Communication Port:</b>	Not specified



ACCESSORIES	
“Power Cord”:	European
Software/Drivers CD:	Yes
USB Cable :	Yes
WARRANTY	
“Warranty”:	1 year

165.

166.

167.

## 2.2 Social spaces

### 168. 2.2.1 Library

The users of the library may be the students and teachers, therefore the calculation of libraries spaces shall take into consideration this fact.

For high schools, the library space shall be calculated based on students number and necessary space for each student must be 0,15 m<sup>2</sup>. Designers shall take into consideration the space for books archive and reading positions for students. Designers shall take into consideration that the reading venue of the library shall have a natural lighting as much as possible. Each reading post shall include sockets.

#### - *Library table (1000 mm)*

Square shape

Dimensions: about 1000 x 1000 x 720 mm

Upper surface:

Dimensions: about 1000 x 1000 x 25 mm

Skeleton:

Dimensions: about 1000 x 1000 x 690 mm

Tube shape – coated with plastic or chrome-plated material with 4 plastic sliding basements that regulate the height and frame in the shape of a tube, plated (uninterrupted).



#### *Cupboard for files*

Dimensions about 940 x 500 x 900 mm

Corpus (body)

A vertical separation in the middle made of melamin or its equivalent, fixed up and down with screws.

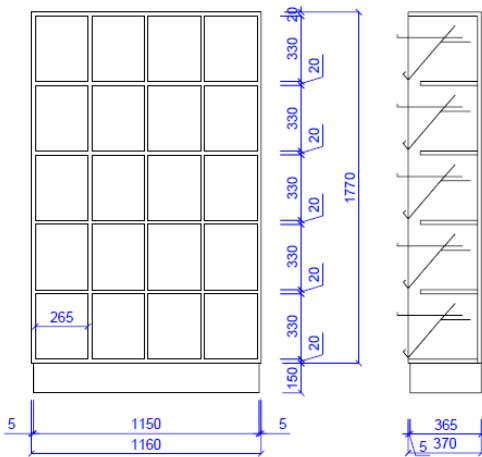
In every vertical sub-division are three drawers, made also of melamin, which will enable the placement of drawers.

16 drawers for about 15.000 kartela that can be easily extracted.

The drawers are made of wood with a place to be attached and removed easily.

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Dimensions of drawers: 210 x 210 x 480 mm



**- Book shelves (depth 30 cm)**

Dimensions: about 900 x 320 x 2080 mm

5 mobile divisions for drawers

According to the accompanying plan-scheme

The heads (main components ) shall be realized by taking into account the possible serial connection according to the space.

Construction with frames composed from main parts located on the sides and a drawer base situated above that is linked and fixed at the height of the top base.

The surface is made of a wooden base coated with rimesso.

4 sliding and movable bases made of plastic to regulate the height.

**- Drawer for papers and magazines**

- According to the accompanying plan-scheme

Dimensions about 1160 x 370 x 1920 mm

The heads shall be realized by taking into account the possible serial connection according to the space. Frame constructions composed of the main components placed on the sides and a drawer base placed in front and attached and fixed at the height of top base.

1 complete plaque placed from the behind

Open part with 20 units

For each unit there is one mobile drawers separation sliding according to a slip with tap that serves as a stopper of the type PVC and attaching slat PVC 35 mm placed in the frontal position.

**i. Multi-purpose space**

The multi-purpose spaces include venues that can be used for several purposes, such as meeting rooms for students and teachers, meeting rooms for teachers and parents, halls for organization of symposiums, display of different film materials, etc. This space shall be designed in the shape of an auditorium and count a seating capacity of at least 100 persons. There shall be a space to serve as a scene or special lectures enabling the school to organize broader activities. The hall shall have an audio system and technics room to control the lights, audio, projector, etc. The hall shall be acoustically functional. This space shall have two entrances, one direct entrance from school corridors and one directly connected to the public space of the school in order to be sufficiently flexible also for beyond school hours. Its minimal height shall be same as two floors of the classes, i.e minimum 5.6 m floor – ceiling.

Equipment for such a multi-functional hall :

- *Overhead projector*

Overhead projector MENTOR 250 basic mode

Technical data

Projektor overhead for daily use

Halogen lamp : 2x 24 V/250 W

Objective with 3 lenses with  $f = 315$  mm

Roboust carcass

Simple use

Rapid inclusive changer of the lamp, scratchless lenses of the make Fresnel, Ventilator, thermal fuse , 5 m network cable.

Weight: 13 kg

Dimensions : L 34 x B 36,5 x H 70 cm

Labor surface 285 x 285 mm

Clearness : about 2.200 ANSI-Lumen

The following picture presents a MENTOR 250 dia film. It is recommended the use of this projectors or a similar make that meets the same criteria

- *dia film projector*

Following are presented two types of different projectors with dia film, one is new with a remote control and the other connected to cable.

Technical data of the type: **OPLITE 7**

1 x Projector

ARCHITECTURAL/ENGINEERING SERVICES FOR PROCESSING OF SPECIFICATIONS OF CONSTRUCTION MATERIALS AND SPECIFICATION OF EQUIPEMENT AND FURNITURE OF SCHOOLS

MINISTRY OF EDUCATION AND SCIENCE

SPECIFICATIONS OF FURNITURE AND LAB EQUIPMENT Page -66-

2 x Lamps 400W - 36V

1 x Bag for its transport

1 x 3280 store for dia film

1 x enlargement objective 70-120 mm (1:2,8)

1 x cable for remote control

1 x control panel with 6 functions of the type IFR 8

The following picture presents a SIMDA dia film. It is recommended the use of this projectors or a similar make that meets the same criteria

Technical data of the type: **OPLITE 4**

1 x Projector

2 x Lamps 250W - 24V

1 x Transportation bag

1 x 3280 store for dia film

1 x enlargement objective 85-150 mm

1 x cable for remote control

Focus regulation + / -

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The following picture presents a SIMDA dia film. It is recommended the use of this projectors or a similar make that meets the same criteria

**169.**

- Working table for conference room

**170.**

**171.** Dimensions: about 1950 x 975 x 720 mm.

**172.** Upper surface : Dimensions : about 1950 x 975 x 30 mm. Made of melamin or equivalent material, with plastic coat and plastic stripe for the edges.

**173.**

**174.** Skeleton: Dimensions: about 1950 x 975 x 685 mm. Metallic tube with four legs based on the floor and equipped with height regulating screws made of PVC.

**175.**

**2.3 Communication Room (IT Room )**

**176.**

- *Specification of Network Equipment*

**177.** The IT room shall meet the following criteria:

- Dimensions of the room at minimum of 2 m x 2 m (4 m2).
- Note: *If it is planned that school will have a server there shall be an air conditioning system where the standard temperature must register a standard of 21 degrees.*
  - The server room shall have a rack for minimal cabling of 24 HU.
  - Minimally a UPS 1000VA for network devices such as switch, router wireless etc.
- Patch-panel 24 Port per cabinet (rack) depending on connections necessary for each position
  - Switch-e Layer 2 for network distribution
- Router Wireless for spreading of internet signal in places destined for internet access.
  - Patch-Cord 1 m or 2 m, Cat6 (for connections between switches and patch panels)
    - Socket Rack 6 with rack

**178.**

- Switch with 5 ports

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>MINIMAL TECHNICAL</b>	
<b>"Type":</b>	Switch Gigabit unmanageable 5 Ports
<b>"Number of Ethernet Ports" :</b>	5 Ports Gigabit
<b>"Forwarding modes":</b>	Store-and-forward
<b>"IEEE Network Protocols":</b>	IEEE 802.3 Ethernet IEEE 802.3ab 1000BASE-T
<b>"Certification":</b>	CE mark
<b>"Accessories included":</b>	Power Supply Power Adapter Quick Install
<b>“Warranty”:</b>	1 year

- Switch with 8 Ports

**179.**

<b>MINIMAL TECHNICAL</b>	
<b>"Type":</b>	Switch Gigabit unmanageable 8 Ports
<b>"Number of Ethernet Ports" :</b>	8 Ports Gigabit
<b>“Forwarding modes”:</b>	Store-and-forward
<b>"IEEE Network Protocols":</b>	IEEE 802.3 Ethernet IEEE 802.3ab 1000BASE-T
<b>"Certification":</b>	CE mark
<b>"Accessories included":</b>	Power Supply Power Adapter Quick Install
	1 year

- Switch with 24 Ports

<b>MINIMAL TECHNICAL CHARACTERISTICS</b>	
<b>Interfaces and HW characteristics</b>	Switch 24 Port L2

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>Port PoE 10/100/1000Mbps RJ45 (Auto Negotiation /Auto</b>	<b>≥24</b>
<b>uplink port (copper/fiber)</b>	min. 2 Combo Optional
<b>100/1000Mbps SFP Slots</b>	
<b>Port Combo</b>	Optional
<b>Port Consol RJ45/RS232</b>	1
<b>Installation in rack</b>	19” rack mountable
<b>"INPUT"</b>	
<b>Nominal voltage</b>	100~240VAC
<b>Frequency</b>	50/60Hz
<b>PERFORMANCE AND FLEXIBILITY</b>	
<b>Bandwidth/Backplan</b>	≥ 48 Gbps
<b>Throughput</b>	≥35 Mpps
<b>Jumbo Frame</b>	Optional
	16k
<b>Fan</b>	Optional
<b>STANDARDS</b>	
<b>IEEE 802.3 - 10BASE-T</b>	Yes
<b>IEEE 802.3u - 100BASE-T</b>	Yes
<b>IEEE 802.3ab -1000BASE-T</b>	Yes
<b>IEEE802.3z -1000BASE-X</b>	Yes
<b>IEEE 802.3ad –aggregation link</b>	Yes
<b>IEEE 802.3x -full duplex on 10BASE-T, 100BASE-TX, and</b>	Yes
<b>IEEE 802.1d -Spanning Tree Protocol</b>	Yes
<b>IEEE 802.1s- multi STP</b>	Yes
<b>IEEE 802.1ë- RSTP</b>	Yes
<b>IEEE 802.1q -VLAN</b>	Yes
<b>IEEE 802.1x - Port-based Network Access Control</b>	Yes
<b>IEEE 802.1p -QoS classification</b>	Optional
<b>IEEE 802.3at</b>	Yes
<b>IEEE 802.3af- PoE</b>	Yes
<b>OPERATIVE SYSTEM</b>	
<b>Oriented for LAN operations</b>	Yes
<b>Upgrade possibility</b>	Yes
<b>QUALITY OF SERVICE</b>	

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<b>Priority queues</b>	Yes
<b>Queue scheduling</b>	SP, WRR
<b>Characteristics Layer 2 and 3</b>	
<b>IGMP Snooping</b>	V1/V2/V3
<b>Spanning Tree</b>	STP/RSTP/MSTP
<b>LLDP</b>	Yes
<b>BPDU Filtering/Guard</b>	Yes
<b>Loopback Detection</b>	Yes
<b>802.3x Flow Control</b>	Yes
<b>VLAN</b>	4k, (Voice VLAN Optional)
	802.3ad LACP
<b>Addressing IPv6</b>	Yes
<b>DHCP/BOOTP, DHCP Snooping, DHCP Option82 for clients</b>	Yes
<b>Dynamic ARP inspection (DAI)</b>	Yes
	Port/Flow
<b>Policy-based routing (PBR)</b>	No
<b>Routing</b>	No
<b>SECURITY</b>	
<b>Access Control List</b>	min L2
<b>TCP/UDP Ports</b>	Yes
<b>Protocoll DSCP</b>	Yes
<b>Authentication</b>	TACACS+ , RADIUS, IEEE 802.1X, Port/MAC, SSH v1/v2, SSLv2/v3/TLSv1
<b>Storm Control</b>	broadcast, multicast, unicast
<b>MANAGEMENT</b>	
<b>Web-based GUI and CLI.</b>	Yes
<b>RS-232 console/ RJ45 Console</b>	Yes
<b>Telnet, SSH</b>	Yes
<b>CPU monitoring</b>	Yes
<b>SNTP</b>	Yes
<b>Upgrade of Firmware</b>	TFTP or Web interface
<b>Led screen</b>	Optional
<b>SNMP v1/v2c/v3</b>	
<b>SYSLOG</b>	Yes
<b>Warranty</b>	1 year

Router Wireless

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>MINIMAL TECHNICAL</b>	
<b>"Type":</b>	Router Wireless Wi-Fi Gigabit
<b>"Operation Mode":</b>	Wireless router mode Access point mode Media bridge
<b>Rating:</b>	Min AC 1900
<b>"WiFi standards":</b>	IEEE 802.11a/b/g/n/ac
<b>"Network Standard":</b>	IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11ac, IPv4, IPv6
<b>"Ports":</b>	(1) Gigabit WAN Port (4) Gigabit LAN Ports (1) USB
<b>"WAN Connection Type":</b>	Automatic IP, Static IP, DDNS, PPTP
<b>"Transfer rate" :</b>	up to 1.3 Gbps
<b>"Routing protocols":</b>	IPSec, L2TP or PPTP
<b>"Band":</b>	Dual band: 2.4 GHz & 5 GHz
<b>"Antennas":</b>	Build-in or external
<b>"Security features":</b>	WEP 64/128-bit WPA2-Personal & Enterprise
<b>"LED indicators":</b>	Yes
<b>"Buttons":</b>	WPS Button Reset Button Power
<b>"System requirements":</b>	Windows 7, 8 ose 10
<b>"Power Supply":</b>	AC Input: 110V ~ 240 V (50 ~ 60Hz)
<b>"Accessories included":</b>	Quick start guide ROM with documentation External Antennas (optional)  Ethernet cable
	1 year



**180. 2.2.3 Hall for physical education**

**High schools**

The high schools must have a special closed premise (gym) for physical education and venues in its external yard.

The minimal dimensions of the gym shall enable playing of basketball and volleyball, i.e 18 m x 26 m. Its minimal height shall be equal to two floors, at minimum 5.6 m floor–ceiling.

In this respect, the physical education hall shall include the following additional venues:

- two wardrobes at minimum 20 m<sup>2</sup> each.
- two toilets – showers at minimum 20 m<sup>2</sup>
- a depot for tools at minimum 20 – 30 m<sup>2</sup>
- venue for teachers with toilet-shower and wardrobe minimum 16 m<sup>2</sup>

181.

182. The gym shall envisage the paving with wood parket and lined for organization of volleyball/ basketball in it.

183. The gym shall also have the supports for placing volleyball nets and baskets and tables for basketball.

184.

185. *Necessary elements for the gym:*

- Portmanto for teachers room
- Clothes hangers (for the gym)
  - Long benches
  - Baskets for internal venues
- Swedish double stairs 2x (1mx220 m)
  - Gymnastics mattress
  - Volleyball net

186.

187.

188.

189.

### 2.3 Administrative Space

190. For each type of planned school following are made evident the number of academic and administrative staff :

Numri I stafit te nevojshem												
Shkolla sipas numrit te klasave	Nr. Nx	Nr Klasave	Mesues	Drejtor	Nendrejtor	Sekretar	Psikolog	Punjes Social	Roje	Punetore pastrimi	Mjek/Infermier	
Shkolle 9-vjecare me 20 klasa, me 30nx/klase	600	20	26	1	1	0	1	1	1	3	1	
Shkolle 9-vjecare me 30 klasa, me 30nx/klase	900	30	40	1	2	0	1	1	1	3	1	
Shkolle 9-vjecare me 20 klasa, me 24nx/klase	480	20	26	1	1	0	1	1	1	3	1	
Shkolle e mesme e larte me 21 klasa, me 30nx/klase	630	21	32	1	1	1	1	1	1	3	1	

191.

#### 192. 2.3.1 Office of headmaster /Office of deputy headmaster

The office of headmaster and deputy headmasters shall be distributed in each floor in order to cover the school territory.

The office of headmaster for high schools shall be at minimum 25 m<sup>2</sup>

The office of deputy headmaster for high schools shall be at minimum 16 m<sup>2</sup>

Table: Dimensions about 3700 x 1020 x 720 mm

Surface about 1950 x 975 x 50 mm Melamin made of natural wood slat

Skeleton

Upper surface is based on two legs with a diameter of 500 mm, made of mass wood painted with natural lacquer.

#### 193. 2.3.2 Secretariat /room for the administration

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

These schools need a secretary office. The space for secretary office shall be at minimum 16 m<sup>2</sup>. It is preferable to be located on ground zero.

- Cupboard for registries

Dimensions about 1260 x 450 x 2080 mm

Material of the corpus and sub-divisions : Melamin plaque – with a plastic coat with plastic coating stripe of the edges.

Divisions are realized by taking into account the serial potential connection according to space and its better exploitation.

1 vertical uninterrupted division

2 fixed drawers separations, in half width

2 drawers separations whose height can be regulated, in half width

1 frame in the telescopic slide (guideline) that can be removed by additions (small case) for inventory sheets and accounting – vertical (size of sheet 380 x 260 mm) in half width.

4 frames to be withdrawn in telescope slides (guideline) for the archive of registries with the dimensions A4 – in half width

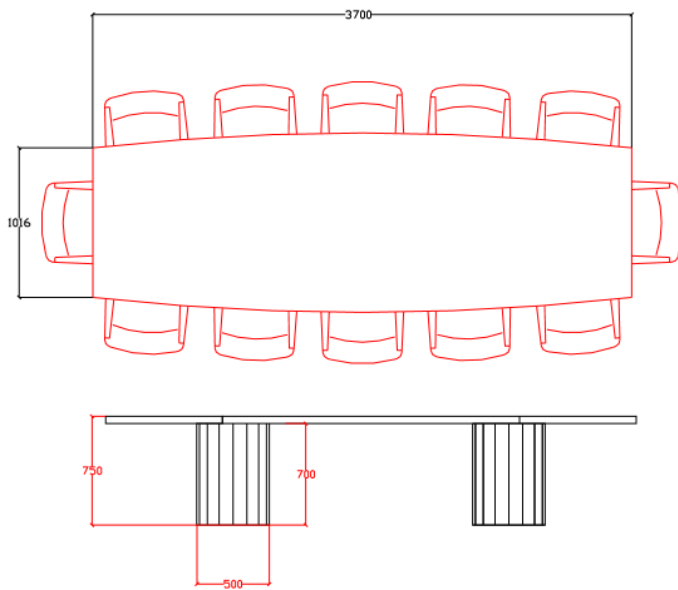
2 rotating doors with a lock and rotating stick with a cylindrical handle and big cylinder suitable for the general closing system.

194.

### 195. 2.3.3 Teachers room

The space for teachers room in high schools shall be 2,5 m<sup>2</sup> per each teacher. If there are several teachers rooms, then it is preferable to have them in different floors.

- Meeting table



Dimensions about 3700 x 1020 x 720 mm  
Upper surface about 1950 x 975 x 50 mm.  
Melamin with natural wooden slat

Skeleton

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

The upper surface is based on two legs with a 500 mm diameter, made of mass wood painted in natural lacquer.

**196. 2.3.4 Supporting staff**

For the supporting staff, where is included the maintenance staff, there shall be envisaged a venue of 2 m<sup>2</sup> per each person.

**197.**

**2.4 Additional venues**

**198. 2.4.1 Hygiene-sanitary**

Sanitaries, teachers, students, male/female

Sanitary block including toilets shall be in every floor.

***Location***

Teaching and recreation classes shall not be further than 50 m from the sanitaries.

***Number***

The determination of number of WC, it is based on norms indicated in the following table, which is valid for all school categories.

	No. students / Teachers	WC cabins	Pissoirs	Sinks
Male				
Students (boys)	About 100	2	4	2
Teachers	About 20	2	2	1
Females				
Students (girls)	About 100	4	One WC with bidet	2
Teachers	About 20	2	One WC with bidet	1
Maintenance room	2 m <sup>2</sup> for each floor			

It is not recommendable to have separated toilets for teachers and students. Thus, it is envisaged that they shall share the same service space, corridor, sink, etc.

A continuous care shall be paid to sanitary equipment to avoid concerning odors.

*Furthermore, it is recommended:*

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Walls shall be resistant to scratches, if possible, not able to write on them, i.e. to pave them with majolica tiles up to the minimal height of 1,6 m.

Doors of the toilets shall be about 70 cm and possible to open from outside.

The pissoir shall have plenty of water to avoid concerning odors.

Minimum dimensions of a WC linkage shall be not less than 1,3 m x 0,9 with a minimal height of 2 m

Sanitations shall be hydro-isolated and with a good ventilation

For washing the WC venues, designers shall envisage a tap that can be connected with an elastic pipe and a drain for collection of waters. The pre-rooms of bigger sanitation groups shall be envisaged also a drain for removal of waters on the floor.

### ***Sanitations for the disabled***

All categories of schools shall have a minimum of a toilet for these persons. For further information refer to CoMD No. 1503, dated 19.11.2008, “For people with disabilities”.

199.

### **200. 2.4.2 Office of the physician**

The office of the physician is located in the ground floor of the building and counts a surface of 17-18m<sup>2</sup>, with recommendable dimensions of 6x3m. The 6m length is necessary for a regular performance of examinations for students visibility and hearing.

The office shall have a sink.

Natural illumination shall be provided by a window with a size equal to 1/6 of the office’s surface. The artificial illumination shall be 100 lux.

### **Cupboard for medical instruments**

Dimensions about 1260 x 550 x 2080 mm

Material of the corpus and subdivisions :

Melamine plaque – with a plastic coating layer and a plastic stripe coating the edges.

Divisions shall be realized taking into account the potential serial connection according to the space and best exploitation.

1 drawers division that may be totally removed with a minimal holding force of 600 N (free illuminated space 250 mm)

2 drawers division that may be totally removed with a minimal holding force of 400 N each (free and illuminated space of 250 mm)

3 drawers divisions moving according to the height: one according to depth of cupboard, wheres the other two up to the depth of about 320 mm.

Divisions located in a depth of about 320 mm are movable according to the entire height, therefore an extra row is necessary for the drawers holder. All the divisions that may be fully removed are equipped on all sides with a holder 15 mm high.

Two rotating doors with a clash-protection slat. Cylindric lock and rotating lever with a big handle where it can be kept and a big cylinder.

**201. 2.4.3 Office of the psychologist**

Office of the psychologist is located in the ground floor of the buildings and counts a surface of 17-18m<sup>2</sup>, with recommendable dimensions of 6x3m. The 6m length is necessary for duly performance of students' examinations.

The office shall envisage a sink

The natural illumination shall be provided by a window with a size equal to 1/6 of the office's surface.

Artificial illumination shall be 100 lux.

The space of psychologist and physician can be integrated together.

**202.**

**203.**

**2.5 Communicative venues, entrances, staircase, corridor, halls**

All the categories of schools required communicative venues, entrance, hall, corridors, staircase, ramps, handrails for the stairs.

School entrances shall enable free entries-exits of students. The dimensions of entry-exist doors shall depend on the number of students in the school. For each school entrance, the designer shall envisage a shelter.

There should be an emergency exit in each floor, in further possible distances from the main entrance. The maximal distance between each door and emergency exit of the floor shall be 30 m. The width of the emergency exit shall be 0,55 m for each 60 persons. The ground floor shall have at least two entrances.

**204. 2.5.1 Corridors**

***They must meet the following criteria:***

The width of the corridor when it serves for classes only from one side shall be at minimum 2m.

The width of the corridor when it serves for classes from both sides shall be at minimum 3 m.

The height of the corridor shall be at minimum 2,8 m floor - ceiling.

Corridors shall provide a natural illumination

**205.**

Furniture to be placed in the corridors:

***Metallic drawers that can be closed by key***

Dimensions: Depending on the number of divisions per width of the division 300 mm / 400 mm, we have: Drawers with a width : width per drawer with 1 division = 300 mm / 400 mm width per drawer with two divisions = 600 mm / 800 mm width for drawer with three divisions = 900 mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

/ 1200 mm width per drawer with 4 divisions = 1200 mm / 1600 mm width per drawer  
with 5 divisions = 1500 mm

The height of drawers depends on the way of organization and is :

For drawer with upper base: 1750 mm For drawers supported on legs: 1850 mm For drawers with a class A bench: 1950 mm. For drawers with class B bench: 2100 mm

Their priorities are:

Optimal self-ventilation

Long-lasting and robust metallic construction

Lateral holes that enable the simple joining of several drawers

Zinc-coated and painted legs

Elaborated round-edges metallic material

Sustainability and protection against physical damage

Metallic stable hook welded in the internal side of the door

Sustainable anti rust paint

Door with a ventilation gap and locking system with an individual key

In the internal part: 1 drawer in the upper part, 250 mm high

**206.**

207. Metallic drawers shall be calculated in order to have a division at the disposal of each student.

**208.**

**209. 2.5.2 Staircase**

***It shall meet the following criteria :***

The width of stairs: minimum 1,2 m /100 students + 0,2 cm for every 100 students.

There shall not be designed or implemented a spiral staircase

The height of the stairs handrail shall be 1,10 m

For stairs with a width up to 1,5 m, handrail is placed only on one side.

For stairs with a width up to 2 m, handrail is placed on both sides

For stairs wider than 2 m, there should be a handrail even in the middle.

Walking space shall be treated with anti slippery material

Staircase shall have a natural illumination

Staircase shall not have more than 18 threads in a ramp

For other elements of staircase design refer to CoMD No. 626, Dt. 15.07.2015 “Normative of dwellings design”.

For the disabled refer to CoMD No.1503, Dt. 19.11.2008 in approval of regulation “Exploitation of facilities by persons with disabilities”.

**210.**

**211. 2.5.3 Lift**

***It shall meet the following criteria:***

The lift shall serve for the vertical movement of the disabled or in other necessary cases, if there is no other technical solution.

Minimal width of the lift door: 85 cm

Holding pipes and control panel of the lift not higher than 90 cm

Dimension of the internal space of the lift not less than 1 m x 1.4 m

**212.**

**213. 2.5.4 Hall**

The hall is a very important and necessary element for schools. Halls on the ground floor enable quick movement of students from main entrance to classes and vice versa, as well as consist of the first visual contact of students with internal venues of the school. In other floors, the halls, beside function of distribution of students to classes, play also the role of venues where students stand during the breaks between teaching hours. Halls serve also as venues where are displayed different boards necessary for performance of the teaching process.

Halls as necessary parts of school organization shall enable the completion of the above-mentioned functions. Their size depends on the number of students, floors and organization of classes.

**214. 2.5.5 Storeroom and additional corners**

The storerooms are venues serving for inventory and other materials. The storeroom surface may vary from 18 m<sup>2</sup> - 40 m<sup>2</sup>.

Technical rooms for installation of the boiler, sanitary water tanks, water pumps and pumps of fire protection system shall have a surface and geometric size that could enable the installation of all equipment and systems according to technical specifications of the producers, by calculating necessary space for repair and maintenance works.

- **2.5.6 External space**

External spaces are divided into three categories:

Spaces determined for recreation zones (fields) and sports premises;

Movement zones include vehicles (streets and parking) and pedestrians (pavement and alleys);

Green spaces and zones planted with trees, bushes, as well as valley.



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Entrance to the school shall be clearly noticeable and easily to be found.

Billboard with the name of the school is placed in a noticeable position from far and in the vicinity of the main entrance.

If a bus stop for students is not situated within a reasonable distance, then there should be taken into consideration the projection of a bus stop near the school. This stop should not be in the school territory and should be defined with the understanding of the local power.

Parking for bicycles, if suitable, shall be easily accessible from the students entrance.

The installation of illumination system in school’s territory shall be taken into consideration, because it will be used even beyond the school timetable. The designing level shall reflect also the location of the school and take into account the use of building beyond the normal school timetable.

Landscape elements: The background must be simple and easy to be maintained. It is encouraged the use of local plants and calculation of spaces where can be carried out garden activities by students. The designing team shall take into account the inclusion of landscape elements to promote a surface that could help the teaching process, as well as spaces for sowing different plant. Large background spaces with solid materials must be avoided.

The perimetrical space of the school shall be surrounded with low walls and fence, or only iron fence at a minimal height of 2m.

The vicinity of streets and vehicles to the schools shall be at minimum. not be near the school, nevertheless there should be an access to school parking space. Where this can be inevitable, it shall have a clear physical distinction (pavement) between the pedestrian and vehicles streets.

If possible, there shall be projected a parking space for about 20% of the staff and at least a parking space for the disabled.

For sports premises, according to normative of designing and construction, there shall be used materials for layers and surroundings that meet the conditions of physical security. Such as absorbing tartan layer, protection materials in the baskets columns or surrounding of fields and wherever will be held physical activities.

Two school objects shall have separated yards, pre-school cycle shall also have a separated year and respective recreation spaces.

In the schools yard shall be envisaged and designed the installation of an art work that could serve as an identifying and orientating element of the school in the community.

In each yard, it is necessary the creation of a volleyball field and basketball field, integrated or in a separated space, as well as the gymnastics corner. In cases, when the territory’s surface enables creation of other sports venues, there can be projected mini-football fields, tennis courts, etc.

### Kindergartens

#### 215.

#### 216.

Based on standards approved by MoES, it is recommended :

The kindergarten shall have up to 100 children, according to the groups and physical spaces of the kindergarten space. It is recommendable that the kindergarten shall not have more than 125 children.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

First group (3-year old) shall have 15 children.

Second group (4 year old) shall 20 children;

2. The kindergarten shall have the block (group), filter room (wardrobe), staff room, kitchen and laundry.

Block (group) of the kindergarten with food supplement shall have:

Reception-wardrobe or filter room, including children wardrobe;

Sitting and games;

Sleeping space;

Eating space;

Sanitaries for each group.

Regarding functional separation and type of functions, the designer shall refer to:

- Standards and norms, criteria of design for kindergarten/kindergartens/nurseries prepared by Ministry of Education and Science (chapter “Kindergartens of children”);
- Hygiene-Sanitary regulation for construction and functioning of kindergartens for children, rules of Ministry of Health and environmental protection No. 105 dated 17.05.1995;

**217.**

**Requirements on construction and functional conditions**

- The kindergarten shall be situated in the ground floor of the building, i.e in the first floor. The block of vertical movement ion (staircase) shall be 15 cm high, secure and suitable for the age group.

**Plastering works.**

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Facade of kindergartens shall be easy to be maintained. The design shall avoid huge glass surfaces if possible.

External plastering shall depend on the type of intervention envisaged by the project.

### **Layers of tiles and other layers**

The floor shall be dry, hygienic, warm and easily cleanable. For sitting, filter, eating and sleeping spaces shall be used the wooden laminate.

Corridors, sanitariums and other venues shall be designed with tiles with minimum of dimensions 40cm\*40 cm gres porcelain. Floors of toilets and their walls at a certain height, shall be isolated and the designer shall provide details of their isolation.

### **Doors, windows**

Doors shall have a full wood modular panels made of MDF and equipped with a wooden case, whereas regarding windows, they shall be made of duralumin of high quality with rotating opening made of double glass and fanlight if necessary.

Windows shall include the moveable nets against insects.

### **Electric, telephonic and computer systems**

218. Consultant shall envisage the lighting of rooms with strong sufficient lighter to guarantee a lighting in line with norms in force and space. Bedrooms shall include artificial lighting according to needs and a sufficient number of sockets for each venue and according to their destination. The distribution of sockets shall take into account the elements of security such as height from floor and type of socket.

219. Control panels shall be placed according to contemporary standards.

The draft IPR shall include lamps with renewable batteries, in case of power cut.

### **Electrical, lighting, emergency and security systems**

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

220. Transformer’s room shall be isolated from other fireproof walls and shall not be connected to the emergency passages.

221. The entire electrical system shall be able to go off in one point in the first floor, which can be easily reached and equipped with respective distinguishing signs. The electric scheme of lighting and power shall be displayed on the set off panel.

222. The emergency lighting shall be automatically set on and last for at least one hour before voltage could go off.

223.

**Outdoor systematization and green spaces**

Designer shall prepare the necessary materials to include in the project a completed environment of the yard of kindergarten with alley, irrigation system for territory, surrounding wall, including games space with respective equipment.

It shall consist of a transparent surrounding (banisters, etc) and guarantee all the security norms and standards regarding such constructions. There shall be included also an incorporated sound system that shall work in all the other venues of the buildings.

Outdoor venues serve for sitting, recreation, especially as game space which are integrated parts of the general education program for these children. These sites shall also be equipped with tents for sun protection. Special importance has also the creation of a green space.

In the framework of outdoor systematization shall be taken into consideration the following activities:

Corner of water and sand;

Vitality corner;

Theater corner;

Corners for outdoor games,

Green spaces, benches, sun tents, etc

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Designer shall provide details about the respective layers and their implementation technology, as well as combine game space with green venues, taking into account also the realization of game spaces for children of this group age.

To keep the kindergarten’s yard clean and establish bins for wastes in the respective yard and especially near the benches.

### 224.

## 3.2 Furniture and equipment for kindergarten according to functions

### 3.2.1 Group venues (sitting + games)

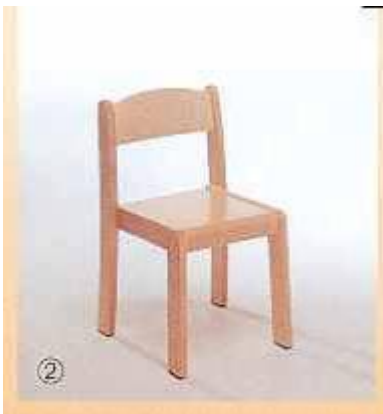
Chairs for children in the kindergartens according to dimensions is classified into two groups as in the following table:

Nr.	Grupi	Lartësia e sipërfaqes së tavolinës	Lartësia trupore e fëmijëve	Lartësia e ndenjësës së karriges
1	2	50	113 – 127	28
2	3	55	128 - 142	32



Material of the skeleton:

Mass oak wood with rounded lips (to avoid possible damage)



Surface painted in lacquer, colorless and water resistant and not harmful for the health.

Material for the seat and back :

Plywood in **ANATOMIC** shaped and rounded lips.

Surface painted in lacquer, colorless and waterproof, not harmful for the health.

### Round table

Same as chairs, even tables are classified into two groups according to height :

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Round table for a group of children with a diameter of 600 and 1200 mm.

<b>Nr.</b>	<b>Grupi</b>	<b>Lartësia e sipërfaqes së tavolinës</b>	<b>Lartësia trupore e fëmijëve</b>	<b>Lartësia e ndenjësës së karriges</b>
1	2	50	113 – 127	28
2	3	55	128 - 142	30

Material of the skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in

lacquer, waterproof and not harmful for the health.

The upper surface material: MDF or melamine with plastic layer and plastic lateral stripe, with rounded lips. The surface is waterproof and not harmful for the health.

***Square table***

Rectangular table for children with dimensions:

1200 x 800 mm      800 x 800 mm      1200 x 600 mm      600 x 600 mm

Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health).

The upper surface material: MDF or melamine with plastic layer and plastic lateral stripe, with rounded lips. The surface is waterproof and not harmful for the health.

***Trapezoidal Table***

Trapezoidal table for children with dimensions: 1200 x 600 x 600 mm

Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health).

Upper surface material: MDF or melamine with a plastic layer and lateral plastic stripe, rounded lips.

***Six-angle table***

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Six angle table for children with a diameter of 1200 mm. Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health).

The upper surface material: MDF or melamine with plastic layer and plastic lateral stripe, with rounded lips. The surface is waterproof and not harmful for the health.

### *Cupboards*

Cupboards for kindergartens are numerous from the point of view of the shape and use. Following are some types of cupboards :

1. Cupboard for toys 2. Cupboard for books 3. Cupboard with two drawers in the lower part Raft 4. Cupboard for personal drawers

Material for 4 types: Melamine plated with natural wood with rounded .

Dimensions:

Cupboard for toys: 900 x 400 x 760 mm 3 drawers submissions in entire width, regulatory. Top base 100 mm See picture 1 Cupboard for books: 900 x 400 x 760 mm 2 subdivisions for books with an 45 ° inclination and protective to avoid books slippery. Top base 100 mm See picture 2

Cupboard with two drawers in the lower part: 1200 x 400 x 760 mm

1 vertical division in the middle, 2 drawers divisions in each subdivision ,1 drawer in each subdivision. See picture 3

Cupboard for personal drawers: 900 x 400 x 760 mm. Five 5 subdivisions in all the width. 15 drawers that can be easily removed.



*C  
upboard  
for toys*

Dimensions t: 900  
x 400 x  
760 mm  
600 x 400  
x 760 mm  
Material:  
Veneered  
melamine  
with  
natural

wooden slat with rounded lips.

Divisions have been realized taking into account a potential connection in series according to space and a better exploitation.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

1 vertical division in the middle with 3 divisions of drawers in each subdivision with a regulatory height, 4 rotating doors with a protection slat against clashes. Top base 100 mm

### *Filter rooms (wardrobe):*

#### *Wardrobe for children*

Wardrobes for children are classified as following :

Wardrobe for children with bench to sit on one side. Dimensions: height 1100 mm; depth 390 mm; height of seat 330 mm.

Wardrobe for children with a bench to sit on both sides. Dimensions: Height 1100 mm; Depth 1120 mm; Height of seat 330 mm.

Wardrobe for children with a bench to sit on one side and a place for placing shoes, hats. Dimensions: Height 1100 mm; width 570 mm; height of seat 330 mm.

Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health). Dimensions of wood 40 x 40 mm

Material of the seat: Slat made of oak wood, with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health). Thickness of slats minimum 30 mm.

In the upper part are placed hooks for hanging clothes whereas in the lower part of the seat are placed the shoes on slats.

### **3.2.3 Bedrooms**

#### *- Beds for children up to 6 year old*

The children bed shall be single (not sailor bed), and shall be made of wood. It shall be not be high from ground.

### **3.2.4 Kitchen**



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Cooking shall have a special space, well-aspirated and accessible from corridors of the kindergarten and with groups. In this room the natural lighting shall be good and ventilation of space beside natural shall also be equipped with ventilation system (beside aspirator). Windows shall have suitable openings for their location in relation to the kitchen cupboards. Kitchen walls shall all be coated with majolica tiles with large dimensions at a minimal height of 1.5 m from the floor level.

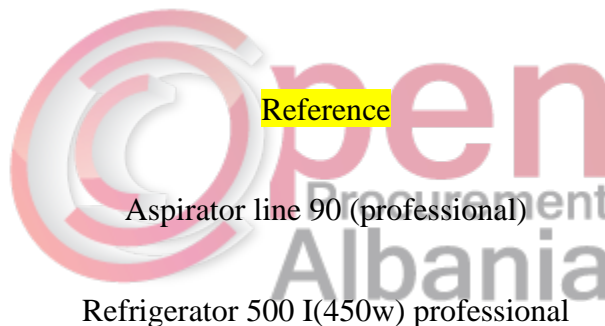
Artificial lighting shall be sufficient and lighter shall be hermetic, suitable for cooking steam resistant.

The kitchen must contain :

Professional sink 1.8x0.7 m stainless with two holes completed with taps + accessories which may be or not be part of kitchen cupboards or stand alone.

Cooking cooker with gas 4 cooking lines 90 (professional)

Kitchen cupboard with MDF buffet. As long as the cooker will use gas then shall be included a good solution according to rules for pressure dishes.



Aspirator line 90 (professional)

Refrigerator 500 I(450w) professional

Stainless kitchen table 1.2x70x85h to enable the cutting of vegetables

Meat cutting machine

Bin for daily wastes

### 3.2.5 Laundry

The laundry shall have a space destined for washing, drying and placement of clothes ready to be used.

This space shall have all the conditions and necessary installations for the equipments:

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Professional washing machine 7 kg

Professional clothes dryer

**225.**

**3.3 Didactic materials**

Based on a document issued from the Institute for Development of Education, No. 340 prot., dated 29.05.2017, protocoled by Tirana Municipality under no. 16532/1 prot., dated 08.06.2017, didactic materials that will be put at disposal from the winning economic operator shall have the following specifications :

- For Laboratory of Informatics

No.	DESCRIPTION OF DEVICE	UNIT/QUANTITY	TECHNICAL SPECIFICATIONS
1.	TABLETS PRESTIGIA	40 pieces	PRESTIGIO MULTIPAD Internal Memory Size 25GB, RAM 2GB
2.	COMPUTERS	40 pieces	HDD 160 GB/250 GB Processor Core 2 Duo 30GH <sub>2</sub> Ram (2-4) GB Monitor 19
3.	SOFTWARE OF PACKAGES	40 pieces	Office 2013, WINDOWS 7
4.	CLIENT FOR ELECTRICAL TEXT	40 pieces	
5.	LAPTOP LENARE LENOVO	1 piece	Lenovo - 15.6" Laptop - Intel Core i3 - 6GB Memory - 1TB Hard Drive  PROCESSOR I5, 8GB RAM, GRAPHIC CARD INTEL 4000
6.	CUPBOARD FOR TABLETS	1 pieces	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

7.	UPS INTERNET	1 piece	650V FOR EACH
8.	PROJECTO	1 piece	EPSON 673595
9.	RENTER	1 piece	FG-60 D
10.	WEB CHANGE SERVER APLIANSYUS		HP Server G5 or G6
11.	CACHEBOX	1 piece	170
12.	WIRELESS		HPMSM 430
13.	RACK	1 piece	22U DIMENSIONS 600X1000
14.	CABLE GRID	1 piece	
15.	SWITCH 24 PORT		24 PORT POE GIGABIT
16.	HP	1 piece	2530-24G-POEE+SWTCH
17.	PRESENTATION WHITEBOARD	2 pieces	

- For Laboratories of Biology

No.	Description	Duration in the course of years	Unit	Quantity	Technical specifications
1	Apparatus for photosynthesis	10	Piece	1	Glass Ballon, scaled test tube with caps, with instructions
2	Retroprojector	20	Piece	1	Current: AC110/220 V 60/50Hz, Power 350W dimensions 285 x 285 mm, distance of projection 1.5-3.5 m, height ~300 mmm,

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

					halogen lamp of 24V 300W
3	Stripe Meter	10	Piece	5	1-2 m
4	Compass	15	Piece	10	ø 40-50 mm
5	Entomological net	5	Piece	10	Metallic circle,polyester net,plastic stick
6	Entomological neddle	1	Piece	200	Metallic, enamelled, coloured, 40mm
7	Chemical cup of different sizes	5	Set	5	glass, scalable with mouth, degrees, 50ml up to 500ml
8	Glass Cylinders of different sizes	5	Set	5	glass, scalable with mouth, degrees,10ml up to 250ml
9	Test tube clip	15	Piece	10	Wood-made
10	Plastic vessel with loupe cap for collection of insects, etc	15	Piece	10	Organic glass cap with loupe ø40mm-60mm,3x ose 5x
11	Alcohol lamp	10	Piece	10	Standard glass, with plastic cap
12	Hand magnifying glass	10	Piece	10	enlargement 2x ,3x
13	Test tube holder	15	Piece	10	standard, wood or plastic material ø18-20mm
14	Dropper	5	Piece	10	Glass + rubber
15	Scalable pipette	5	set	10	Glass with ø 900mm
16	Petri Dishes	5	Piece	10	Glass, no lips
17	Test tubes 12 x 100mm	5	Piece	100	Glass, no lips
18	Test tubes 16 x 150mm	5	Piece	200	Glass , enamel cap
20	Air Thermometer	10	Piece	5	With alcohol 0-40 °C
21	Laboratory Thermometer 0-50°C dhe -10-110°C	10	Piece	10	With alcohol
22	Glass mixer	5	Piece	10	Glass, length 200mm
23	Clock glass	5	Piece	10	Glass. ø70mm
24	Set of preparation tools (with 7 accessories)	10	set	10	With accessories: scalpel, scissors, preparation needle, tweezers
25	Lama	2	Box	5	Dimensions:: 25,4mm x 76,2mm
26	Lamela	2	Box	5	20mm x 20mm
27	Biological microscope	10	Box	10	Magnifying 600 x, ocular, three objectives
28	Alcohol per djegie	1	bottle	5L	Denaturalized, technical 92-96 Degrees
29	Dropper bottle 60 ml no color	1	Piece	10	Enamel
30	Dropper bottle 60 ml no color	2	Piece	10	Enamel
19	Glass bottle for colorless liquids 60 ml	1	Piece	20	Enamel cap
	Glass bottle for colorless liquids 60 ml	5	Piece	20	Enamel cap

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

31	Conical bulbs of different sizes	5	Piece	20	glass,with mouth,50ml deri 500ml
32	Funnels	5	Piece	10	glass, ø75mm
33	Box for lama	5	Piece	5	Plastic box with 25 separated places
34	Holder	2	Piece	10	Metallic with three legs
35	Ceramic net	15	Piece	10	Metallic net with ceramic
36	Filter letter	1	box	3	ø 120 mm, boxes with 100 piece
37	Dissection plates	10	Piece	10	Metallic pan with wax or parafin
38	Half analytical scales with weighting stones	10	Piece	2	Maximal Capacity 1000g, Sensitivity 50mg, error margin 1.5, ø120mm
39	Washing Pisetta	10	Piece	10	Plastic with glass gyp
40	Laboratory Stative with Accessories	15	set	5	Basement + rods+metallic circle+pressing+fixing
41	Brush for washing vessels	1	Piece	10	Plastic threads
42	Spatula spoon	10	Piece	10	Porcelain
43	Pezafilters	5	Piece	10	glass, low shape, 50mm x 30mm
44	Vessel for aq uariums and incubators	5	Piece	2	glass, square
45	Porcelain bowl	10	Piece	3	With supressor ø 90 mm
	<b>Chemical Reagents</b>				<b>For all the list of reagents shall be meet the following specifications :</b>
46	Ascorbic Acid	1	bottle	100g	
47	Etnoic Acid (Acetic Acid)	1	bottle	100ml	Reagent of "p" classification . Packaged according to rules of technical security
48	Soluble Amidon	1	bottle	200g	The label shall contain : Description, chemical formula, expiry date
49	Ethanol 96°	1	bottle	500ml	Molar mass, quantity, signs of risks
50	Formaline	1	bottle	1000 ml	
51	Natrium Hydrogen Carbonate	1	bottle	100g	
52	Amon Hydroxide	1	bottle	250ml	
53	Calcium Hydroxide	1	bottle	100g	
54	Violet Metil	1	bottle	25g	
55	Chlorophorm	1	bottle	250ml	
56	Calcium Chlorur	1	bottle	100g	
57	Calium Chlorur	1	bottle	100g	
58	Parafin	1	plastic	200g	
59	Fehling A Solution	1	bottle	250 ml	
60	Fehling B Solution	1	bottle	250 ml	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

61	Biuret reaction	1	bottle	250 ml	
62	Potassium Sodium Tartrate	1	bottle	100g	
63	NatriumTetraborat (Borax)	1	bottle	200g	
64	Iod-iodine of Calium solution	1	bottle	250ml	
65	Fenolftaleine	1	bottle	100ml	
66	Sodium Citrate	1	bottle	100g	
67	Indication letter pH	1	box	2	pH 0-14
	<b>Microscopic Preparations</b>				
68	Kelps – (Chlamydomonasi – one-cell)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
69	Kelps - (Spirogyra with chloroplasts in a cell)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
70	Amphioxus – roundmouther (Matured Individual)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
71	Bacteria - (types of bacteria)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
72	Tiglia. Vertical cut of the stem of two-cotyledons.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
73	Frogs – Larval Development (10mm)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
74	Frogs – Larval Development (3mm)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
75	Epithelium of human mouth	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
76	Euglena	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
77	Ganglion nerve (with nerve fibres and nerve cells)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
78	Human Blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
79	Adipose Tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
80	Epithelial tissue – (simple, with one layer)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
81	Bone Tissue. Vertical Cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
82	Smooth muscle tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
83	Layer muscle tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
84	Nerve tissue – vertical cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
85	Different legs of insects	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>86</b>	Sunflower (Heliantus). Cut of matured root of two-cotyledons.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>87</b>	Maize (Zea mays). Vertical cut typical of one-cotyledon stem	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>88</b>	Human Lungs. General View	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>89</b>	Mosquito – Mouth Apparatus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>90</b>	Medullary Bone	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>91</b>	Paramecium – General Constrution	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>92</b>	Paramecium – Reproduction	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>93</b>	Pines (Pinus) – Leaf cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>94</b>	Planctons (Cyclops)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>95</b>	Planctons (Daphnia)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>96</b>	Allium. Longitudinal cut, epiderma, cell and nucleus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>97</b>	Allium. Type of roots of different levels of one-cotyledons	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>98</b>	Tapeworm in cattles (head)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>99</b>	Tapeworm in cattles (matured proglottid)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>100</b>	Stitch (Vertical cut )	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>101</b>	Different types of pollen. Middle multi-purpose cut.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>102</b>	Human Kidney - cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>103</b>	Lilium. Vertical cut typical of monocotyledons leaves .	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>104</b>	Small Intestine. Vertical cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>105</b>	Artery, blood vessels	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>106</b>	Nucleus of cell	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>107</b>	Esophagus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>108</b>	Womb of gall	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>109</b>	Frog	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>110</b>	Rabbit blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>111</b>	Pigeon blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>112</b>	Fish blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>113</b>	Hypophysis gland	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

114	Lymphatic gland, section	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
115	Tiroide Gland	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
116	Milk glands	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
117	Chloroplasts	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
118	Chromosomes	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
119	Human skin with sweat glans	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
120	Human Liver	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
121	Mitosis	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
122	Pancreatic islets of Langerhans	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
123	Medullary bone	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
124	Human spermatozoid, sperm stain	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
125	Human Testes	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
126	Trachea, longitudinal cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
127	Rabbit Uterus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
128	Human Uterus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
			piece		
	<b>Liquid preparations</b>		piece		
129	Lizard Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
130	Chicken Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
131	Rabbit Dissection	10	piece	1	Dissection in formalin closed in a glassware , 200 x 70 x40 mm
132	Frog Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
133	Fish Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
	<b>Biological models (Plastic)</b>		piece		
134	Archeopterix (model of fossil)	15	piece	1	Relief PVC, 400 x 300 mm
135	Archeopterix (model of poultry )	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
136	Anatomic bust of man with removable head and other parts 85 cm	15	piece	1	3D model made of PVC and colorant, not toxic, length 850 mm, with removable parts, PVC support
137	Glomerules	15	piece	1	3D model made of PVC and colorant, not toxic,250 x 350 mm



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>138</b>	Comparison of limbs in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, enlarged, limbs of 5 types of vertebrates
<b>139</b>	Larynx	15	piece	1	3D model made of PVC and colorant, not toxic,magnified
<b>140</b>	ADN Model (helicoïdal)	15	piece	1	PVC, not toxical colorant, with removable parts
<b>141</b>	Vertical cut of leaf	15	piece	1	3D model made of PVC and colorant, not toxic,, 300x 400 mm
<b>142</b>	Vertical cut of stem	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>143</b>	Model of dicotyledon flower	15	piece	1	3D model made of PVC and colorant, not toxic,180x 300 x 60 mm
<b>144</b>	Model of monocotyledon flower	15	piece	1	3D model made of PVC and colorant, not toxic, 250 x 350 mm
<b>145</b>	Cross-section of the root	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>146</b>	Eye Anatomy	15	piece	1	3D model made of PVC and colorant, not toxic, external, middle ear, magnified 6 x, hearing bones, pipe, canals etc
<b>147</b>	Brain anatomy	15	piece	1	3D model made of PVC and colorant, not toxic, with two separated hemispheres, 2 movable lenses and removable components, magnified 3 x
<b>148</b>	Ear anatomy	15	piece	1	Model in basorelief made of PVC and non toxic colorants,70 x magnified, hair, epiderm, sweat-fat glands, etc.
<b>149</b>	Heart Construction	15	piece	1	3D model made of PVC and colorant, not toxic, with 3 removable parts, magnified 3-4 x
<b>150</b>	Nephrons	15	piece	1	3D model made of PVC and colorant, not toxic, magnified
<b>151</b>	Jaws, teeth	15	piece	1	3D model made of PVC and colorant, not toxic, magnified, lower jaw with mobile teeth
<b>152</b>	Vertical cut of head	15	piece	1	3D model made of PVC and colorant, not toxic, 250 x 350 mm
<b>153</b>	Vertical cut of skin	15	piece	1	Model in basorelief made of PVC and non toxic colorants,70 x magnified, hair, epidermis, sweat-fat glands, etc.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>154</b>	Urinary system	15	piece	1	3D model made of PVC and colorant, not toxic magnified,
<b>155</b>	Human Skeleton 85cm	15	piece	1	3D model made of PVC and colorant, not toxic, length 850 mm, metal base
<b>156</b>	Model of plant cell	15	piece	1	3D model made of PVC and colorant, not toxic, 180x 300 x 60 mm
<b>157</b>	Kidney	15	piece	1	3D model made of PVC and colorant, not toxic, with removable parts, where are noted: hull,pyramids,cups,waterflow, 3-4 x
<b>158</b>	Model of animal cell	15	piece	1	3D model made of PVC and colorant, not toxic,, 180x 300 x 60 mm
<b>159</b>	Superstructure of cell (with cell organs)	15	piece	1	3D model made of PVC and colorant, not toxic,, 700 x400 x500 mm
<b>160</b>	Digestion apparatus	15	piece	1	3D model made of PVC and colorant, not toxic, with removable parts , 3-4 x
<b>161</b>	Model of protein	15	piece	1	PVC, non-toxic colorant, with removable parts
<b>162</b>	Models of simplified nucleotides for students	15	box	10	PVC, non-toxic colorant, with removable parts
<b>163</b>	Comparison of brain in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, magnified , brain of 5 types of vertebrates
<b>164</b>	Comparison of heart in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, magnified , heart of 5 types of vertebrates
<b>165</b>	Model of liver, with spleen, gall, pancreas and duoden	15	piece	1	3D model made of PVC and colorant, not toxic, magnified,
<b>166</b>	Neuron Model	15	piece	1	3D model made of PVC and colorant, not toxic, magnified
			piece		
	<b>Teaching tables on the wall</b>		piece		Content of tables in line with program requirements. In Albanian Language
<b>167</b>	Hearing Apparatus	10	piece	1	One or two sided material, plasticized or banner
<b>168</b>	Excretory Apparatus	10	piece	1	With plastic slide and movable hanger
<b>169</b>	Respiratory apparatus	10	piece	1	70cm x 100cm
<b>170</b>	Eye Apparatus	10	piece	1	
<b>171</b>	digestion apparatus	10	piece	1	
<b>172</b>	Human Teeth	10	piece	1	
<b>173</b>	ADN structure	10	piece	1	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

174	Evolution of animal world	10	piece	1	
175	Birth of conditioned reflexes	10	piece	1	
176	Liver- supporting organ of digestion apparatus	10	piece	1	
177	Human Muscles	10	piece	1	
178	Anatomic Construction of bone	10	piece	1	
179	Construction of flower in enclosed plants (Angiosperms)	10	piece	1	
180	Female Genital Organs	10	piece	1	
181	Male Genital Organs	10	piece	1	
182	External View of Heart	10	piece	1	
183	Blood Composition	10	piece	1	
184	Ecological Pyramide	10	piece	1	
185	Components parts of skin	10	piece	1	
186	Positions of fetus before birth	10	piece	1	
187	Reproduction of cells - Mytosis	10	piece	1	
188	Reproduction of sexual cells - Meyosa	10	piece	1	
189	Blood Circulatory System	10	piece	1	
190	Nervous System	10	piece	1	
191	Vegetative Nervous System	10	piece	1	
192	Human skeleton	10	piece	1	
193	Plant cell structure	10	piece	1	
194	Animal cell structure	10	piece	1	
195	Mendel Legacy (1 <sup>st</sup> Law of Mendel)	10	piece	1	
196	Mendel Legacy (1 <sup>2nd</sup> Law of Mendel)	10	piece	1	
197	Mendel Legacy (3 <sup>rd</sup> Law of Mendel)	10	piece	1	
198	AIDS Virus	10	piece	1	
199	Drugs	10	piece	1	
200	Risks from alcohol	10	piece	1	
201	Risks from smoking	10	piece	1	
202	Biosynthesis of proteins	10	Piece	1	
203	Earth's Terrestrial Biomes	10	Piece	1	
204	Air pollution : Smog	10	Piece	1	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>205</b>	Air pollution : Carbon monoxide and sulphur dioxide	10	Piece	1	
<b>206</b>	Sea pollution	10	Piece	1	
<b>207</b>	Devastation of tropical forests	10	Piece	1	
<b>208</b>	Food chain in the sea	10	Piece	1	
<b>209</b>	Food Pyramide in the lake (Ecological Pyramide)	10	Piece	1	
<b>210</b>	Forests echosystems	10	Piece	1	
<b>211</b>	Environment Protection from Wastes	10	Piece	1	

- For Chemistry Laboratories

	<b>CHEMICAL REAGENTS</b>				<b>Technical Specifications</b>
	<b>Description</b>	<b>Duration</b>	<b>Unit</b>	<b>Quantity</b>	<b>For all reagents, the list must meet these specifications:</b>
1	Salicylic Acid	1	bottle	100g	Clasificated reagent "p" . Packaged as technical safety rules. Label shall have: Description, chemical formula, expiry date, molar mass, quantity,risks signs
2	Benzoic Acid	1	bottle	100g	
3	Oleic Acid	1	bottle	250ml	
4	Ethanoic Anhydrite	1	bottle	250ml	
5	Ethanoic Acid glacial	1	bottle	500ml	
6	Ethandoic Acid	1	bottle	200g	
7	Phosphoric Acid 85%	1	bottle	250ml	
8	Chlorhydric Acid 36%	1	bottle	2000 ml	
9	Methanoic Acid	1	bottle	250ml	
10	Nitric Acid 63%	1	bottle	500ml	
11	Silicic Acid	1	bottle	100g	
12	Sulfuric Acid 98%	1	bottle	1000 ml	
13	Sulfanilic Acid	1	bottle	50g	
14	Perchloric Acid 65%	1	bottle	100ml	
15	Aluminium (powder)	1	bottle	50g	
16	Soluble starch	1	bottle	100g	
17	Aniline	1	bottle	100ml	
18	Copper (pieces)	1	bottle	100g	
19	Copper – powder	1	bottle	100g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

20	Benzene	1	bottle	250ml
21	Bromothymol blue	1	bottle	25g
22	Brom (brom water)	1	bottle	100ml
23	Potassium bromide	1	bottle	200g
24	Butanol- 1	1	bottle	100ml
25	Cyclohexane	1	bottle	100ml
26	Dextrine	1	bottle	100g
27	Natrium dihydrogen phosphate	1	bottle	100g
28	Ammonium Dichromate	1	bottle	200g
29	Potassium dichromate	1	bottle	100g
30	Natrium dichromate	1	bottle	100g
31	Dchloroethane	1	bottle	100ml
32	Ethanol 96% (ethyl alcohol)	1	bottle	500ml
33	Denatured ethanol	1	bottle	5 L
34	Ethanoate ethyl	1	bottle	250ml
35	Diethyl ether	1	bottle	250ml
36	Ethanoat sodium	1	bottle	200g
37	Lead ethanoate	1	bottle	200g
38	Calcium ethanoate	1	bottle	200g
39	Calcium phosphate	1	bottle	200g
40	Calcium fluor	1	bottle	100g
41	Phenol	1	bottle	100g
42	Phenolphthalein	1	bottle	250ml
43	Potassium Ferricyanide	1	bottle	100g
44	Potassium Ferrocyanide	1	bottle	100g
45	Formaldehyde (formic aldehyde )40%	1	bottle	250ml
46	Red phosphorus	1	bottle	50g
47	Sodium phosphate	1	bottle	100g
48	Iron powder	1	bottle	200g
49	n – Hexane	1	bottle	100ml
50	Hydrogen phosphate sodium	1	bottle	100g
51	Hydroxide amides (ammonia in water 25%)	1	bottle	500ml
52	Hydroxide Calcium	1	bottle	200g
53	Hydroxide Potassium	1	bottle	200g
54	Hydroxide sodium	1	bottle	500g
55	Universal indicator pH: 0-14 (Indicator)	1	Kuti	3

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

56	Iod (crystals)	1	bottle	50g	
57	Potassium iodines	1	bottle	100g	
58	Potassium iodide	1	bottle	100g	
59	Calcium (metallic)	1	bottle	50g	
60	Potassium (metallic)	1	bottle	25g	
61	Carbamide (urea)	1	bottle	100g	
62	Activ Carbon	1	bottle	25g	
63	Ammonium carbonate	1	bottle	100g	
64	Sodium carbonate	1	bottle	200g	
65	Calcium Carbonate (granuls)	1	bottle	200g	
66	Calcium Carbonate (powder)	1	bottle	200g	
67	Calcium Carbide	1	bottle	200g	
68	Tin- grain (granuls)	1	bottle	100g	
69	Chlorates of potassium	1	bottle	500g	
70	Ammonium chloride	1	bottle	200g	
71	Copper chloride (II)	1	bottle	100g	
72	Barium chloride	1	bottle	200g	
73	Chlorine iron (III)	1	bottle	200g	
74	Hydrate calcium chloride	1	bottle	200g	
75	Potassium chloride	1	bottle	100g	
76	Magnesium chloride	1	bottle	100g	
77	Sodium chloride	1	bottle	200g	
78	Copper chloride	1	bottle	100g	
79	Nickel chloride	1	bottle	100g	
80	Tin chloride (II)	1	bottle	100g	
81	Cadmium chloride	1	bottle	100g	
82	Lithium chloride	1	bottle	100g	
83	Strontium chloride	1	bottle	100g	
84	Aluminium chloride	1	bottle	100g	
85	Zinc chloride	1	bottle	200g	
86	Mohr's salt	1	bottle	100g	
87	Potassium chromium sulfate	1	bottle	100g	
88	Sodium chromate	1	bottle	100g	
89	Xylene	1	bottle	250ml	
90	Blue reagent paper	1	Box	3	
91	Red reagent paper	1	Box	3	
92	Filter paper 120mm	1	package	3	
93	Magnesium (powder)	1	bottle	50g	
94	Magnesium (stripe)	1	m	5	
95	Metanol (metilic alcoho)	1	bottle	250ml	
96	Metilorange (indicator)	1	bottle	25g	
97	Red metil (indicator)	1	bottle	25g	

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98	Natrium (metallic)	1	bottle	50g
99	Ammonium nitrate	1	bottle	200g
100	Aluminium Nitrate	1	bottle	100g
101	Silver Nitrate (crystals)	1	bottle	25g
102	Copper Nitrate	1	bottle	100g
103	Barium Nitrate	1	bottle	100g
104	Cobalt Nitrate	1	bottle	100g
105	Potassium Nitrate	1	bottle	200g
106	Natrium Nitrate	1	bottle	200g
107	Lead Nitrate	1	bottle	200g
108	Sodium Nitrite	1	bottle	100g
109	Nitrobenzene	1	bottle	250ml
110	Octanol – 1	1	bottle	100ml
111	Aluminium oxide	1	bottle	200g
112	Lead oxide (II)	1	bottle	200g
113	Iron oxide (III)	1	bottle	200g
114	Calcium Oxide (granuls)	1	bottle	200g
115	Chromium Oxide (VI)	1	bottle	100g
116	Phosphorus Oxide (V)	1	bottle	100g
117	Manganese Oxide IV. (manganese dioxide)	1	bottle	200g
118	Magnesium Oxide	1	bottle	200g
119	Lead Oxide (IV)	1	bottle	100g
120	Zinc Oxide	1	bottle	200g
121	Paraffin	1	bottle	200g
122	Potassium permanganate	1	bottle	500g
123	Propanetriol 1,2,3, (Glycerine)	1	bottle	250ml
124	Propanone	1	bottle	250ml
125	Natrium Peroxide	1	bottle	100g
126	Sulfur (powder)	1	bottle	100g
127	Ammonium sulphate	1	bottle	200g
128	Aluminium sulphate	1	bottle	200g
129	Carbon Sulfur	1	bottle	100ml
130	Ammonium Sulfur	1	bottle	100ml
131	Natrium Sulfur	1	bottle	100g
132	Chromium Sulphate	1	bottle	100g
133	Sodium Sulphite	1	bottle	200g
134	Hydrated copper Sulphate	1	bottle	500g
135	Iron Sulphate (II)	1	bottle	100g
136	Calcium Sulphate	1	bottle	100g

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

137	Potassium Sulphate	1	bottle	100g	
138	Nickeli Sulphate	1	bottle	100g	
139	Magnesium Sulphate	1	bottle	100g	
140	Sodium Sulphate	1	bottle	100g	
141	Zinc Sulphate	1	bottle	100g	
142	Sulfocianuro ammonia	1	bottle	100g	
143	Sulfocianuro potassium	1	bottle	100g	
144	Iron Sulfur	1	bottle	100 g	
145	Potassium Sulfur	1	bottle	100g	
146	Aluminium shape	1	bottle	100g	
147	Chrome Shape	1	bottle	100g	
148	Potassium and sodium tartrate	1	bottle	100g	
149	Tetraclorometano (carbon tetrachloride)	1	bottle	100ml	
150	Turpentine	1	bottle	100ml	
151	Sodium thiosulfate	1	bottle	100g	
152	Triclorometan (Chloroform)	1	bottle	100ml	
153	Toluene	1	bottle	100ml	
154	Granular zinc (granuls)	1	bottle	200g	
155	Zinc powder	1	bottle	100g	
	<b>Didactic devices and measuring devices</b>				
	<b>Description</b>		<b>Unit</b>	<b>Quantity</b>	
156	Kipp's apparatus	10	piece	2	classic type with security tubing 125ml
157	Simple Kipp's apparatus	5	piece	5	with buckle insurance
158	Electrolytic electrical conductivity devices	5	piece	5	with carbon electrodes
159	Vacuum filtering equipment	5	piece	2	erlenmayer bunsen, porcelain funnels, glass pumps
160	Liquid distillation apparatus	5	piece	3	Insurance funnel
161	Apparatus for electrolysis of water (Hoffman's Voltmeter)	10	piece	3	With two electrodos , continued current 6-12V
162	Device for water synthesis (Eudiometer)	10	piece	1	With escalation, glass
163	Simple device for studying the properties of gases	5	piece	10	refractory glass
164	Simple apparatus for gases that are not dissolved in water	5	piece	10	refractory glass
165	Simple apparatus for gas preparation heavier than air	5	piece	10	refractory glass
166	Simple apparatus for gas preparation lighter than air	5	piece	10	refractory glass
167	Pajisje te thjeshta per djegien e gazeve	5	piece	10	refractory glass
168	Pajisje me spekter te gjere perdorimi	5	piece	10	refractory glass
169	Apparatus for electrolysis of salt	5	piece	5	Glass funnel U, carbon elektrodos



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

170	Apparatus for the preparation of chlorine, hydrogen chloride	5	piece	1	Glass ballon 500 ml, glass funnel, funnel Z
171	Apparatus for the preparation of hydrocarbons	5	piece	1	Erlenmayer 800 ml, glass funnels separator,
172	Apparatus for demonstrating the galvanic element (with Galvanometer)	5	piece	3	Glasses 100 ml, elektrod at zinc and copper
173	Metallic Barometer	15	piece	1	standart type
174	Higrometer or Psikrometer (with termometer)	15	piece	1	standart type
175	Calorimeter	15	piece	10	400mm , ø20mm,aluminium
176	Areometer (density measure for liquids with d<1	15	piece	5	With alcohol
177	Areometer (density measure for liquids with d>1	15	piece	5	With alcohol
178	Laborator thermometer -10-100°C	5	piece	10	With alcohol
179	Laborator thermometer 0-200°C	5	piece	5	With alcohol
180	PH-meter	15	piece	1	pH 0-14.0pH with resolution pH:0.1ph
	<b>Glasses</b>				
181	Adaptors (Alunge)	5	piece	2	refractory glass
182	Burets for acides 25 ml or 50 ml	5	piece	10	Glass water tap
183	Burets for bases 25 ml or 50 ml	5	piece	10	With glass and rubber pipe
184	Measuring cylinder 10 ml	5	piece	10	Scalable with mouth
185	Measuring cylinder 25 ml	5	piece	10	Scalable with mouth
186	Measuring cylinder 50 ml	5	piece	10	Scalable with mouth
187	Measuring cylinder 100 ml	5	piece	10	Scalable with mouth
188	Measuring cylinder 250 ml	5	piece	2	Scalable with mouth
189	Measuring cylinder 500 ml	5	piece	2	Scalable with mouth
190	Measuring cylinder 1000 ml	5	piece	2	Scalable with mouth
191	Eksikator	5	piece	2	glass, sanded
192	Vertical Cooling	5	piece	2	type Liebih
193	Chemical glasses (Bekera) 50 ml	5	piece	10	High form, scalable, with mouth
194	Chemical glasses (Bekera) 100 ml	5	piece	10	High form, scalable, with mouth
195	Chemical glasses (Bekera) 250 ml	5	piece	10	High form, scalable, with mouth
196	Chemical glasses (Bekera) 500 ml	5	piece	5	High form, scalable, with mouth
197	Chemical glasses (Bekera) 800 ml	5	piece	2	High form, scalable, with mouth
198	Chemical glasses (Bekera) 1000 ml	5	piece	2	High form, scalable, with mouth
199	Glasses pipes with different diameter	5	kg	1	glass, with different diameter
200	Glasses pipes with T form	5	piece	10	glass, with different diameter
201	Glasses pipes with Y form	5	piece	10	glass, with different diameter
202	Drying pipes	5	piece	5	glass, with different diameter
203	Safety pipes with bule	5	piece	5	with 1 bule
204	Glasses funnel Ø 75 mm	5	piece	10	Short tail
205	Glasses funnel Ø 90 mm	5	piece	5	Short tail
206	Dividing funnels (separatore) 125 ml	5	piece	10	Sanded cup

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

207	Dividing funnels (separatore) 250 ml	5	piece	5	Sanded cup
208	Dividing funnels (separatore) 500 ml	5	piece	2	Sanded cup
209	Glass bell with cap	5	piece	2	Sanded cup
210	Crystallisator Ø=180mm, h=90 mm	5	piece	10	With mouth
211	Crystallisator Ø=90mm, h=40 mm	5	piece	10	With mouth
212	Drying column	5	piece	2	Sanded neck
213	Alcohol lumps	5	piece	15	Plastic cup
214	Microburette	5	piece	2	With tap
215	Pjata Petri# plates (sett)	5	piece	10	ø 90mm
216	Escalating Pipets (cannuls) 1ml or 2 ml	5	piece	10	glass, standard type
217	Escalating Pipets (cannuls) 5ml	5	piece	10	glass, standard type
218	Escalating Pipets (cannuls) 10ml	5	piece	5	glass, standard type
219	Escalating Pipets (cannuls) 25ml	5	piece	5	glass, standard type
220	Regulated Pipets 1ml or 2ml	5	piece	10	glass, standard type
221	Regulated Pipets 5ml	5	piece	10	glass, standard type
222	Regulated Pipets 15ml ose 20ml	5	piece	5	glass, standard type
223	Bulb (sphere ballonns ) 100 ml	5	piece	10	Tight neck
224	Bulb (sphere ballonns ) 250 ml	5	piece	10	Tight neck
225	Bulb (sphere ballonns ) 500 ml	5	piece	2	Tight neck
226	Bulb (sphere ballonns) 1000 ml	5	piece	2	Tight neck
227	Distillation bulbs with side pipes	5	piece	2	Tight neck
228	Bulbs with flat bottom (Balloons with flat bottom) 100ml	5	piece	10	Tight neck
229	Bulbs with flat bottom (Balloons with flat bottom)250ml	5	piece	10	Tight neck
230	Bulbs with flat bottom (Balloons with flat bottom) 500ml	5	piece	2	Tight neck
231	Bulbs with flat bottom (Balloons with flat bottom) 1000ml	5	piece	2	Tight neck
232	Conic bulbs (Erlenmajer) 50 ml	5	piece	10	Scalable, Tight neck
233	Conic bulbs (Erlenmajer) 100 ml	5	piece	10	Scalable,, Tight neck
234	Conic bulbs (Erlenmajer) 250 ml	5	piece	10	Scalable,, Tight neck
235	Conic bulbs (Erlenmajer) 500 ml	5	piece	5	Scalable,, Tight neck
236	Conic bulbs (Erlenmajer) 1000 ml	5	piece	2	Scalable,, Tight neck
237	Conic bulbs (Erlenmajer) with sanded cup	5	piece	10	Scalable, Tight neck
238	Poça konike me gyp anesor (Erlenmajer Bunsen)	5	piece	2	Scalable,, Tight neck
239	Test tube 12 x 120 mm	5	piece	100	refractory glass, with borders
240	Test tube 16 x 150 mm	5	piece	200	refractory glass, with borders
241	Test tube 18 x 100 mm	5	piece	200	refractory glass, with borders
242	Test tube 24 x 200 mm	5	piece	50	refractory glass, with borders
243	Signed bulbs (tarated) 100 ml	5	piece	10	Glass, standart type
244	Signed bulbs (tarated) 250 ml	5	piece	10	Sanded neck

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

245	Signed bulbs (tarated)500 ml	5	piece	5	Sanded neck
246	Signed bulbs (tarated)1000 ml	5	piece	2	Sanded neck
247	Pesafilters	5	piece	10	Sanded cup
248	Glass taps	5	piece	2	sanded
249	Agitable glass (agitator)	5	piece	10	200 mm
250	Glass Bottle with sand dropper without colour 60 ml	5	piece	20	Specifications as nominations
251	Glass Bottle with sand dropper with colour 60 ml	5	piece	20	Specifications as nominations
252	Glass Bottle, for liquid reagents with sand without colour 60 ml	5	piece	20	Specifications as nominations
253	Glass Bottle, for liquid reagents with sand with colour 60 ml	5	piece	20	Specifications as nominations
254	Glass Bottle, with neck with sand without colour 60 ml	5	piece	20	Specifications as nominations
255	Glass Bottle, with wide neck with sand with colour 60 ml	5	piece	20	Specifications as nominations
256	Bottle Mariot (for distilated water) 2,5 l	5	piece	2	Specifications as nominations
257	Clock glasses	5	piece	10	Specifications as nominations
	<b>Moleculares models or crytalline</b>				
258	Set of moleculares models	20	piece	1	suitcase, rubber models and metallic bars
259	Micromolekulare models	20	piece	10	box, rubber models and metallic bars
260	Orbital atomic model px	20	piece	1	Plastic model with metallic elements
261	Orbital atomic model py	20	piece	1	Plastic model with metallic elements
262	Orbital atomic model pz	20	piece	1	Plastic model with metallic elements
263	Orbital hybridization model sp2	20	piece	1	Plastic model with metallic elements
264	Orbital hybridization model sp3	20	piece	1	Plastic model with metallic elements
	<b>Wood, rubber plastic instruments</b>				
265	Rubber pipes (laborator) with diameter 6 ÷ 8 mm	20	m	10	Specifications as nomiantions
266	Test tube holder	20	piece	20	Wood material
267	Pipes holder	20	piece	10	Plastic material
268	Test tube holder	20	piece	10	Wood material
269	Washable plastic Bottle (pisets)	20	piece	10	plastic with glass pipe
270	Rubber cups with different diameter with hole	20	piece	50	nr 00,01,1,2,3
271	Rubber cups with different diameter without hole	20	piece	50	nr 00,01,1,2,3
	<b>Metallic instruments</b>				h=150 mm, ø16 mm
272	Bek Bunsen	20	piece	1	standart
273	Cames (pirosti)	20	piece	10	metallic
274	Laboratory Jack screw	20	piece	2	standard
275	Spoon incineration	20	piece	10	standard
276	Spoon for substances	20	piece	10	standard
277	Magnet in horseshoe form	20	piece	1	standard
278	Tongs per pots	20	piece	10	

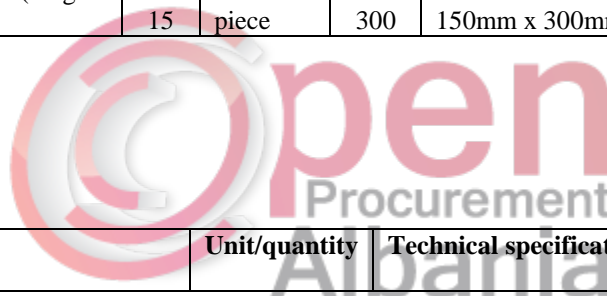
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279	Laboratory tenter	20	piece	10	bar,antimorsete, metallic circles,Metallic fixing
280	Weighter, teknich-chimical with stone weight box	20	piece	10	Maximal capacity 200g, sensitivity 0.1g, tolerance mistake 1.5, pan diameter ø90mm
281	Weighter, half analytic with stone weight box	20	piece	1	Maximal capacity 1000g, sensitivity 50mg,tolerance mistake 1.5, pan diameter ø120mm
282	Ceramic mesh	20	piece	10	Ceramic and metallic mesh
283	Puncture cups	20	piece	2	With 3 dimensions
284	Constriction for burets with fixing	20	piece	10	metallic
285	Constriction for pipes with screw (Hoffman staple)	20	piece	5	metallic
286	Elastic Constriction for rubber pipes (Mohr staples)	20	piece	5	metallic
	<b>Porcelain instruments</b>				
287	Porcelani bowl		piece	5	porcelain
288	Funnel for filtration in space (Buhner funnel)	10	piece	2	porcelain
289	Spoon - spatula	10	piece	10	porcelain
290	Kapsuls (cupshore) porcelain	10	piece	10	porcelain
291	Kroogiola (pote) porcelain	10	piece	10	porcelain
292	triangular for pos post	10	piece	10	porcelain and metallic
	<b>Instruments and different materials</b>				
293	Laboratory distiller for distilated water	10	piece	1	2-3 liter in hour, monofase
294	Instrument for cutting glass pipes	10	piece	2	Metallic with screw
295	Brush for washing instruments	1	piece	10	metallic with plastic cord
296	gloves - protection	1	piece	10	anti acid, anti alcal, anti corrosive
297	Protection masks	5	piece	10	anti acid, anti alcal, anti corrosive
298	Protection glass	5	piece	10	anti acid, anti alcal, anti corrosive
299	Universal Current feeding universal or current leader	10	piece	1	0-24V / 6A
300	Keeper for infiltration instruments	15	piece	2	Metallic with me rubber pins
301	Fast help box	2	set	1	With 7 accessory, as technical safety instructions
302	Fire extinguishing (exintore)	20	piece	1	With powder
303	Dynamic model for demonstration of atomic orbital	15	piece	1	500 x 350 mm current 24V
304	Chemical-physical caracterisics and methods for using chemical reagents in school	20	piece	1	In albanian language
305	Instructions for technical safety	20	piece	1	In albanian language
	<b>Instructional signs</b>				
306	Danger signs of chemical substances	15	piece	1	70cm x 100cm
307	Safety rules in laboratory	15	piece	1	70cm x 100cm
308	Method of separationof substances	15	piece	1	500 x 350 mm 24V
309	Ambience of acid -base of solution	15	piece	1	70cm x 100cm
310	Electrolitic dissolution	15	piece	1	70cm x 100cm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

311	Alcanes	15	piece	1	70cm x 100cm
312	Isomery	15	piece	1	70cm x 100cm
313	Chemical Substances dissolubility in water	15	piece	1	140cm x 100cm
314	Chemical elements table (long version)	15	piece	1	140cm x 100cm
315	Base unit of SI	15	piece	1	70cm x 100cm
316	Ionisation energy of elements as group A of periodic system	15	piece	1	70cm x 100cm
317	Electronegativity	15	piece	1	70cm x 100cm
318	Molecules geometry	15	piece	1	70cm x 100cm
319	Elementary reactions and velocity equation	15	piece	1	70cm x 100cm
320	Thermodynamic information for some substances	15	piece	1	70cm x 100cm
321	Constans of jonic equilibrium	15	piece	1	70cm x 100cm
322	Solubility product	15	piece	1	70cm x 100cm
323	Potentials of reduction	15	piece	1	70cm x 100cm
324	Value relation of quantice numbers for n=4	15	piece	1	70cm x 100cm
325	Moles relation	15	piece	1	70cm x 100cm
326	Table of chemical elements (long variants) for personal use	15	piece	300	150mm x 300mm folding

- For Laboratory of Physics



No.	Definition of the device	Unit/quantity	Technical specifications
1	<b>MECHANICS</b>		
2	Simple apparatus for demonstration of free fall	1 piece	Metallic or plastic spheres with $\phi$ (20-30)mm
3	Tube of Newton	1 piece	Used for demonstrating independence of free fall from mass and shape of a body. Composed of a vacuum tube, with a feather and a metallic piece inside. Dimensions 5x105 cm, pesha 0,7 kg
4	Apparatus for inertia	1 piece	
5	Apparatus for rotating motion in vertical plane	1 piece	Demonstrates transformation of Ek in Ep. Composed of a metallic rut, mounted on a wood basement and a metallic sphere with a $\phi$ (12-15)mm
6	Tribometer	1 piece	Axis with dimensions ( 81.5 x 10 x 2) cm, coach with dimensions 10 x 8 x 4cm, 200g, a roll with a small friction fixed on one edge. The axis is supported on different angles ( 0-45) degrees on a metallic protractor metalik, fixing sticks
7	Dinamometer , force measuring , (0-5) N	3 pieces	Measuring scale (0-5) (500g) ,
8	Dinamometer , force measuring (0-10) N	3pieces	Measuring scale (0-10) (1000g)
9	Disc for moment equilibrium	1 piece	Diameter not smaller than 245mm, scale 4x10-80

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

10	Communication vessels	1 set	4 glass pipe with different dimensions and shapes mounted on a plastic or wood support
11	Half-spheres of Magdeburg	1 set	Composed of two half-spheres with the same diameter Ø (100 – 110)mm, made of metal or plastic, with vacuum pipe
12	Scales stone with hooks	1 set	Box with 10 metallic stone with weight from 10g up to 500 g
13	Caliber	2 pieces	Metallic equipment for measuring lengths in mm
14	Lab coach	4 pieces	Dimensions 290x140x90mm; 0.87kg. Coach line (1.5x0.3m), 10 springs (50x15)mm 10 springs holder, 10 elastic cords with rings in the end 150mm long, wheels with bearings with spheres, with small friction
15	Set of capillary pipes	1 set	Series of glass pipe of different diameters
16	Set of rolls	1 set	Maximal allowed weight 2kg
17	Chronometer	3 pieces	Chronometer for determination of time per second (Classical type – mechanic or digital)
18	Micrometer	1 piece	Metal made for measuring lengths in mm
19	Equipment for demonstration of parallel forces (Lever)	1 piece	Composed of a metallic linear (40-50)cm long, with a hole and diameter (3,5-4,5)mm, scalable. Used to study relations between force and its direction and moment and serves to hang weight stones with hooks
20	Equipment for demonstration of Archimedes force (Double cylinder of Archimedes)	1 piece	Diameter ø 28mm, height 55mm, dimensions of cylinder 35 g, plastic material
21	Equipment for demonstration of principle of preservation of mechanical energy	1 piece	Height ~ 250 mm, dimensions of the set ~380x130x150mm, roll ø 110mm.
22	Equipment for demonstration of distribution of pressure in fluids (Law of Pascal)	1 piece	Steel spheres, size ~350 mm, weight ~300 gram
23	Hand vacuum pump	1 piece	Vacuum pressure shall be less than 6700 Pa
24	Equipment for measuring pressure in fluids	1 piece	General scale, not less than 24 cm, with center of scale 0
25	Thread-Level Indicator	1 piece	Hanging string
26	Physical scales-technical with weight stones	1 piece	Maximal capacity (200 – 300)g, sensitivity 0.1g, error tolerance not more than 1.5, diameter of pan ø(90-110) mm
27	Spheres of different sizes	1 set	Diameter (10-20)mm, steel metal
28	Sensor of gas pressure	1 piece	Requires a signal in proportion with gas pressure
29	Motion Sensor	1 piece	Serves to calculate distances crossed by a body when time and signal output and input is given. Frequency is 50 measures per second and measurement scale from (0.15 -6) m. Connected to smartboard E46. Touchscreen control
30	Force Sensor	1 piece	Force sensor measures withdrawing and

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			submersive forces of about -50N +50N. Connected smartboard. Touchscreen control
31	Tribometer	1 piece	Wooden
32	Hydraulic pressure	1 piece	
33	Stripe-meter	1 piece	Plastic, metallic, 1,5m, 2m,
34	Metallic tripod with accessories	1 piece	Diameter of rod $\phi$ 10-13 mm, basement of triangle iron, height 700-900mm, 1 rod with isolation head, 1 rod with hooks, 2 morsette
35	Unscalable Springs	10 pieces	Maximal allowed weight of 500gram
36	Bodies with same density and different volumes	6 pieces	Bodies with the same shape and dimensions and different materials, such as: wood, plastic, bronze, aluminum, iron, lead etc.
<b>TERMODINAMICS</b>			
37	Apparatus for change of thermal conductivity	1 piece	Composed of three metallic rods, different metals, equipped with a metallic ring, movable, with dimensions (300 x 150) mm
38	Pyrometer	1 piece	
39	Apparatus for demonstration of bulge of fluids and gases	1 piece	Indicates changes during fluids bulge. Composed of 5 glass pipes with a spherical ending, height 400 mm, mounted on a plastic basement and scaled in mm.
40	Apparatus for demonstration of bulge of rigid bodies	1 piece	Diameter of sphere s $\phi$ 20 mm, weight 0.2kg, length 300 mm
41	Apparatus for transformation of thermal energy B29	1 piece	Composed of :copper pipe, holed clips, plastic corks and friction strings. Height about 470 mm, weight about 600 gram,
42	Apparatus for demonstration of Boil-Mariot Law	1 piece	Dimensions 300 x 200 mm, rubber cover, cylindric pipe, volume measurement, measurer of pressure, scale 0.5,1,1.5,2.
43	Apparatus for demonstration of adiabatic process	1 piece	Cylindric vessel with glass valve, with dimensions (64x65x200)mm, diameter (25x130)mm
44	Teaching Barometer	1 piece	Analogue metallic body diameter 10cm
45	Aneroid Barometer	1 piece	Measures air pressure, values (690-790) mm Hg, and scale 1 mm Hg
46	Communication vessels	1 set	4 glass pipes with plastic support
47	Equipment for demonstration of convection B51		Diameter of the pipe $\phi$ 12mm, dimensions: 300mm x 200 mm. Numeric values of technical specifications are flexible up to 15%.
48	Calorimeter	1 piece	Copper made, nicke-plated, with dimensions 54x34 m For the determination of specific heat in fluits with electrical method.It is composed of a calorimeter, copper plated with dimensions (54 x 34 )mm, placed inside an external vessel with dimensions 70x45 mm.Voltage of electrical feeder U = 6V, Resistance of the heater R=2-6 Om, Current : I=0.5--2 A.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

49	Bimetallic sheet	1 piece	Material: copper, iron, length about 200 mm.
50	Temperature Sensor	1 piece	Shkalla: -30/+1350C Resolution: 0.10C Frequency: over 10 matje/s Connected to smartboard. Touchscreen Control. E109 .
51	Gas Pressure Sensor	1 piece	Requires proportional signal in proportion with gas pressure. The required values is 156.050 kPa. Measuring unit may be Bar, kPa, atm. Frequency is 100 measures per second and scale 0-200 kPa. Connected to smartboard. Touchscreen control. Collection and preservation of data on USB. Permanent connection with cord.
52	Combustible Engine	1 piece	
53	Thermometer (0-50) Celsius degrees	10 pieces	Scale (0-50) degres with mercury
54	Thermometers (0-200) Celsius degrees	10 pieces	Scale (0-200) degres with mercury
55	Thermometers (-10-110) Celsius	10 pieces	Scale (-10-110) degres with mercury
<b>ELECTRICITY AND MAGNETISM</b>			
56	Laboratory Ampermeter	4 pieces	Measure scale -0,2~0~0,6A / -1~0~3A,sensitivity 75 mV, Dimensions about (133 x 97 x 100 )mm
57	Ampermeter-voltmeter for demonstrations	1 set	DC direct current,1mA,100mA,1A,10A, DC voltage (0-10)V,(0-30)V AC/alternative 10mA,100ma,1A,5A AC voltage 10V,30V,250V
58	Apparatus for distribution of current	1 piece	Metallic sphere mounted on an isolating handle
59	Apparatus for action of magnetic force on current conductor	1 piece	Dimensions: about (500x250x270) mm I=2A
60	Apparatus for demonstration of Kulon Law	1 piece	Metallic basement, thread made of medullary wood
61	Apparatus for demonstration of line in a magnetic field	1 piece	Box with dimensions (98x55x55)mm, with a tunnel, internal diameter 10mm and length 70mm and magnetic rod with dimensions (50x7)mm long.
62	Light source (battery)	5 pieces	3 V, 4,5V
63	School teaching compass	1 piece	Diameter not less than (50) mm
64	Rumkorff coil	1 piece	220V/50Hz,dalja (20-100)Kv,distance 100mm
65	Couple of induction coils	3 sets	Primary coil ø35mm, length 120mm and 380 wire secondary coil ø65mm,481 wire, as well as iron nucleus
66	Switch with cassette	1 piece	Voltage 36V and direct current 6A
67	Switch for electrical circuit	5 pieces	U= 36V with direct current 0-3A
68	Conductive thread	10 pieces	50cm length with terminal two-sided pin
69	Electroscope with sheets	1 piece	Diameter not less than 200mm, with a support of plastic or glass material
70	Horseshoe-shaped electromagnet	1 piece	Composed of two rolls, one with a nucleus with iron rod in U shape, and a closing metallic armour with a hook and voltage 6V and current 1A.
71	Magnetic needles with support	3 pieces	Length of needle not less than 40mm
72	Small magnetic needles	3 pieces	Length not less than 30 mm



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

73	Plastic pipes	6 pieces	Plastic material
74	Faraday Cage	1 piece	Dimensions (600x300x150)mm
75	Conducting cables with terminal plug	10 pieces	With a length 50cm and two-sided terminal plug
76	Condensator with discs	10 pieces	Plastic discs with a diameter (200-300)mm
77	Resistance box mounted in the cassette	1 set	10x0,1Ω; 10 x 1 Ω; 10x10 Ω; 10x100 Ω; 10x1000 Ω
78	Small lamps	25 pieces	Standard type, 6V
79	Lamp holder	1 set	Plastic basement with lamp holder U= (0-30)V, I=(0-3) A
80	Model of three-phase generator	1 piece	Output > ose = 8V when rotating velocity is about 1600 rot/minute
81	Model of an electromotor	1 piece	Dimensions 50cmx50cm
82	Pendolini elektrizues	1 piece	Plastic support with silk threads
83	Horseshoe-shaped magnet	2 pieces	80mmx200mm, 0,05T80mm x 200mm <sup>2</sup> , 0,05T.
84	Simple magnet	4 pieces	5x25cm
85	Equipment for density of loads	1 piece	Dimensions (600x300x150)mm
86	Voltaic pile	3 pieces	Carbon rod, copper plaque, lead plaque, zinc plaque
87	Rectangular conductor with plastic plaque	1 piece	Composed of three different conductions, plastic basements
88	Record for Winston bridge	1 piece	(1000x100x50)mm, tel Ni-Cr
89	Rheostat 50U with cursor (sliding)	1 piece	Resistenca (0-50) om, current 5A
90	Electrostatic Net	1 piece	
91	Catode Rays	1 piece	(640x440x590)mmm with plastic support
92	Alternative sources systems B46	1 piece	Used in different experiments for study of renewable energy, such as solar, hydric, wind. It is composed of a solar panel, wind turbine, hydraulic turbine, cell with hydrogen, ventilator, rotor. Dimensions 50x45x15 cm. Weight 5.5 kg
93	Series of metallic threads mounted on a plaque	1 set	Material of threads : iron, copper, nickel-chrome
94	Sphere with an isolating handle	1 piece	Plastic handles or metallic spheres with a diameter not less than ø50mm
95	Glass rod	2 pieces	Length not shorter than 300 mm
96	Ebonite rod	1 piece	Length not shorter than 300 mm
97	Discharging rod	10 pieces	Plastic end – Metallic rod (500-700)mm
98	Magnetic rod	2 pieces	With colored poles 160mm, 0,06 T (160 x 200) mm, 0.06T.
99	Magnetic spectres	1 piece	(500x330x250 )mm
100	Power security incentive		Simulates technical problems of the electrical system: short circuit, current leak, over load and fuse. Places in aluminum case filled with foam. Dimensions about: 30x35x10 cm.
101	Sensor for voltage and current	1 piece	Combined Sensor. Measure Frequency 50000 measuring /s. Connected to smartboard. Touchscreen Control.
102	Transformer	1 piece	
103	Geisler pipes (light source with different gases)	1 set	Pipes with hydrogen, oxigen,

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			helium,carbon dioxide, neon, argon.
104	Universal feeder (0-24)V, 6A	1 piece	Outputs of alternative and direct current (2-24)V with 12 scales. Maximal current of work up to 6A. Dimensions about (270 x 120 x 210) mm, 6,5 kg
105	Laboratory Voltmeter	3 pieces	Measuring scale -5~15V, sensitivity 1mA. Dimensions (133 x 97 x 100)mm
<b>ACUSTICS, VIBRATIONS, WAVES</b>			
106	Apparatus for demonstration of wave-spreading phenomenon	1 piece	Voltage (0-6)V; number of vibrations 13; $\phi$ of vibrator 15,6mm, dimensions (450mmx200mmx300mm)
107	Diapason 440Hz	1 piece	Composed of : two forks with the same frequency 440 Hz, with vertical session (6,5 x 16 )mm, length of wings 109 mm, distance between 17mm,
108	Mathematic pendulum	1 piece	Sphere hanged in an unextendable thread, fixed on a basement
109	Pendulum for resonance	5 pieces	5 pendulums of different lengths, metallic frames (400 x 300) mm.
110	Resonance Box	1 box	Suitable for diapason 440 Hz; about 145x88x53 mm
111	Springs set	1 set	Used for demonstration of horizontal and vertical waves . Springs with a diameter of 8 cm, unextendable length 13 cm,it may reach up to 5 m, weight 0.6 kg. Spring 2 with a 2 cm diameter, not extended 1 m long, weight 0.5 kg.
112	Sonometer with cords		Used for study of sound dependence from length, pressure and thicknes of vibrating cord. It is composed of a resonance box made of wood 60 cm long, scalable. Completed with a dinamometer, two steel cords, diameter, $\Phi$ 0,4 mm, one steel cord with a diameter, $\Phi$ 0,8 mm and three immovable bridges for fitting the length of cords.
113	Kundt Pipe	1 piece	Glass pipe with a length of 1,5 m and diameter 35mm, wooden rod 390mm long,basement of wood 1,5 m long and diameter 13mm.
114	Equipment for study of electromagnetic waves		Waves transmitter: diode Gunn 10.7GHz ( $\lambda=2.8$ cm), power 30W voltage (10-12)V në (2 - 3.5)V. Cylindric case with a diameter 83mm and length 70mm. The general length 25 mm. Waves receiver : Similar to transmitter. Sond Detector: silicon microwave diode , same with the receiver but mounted in a shorter rod, Vertical, not metallic. 4 sockets with external circulation, dimensions (75x50x135)m.
115	Stroboscope		Used to observe phenomena than happen very soon. Dimensions (20x12x14) cm, weight 1.8 kg. Frequency (1-300) Hz.
<b>OPTICS</b>			

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

116	He-Ne Lazer		Used for experiments of defraction and interference. Dimensions 35x10x14 cm, pesha 1.5 kg, coherent red light, wave length 633 nm
117	Accessories for analogue optical experiments		Reflecting surface (200x300)mm, (60x300)mm, glass plaque with parallel sides (200x300)mm, polarization net (200x200)mm, convec-plane lenses with a hole that during work is filled with paraffin oil; prism with gap filled with paraffin oil (45x90x45) degrees ;
118	Photocamera	1 piece	Digital, cyber shot, mbi 10 Mega pixel.
119	Optical disc	1 piece	Disc with colors and rotating rope. Used for fragmentation of white light. It is composed of the disc with a diameter of 200 mm, two sets of spectres of colors, a rotor with handle. Axis of the hande coincides with the axis of the disc. It is placed on a plastic base with dimensions about (120x120) mm, with rubber legs, general height about 32 cm.
120	Concave mirror	2 pieces	Glass F' = 65mm, $\phi=100$ mm
121	Convex mirror	2 pieces	Glass F' = 65mm, $\phi=100$ mm
122	Flat mirror	1 piece	Distance f=65mm, $\phi = 100$ mm
123	Filters with different colors	1 set	Plastic, 40x20 mm7 with basic colors of spectrum, with dimensions about 535x310 mm each filter
124	Eye Model		Physical view of eye functioning, including sight impair and their correction. Mounted on a wooden or plastic basement. Dimensions not less than (320 x 180)mm
125	Caleidoscope		Diameter (180 x 35 )mm
126	Summarizing lenses	2 pieces	Made of glass
127	Distribution lenses	2 pieces	Made of glass
128	Convex lenses	2 pieces	Made of glass
129	Glass prism	1 pieces	Point of view 85 <sup>0</sup> , 25mm-75mm / 50mm-15mm
130	Glass plaque with parallel sides	1 pieces	Dimensions (50x20)mm
131	Ceramic net	1 copë	1235x125 mm dhe 150x150mm
132	Magnifying glass	2 copë	Magnifying not less than 4 x
133	Light sensor		Scale: (0 -2 000 )lux / (0 -30 000) lux Resolution: 0.5 lux/10 lux Frequency : over 1000 measures/s Connection to smartboard. Touchscreen control.
	<b>MODERN PHYSICS</b>		
134	Radiation Monitor ( $\alpha$ , $\beta$ , $\gamma$ )		Composed of Geiger-Myler pipe and measurer of frequency mounted in a small plastic box, made of rubber and with an analogue meter. The unit works with battery and can be used without a PC for measuring radiation $\alpha$ , $\beta$ , $\gamma$ . It can be used for measuring radiation statistics, to measure frequency of nucleus fragmentation and to monitor radon transformations

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

135	<b>GENERAL</b>		
136	Alcohol	1 bottle	1kg alcohol in glass bottle
137	Sulphur Acid	1 bottle	250 gram in glass bottle
138	Glass Beaker	10 pieces	100ml, 250ml,500ml, glass
139	Scalable cylinders	10 pieces	25ml, 100ml,500ml, glass
140	Colors disc	1 piece	Colorful Disc with a rotating rope, diameter 200mm
141	Wind measurer	1 piece	Plastic ose inox
142	Glass vessels with different shapes but same volume	5 pieces	100ml, 250ml,500ml, glass
143	Glass vessels with different shapes and volume	5 pieces	100ml, 250ml,500ml, glass
144	Weighting stones with hooks	1 set	Box with 10 metallic stones, 50gr.each
<b>145</b>	Chemical cup	5 pieces	Chemical cup 50 ml 100 ml 250 ml
146	Plastic pipe with different diameters	5 pieces	Transparent, $\phi = 6-8$ mm
147	Small glass pipe U-shape	5 pieces	$\phi = 16$ mm, h= 150mm
148	Scissors	1 pieces	Iron-made, plastic handle, 10cm long
<b>149</b>	Glass funnel	3 pieces	Glass
<b>150</b>	Test tupe clip	1 piece	Wood
<b>151</b>	Alcohol Lamps	4 pieces	Made of glass with alcohol, with a cover and wick
<b>152</b>	Color pencils	2 packages	Box with color pencils wood and water
<b>153</b>	Color marker	5 pieces	Color markers
<b>154</b>	Rubber	10 m	Thin rubber
<b>155</b>	Spoon for substances	2 pieces	Glass, inox, plastic
<b>156</b>	Test tubes holder	2 set	Wooden
<b>157</b>	Microscope	1 piece	Simple microscope
<b>158</b>	Nafthalene	200 gr.	Pure chemical reagent
159	Level indicator	1 piece	Wood or plastic material with an air bubble
160	Adhesive	2 piece	Small and big adhesives
161	Paraffin	250 gr.	Pure chemical Reagent
162	Dropper	3 piece	Made of glass with rubber clips, about 10cm
163	Plasteline	1 package	In colors 70x150mm
164	Iron powder	200 gr.	Pure chemical Reagent
165	Technical scales with weighting stones	1 piece	Simple scales with dishes
166	Test tubes	6 pieces	Glass, 12x100mm
167	Bulbs of different volumes	3 pieces	Volume100 ml 250 ml 500ml
168	Lead-thread	1 piece	Lead hanged in a thread
169	Petri dishes	4 pieces	Material prej petri
170	Spheral bulbs of different volumes	4 pieces	Volume100 ml 250 ml 500ml
171	Plastic Protactor	1 pieces	Standard type, basement 50cm
172	String	10 m	Non-extendable thread
173	Different size spheres	10 pieces	Dimensions with diameter (50-100) mm
174	Plastic Support of silk threads	1 piece	Dimensions (500x300x250)mm
175	Spring	1 set	Diameter 8 cm, length 13 cm, weight 0,6 kg
176	Glass mixer	2 pieces	Glass-made, 30-50 cm
177	Ballons	10 pieces	In different colors
178	Balls for ping-pong, tennis, football	3 pieces	Balls for ping-pong, tennis, football
179	Ceramic Net	1 piece	125x125mm ose 150x150mm
180	Copper sulphat	1 bottle	250gram
181	Glass bottle for liquids	5 pieces	Volume 60ml, 100ml
182	Plastic syringe	3 pieces	big, plastic
183	Rainmeter	1 piece	Plastic or inox , classic PVC

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

184	Sulphuric Acid	1 bottle	250gram
185	Long plastic linear	1 piece	Dimensions 100 cm
186	Triangle linear	1 piece	Dimensions (30x40x50) cm
187	Clock glasses	2 pieces	Glass made
188	<b>TEACHING TABLE</b>		
189	International System of SI units	1 piece	Dimensions (70x100)cm
190	Fundamental Physics Dimensions	1 piece	Dimensions (70x100)cm
191	Thermodynamic processes	1 piece	Dimensions (70x100)cm
192	Karnoy Cycle	1 piece	Dimensions (70x100)cm
193	Fundamental Constants in nature	1 piece	Dimensions (70x100)cm
194	Lorence Transformations	1 piece	Dimensions (70x100)cm
195	Mendeleev Table	1 piece	Dimensions (70x100)cm
196	Work Principle of Refridgerator	1 piece	Dimensions (70x100)cm
197	Gravity center and equilibrium conditions	1 piece	Dimensions (70x100)cm
198	Shell movement	1 piece	Dimensions (70x100)cm
199	Thermodynamic processes	1 piece	Dimensions (70x100)cm
200	Transformations of substance states	1 piece	Dimensions (70x100)cm
201	Magnetic field	1 piece	Dimensions (70x100)cm
202	Earth as a magnet	1 piece	Dimensions (70x100)cm
203	Phase Transformations of liquids	1 piece	Dimensions (70x100)cm
204	Bulge of rigid bodies	1 piece	Dimensions (70x100)cm
205	Electromotor	1 piece	Dimensions (70x100)cm
206	Transformer	1 piece	Dimensions (70x100)cm
207	Model of three-phase generator	1 piece	Dimensions (70x100)cm
208	Model of electrical bell	1 piece	Dimensions (70x100)cm
209	Principle of Generators	1 piece	Dimensions (70x100)cm
210	Electromagnetic Induction	1 piece	Dimensions (70x100)cm
211	Electrical voltage	1 piece	Dimensions (70x100)cm
212	Ohm Law	1 piece	Dimensions (70x100)cm
213	Electromagnet	1 piece	Dimensions (70x100)cm
214	Magnetic field of solenoid with current	1 piece	Dimensions (70x100)cm
215	Connection of conductors in parallel	1 piece	Dimensions (70x100)cm
216	Left hand rule	1 piece	Dimensions (70x100)cm
217	Moon eclipse	1 piece	Dimensions (70x100)cm
<b>218</b>	Globe (physical and political)	1 piece	With a basement on the table or ground
219	Dark room	1 piece	Dimensions (70x100)cm
220	Elecstroscope	1 piece	Dimensions (70x100)cm
221	Serial connection circuit	1 piece	Dimensions (70x100)cm
222	Parallel connection circuit	1 piece	Dimensions (70x100)cm
223	Integrated circuit with mixed connection	1 piece	Dimensions (70x100)cm
224	Short circuit connection	1 piece	Dimensions (70x100)cm
225	Amper Force	1 piece	Dimensions (70x100)cm
226	Crystal Diode	1 piece	Dimensions (70x100)cm
227	Transistor	1 piece	Dimensions (70x100)cm
228	Magnetic Spectres of gases	1 piece	Dimensions (70x100)cm
229	Atom's Construction	1 piece	Dimensions (70x100)cm
230	Galvanometer	1 piece	Dimensions (70x100)cm
231	Experiment of Thomson on cathode rays	1 piece	Dimensions (70x100)cm
232	Scheme of energy generation from HPP to houses	1 piece	Dimensions (70x100)cm
233	Hydraulic system of breaks	1 piece	Dimensions (70x100)cm
234	Solar systems and planets	1 piece	Dimensions (70x100)cm
235	Refraction of light rays from glass prism	1 piece	Dimensions (70x100)cm
236	Law of reflection and refraction	1 piece	Dimensions (70x100)cm
237	Full internal reflection	1 piece	Dimensions (70x100)cm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

238	Interface Experiment of Jungs’ splits	1 piece	Dimensions (70x100)cm
239	Light Polarization	1 piece	Dimensions (70x100)cm
240	Light Dispersion	1 piece	Dimensions (70x100)cm
241	Spectres (with stripes, continuos, absorbaton)	1 piece	Dimensions (70x100)cm
242	Fragmentation of white light and unification of colors	1 piece	Dimensions (70x100)cm
243	Hydraulic and electrical circuit	1 piece	Dimensions (70x100)cm
244	Electronic Microscope	1 piece	Dimensions (70x100)cm
245	Electronic Microscope	1 piece	Dimensions (70x100)cm
246	Diagram of energy levels of atom and hydrogen	1 piece	Dimensions (70x100)cm
247	Lazer Diagrama	1 piece	Dimensions (70x100)cm
248	Series of nucleuses fragmentation	1 piece	Dimensions (70x100)cm
249	Nuclear reaction	1 piece	Dimensions (70x100)cm
250	Chain reaction	1 piece	Dimensions (70x100)cm
251	Magnetic Resonance	1 piece	Dimensions (70x100)cm
252	Diagram of cyclotron	1 piece	Dimensions (70x100)cm
253	Work principle of steam engine	1 piece	Dimensions (70x100)cm
	<b>SECURITY TOOLS</b>	1 piece	
254	Plastic protection glasses	1 piece	Children syze
<b>255</b>	First aid box (security means during work in laboratory)	1 set	Classical first aid box

**226.**

**4.1 Design for persons with special needs**

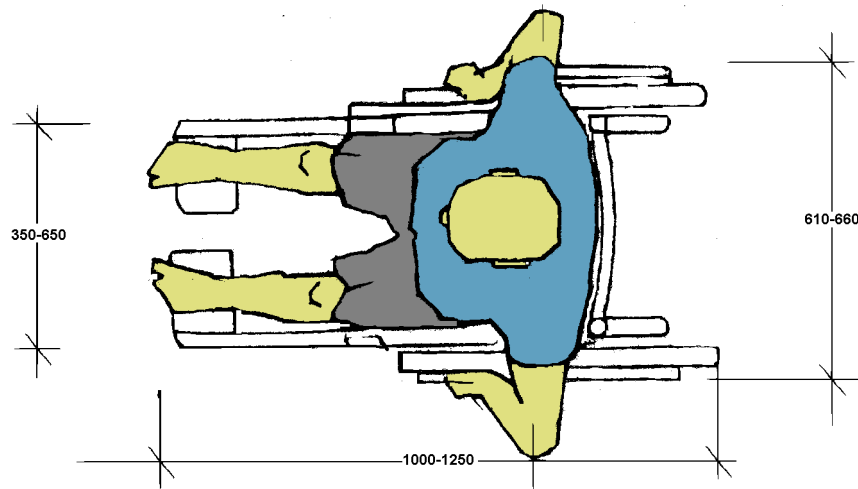
The design of school buildings shall provide a free approach for movement, stay and learning process of students with special needs, referred to special respective legislation for this category. Therefore, designers shall take into account these legislation, as well in this guideline where are presented the most specific technical conditions for school buildings. Types of special needs that can be addressed in a standard school will be limited, due to practical reasons, into those with special needs for the movement, loss of hearing that can be regulated with hearing devices, partial or total loss of sight. The latest category of persons cannot participate in all school activities.

Persons with special needs may be students, teachers, guests or staff. Their main problem is the mobility due to the use of wheelchairs, canes and crutches. This problem requires special determination of movement areas, door space, sanitary equipment, evacuation passages and spaces of classes to accommodate the persons with special needs.

Dimensions of wheelchairs shall be taken into account by the designers in determination of school space and movement. The wheelchairs have different dimensions according to the age of students and type of item. Nevertheless, following dimensions coincide with the average dimensions of adults and shall be taken into consideration. (see picture 1.3.13 and 3.14) :

- Width of chair in general is between 600 and 700 mm
  - Length is between 1000 and 1250 mm
- The external range is between 1300 and 1500 mm

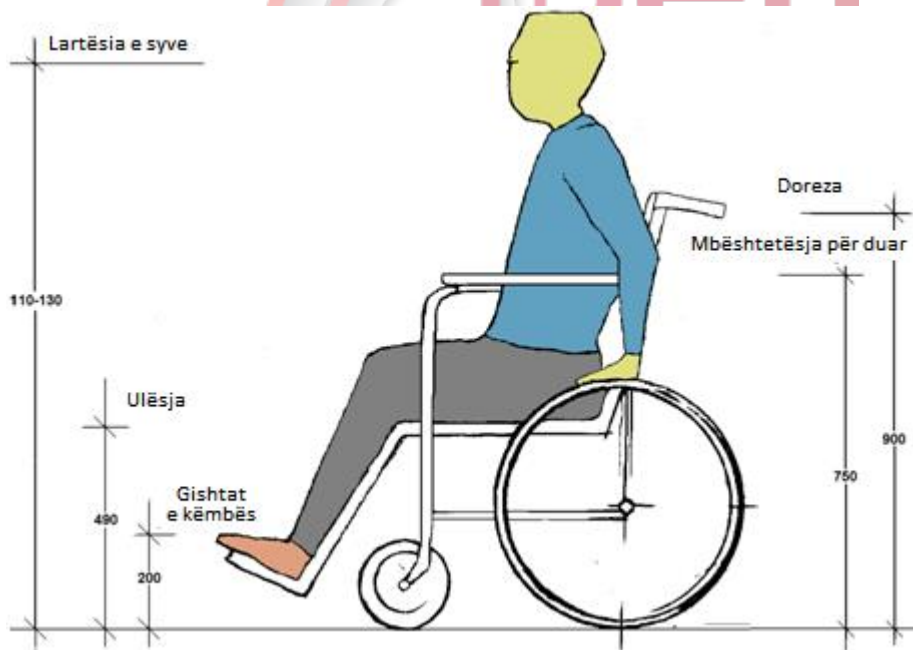
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Picture 1.3.13

227. Space where persons with special needs in wheelchairs arrive shall be defined :

- Between 230 and 300 mm above the floor level;
- Between 1100 and 1300 in height;
- Between 300 and 400 mm from lateral sides of the chair ;



Picture. 3.14

**Approach in external spaces and buildings**

228.

External movement

229.

Special parking for vehicles shall consist of a big space on one side (3.80 m instead of 2.5 m wide);

Borders of pedestrian alleys shall always have interrupted edges and pedestrian space shall be separated from vehicles traffic with pavement stones (blocks) ;

Alleys shall respect the minimum required width of about 1.5 m for a wheelchair, return surface and floor layer shall be composed of anti-slippery material and free of any obstacles;

Inclination of the walking path shall not be more inclined than 1:12 or 5% and long inclinations shall be divided into phases;

Pavements shall have a minimal widths of about 0.90 m if they have been projected on one side and 1.80 m on both sides;

Alarming shall be visible and rationally continuous;

The approach to entire building shall be accessible from persons with special needs, if possible with platforms, whose inclination be over 1:12 (5%) with flat rests every 9 m along the entire length of the platform;

All other passages to sports premise shall be designed with platforms, if necessary. The final part of these platforms shall be composed a anti-slippery materials such as concrete blocks, stones or asphalt; Platforms shall be equipped with a lateral handrail and/or pavement block along the length of the platform;

230.

Internal space

Main entrances of the buildings shall be clearly noticeable, easy to open and simple to pass through them;

Thresholds of the doors shall be avoid or not higher than 20 mm;

In the teaching rooms, working space with a diameter of about 1.5 m shall be kept free and with no obstacles, so that the wheelchair can return and positioned before the table;

Blackboard shall be reachable also from the sitting position. A changeable blackboard can be an option;

Small changes of the level shall be avoided. If inevitable, small platforms are more preferable than stairs;

In order to help students with eye problems, the design shall avoid fully glazed doors, different colors shall be used in the staircase for the rests and stairs, windows at the end of the corridor shall be avoided (exaggerated contrast in illumination);

Lift (s) shall be placed near the building entrance, lift space shall be big enough for wheelchairs, whereas the control signs shall be accessible for persons with special needs. Lift cabin shall contain also signs, such as Braille alphabet, acoustic and visual call and voice explanations for each floor.



**231.**

**232.**

**4.2 Schools as a Community Center**

The initiative “Schools as a Community Center” means that the school is put at the disposal of the community, without hampering the teaching process, completing it beyond the official working hours.

In this respect, it is necessary that the designer shall think about the school functions program and access by the community beyond the official working hours of the school. The architectural solutions shall offer flexibility and at the same time guaranteeing school security and easily accessible venue after school hours.

Schools, including their territory shall be divided into three privacy categories. A. Totally school, students and staff function. B. Spaces for school, but also the community. C. Total space for community.

A. Functions totally dedicated to school are those functions that will be used only by students and staff of the schools, such as classes, laboratories, staff venues, etc. There shall be enabled such entrance that could provide necessary security of the venues, limitation of entries and exits, easy to be monitored.

B. Spaces for the school and community are those that serve the teaching timetable for students and staff and after the official timetable it is dedicated to the community. These functions can be related to the gym, multi-purpose spaces (auditory, concert hall, exhibition, parents meeting, etc), library. In such cases, they shall be accessible. The designer shall design these spaces by offering easy access for the community, if possible directly from outside, without using spaces such as corridors or classes. These venues shall have separated toilets to be used by the community. The designer shall think also about these specific spaces of how they can be function integrated with the schools, but also separately.

Likewise, the school yard shall be flexible taking into account the school security, but at the same time, it shall be easily transformable into public space with a potential use from the entire community after teaching timetable. In this respect, the access shall be easy, transparent surrounding, big entrance gate. It shall have green spaces and trees to make enough shadow, benches, as well as urban illumination also during the night.

C. Spaces dedicated totally to the community are those places that during school hours are always accessible by the community. The designer shall take into consideration that one part of the school yard, coinciding also with the entrance to this yard, could consist of a public space, serving as a public space for the community, used by students after the teaching timetable, where parents bring and wait for children, etc. It shall have green spaces and trees to make enough shadow, benches, as well as urban illumination also during the night.

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**4.3 Thermal Amenity (Temperature)**

235. **4.3.1 Definitions and terminology**

*Thermal amenity* is usually attributed to two key parameters : (1) feeling of thermal amenity as a result of the balance between calories accumulated and lost in the body, and (2) control of thermal conditions, including sun position and radiation, temperature, humidity and odors. Designers of the school buildings shall take into account thermal conditions of the school location. In these instructions are presented also the thermal conditions in Albania, but detailed and additional data shall be collected for exact conditions of respective zones, such as: (1) minimum and maximal average monthly temperature, (2) local hygrometry, and (3) dominating winds for each climate season and frequency of strong winds and storms.

236.

237. **4.3.2 Improvement of thermal amenity**

To improve the thermal amenity of the school spaces, the potential measures for monitoring the temperature are classified into two categories:

**Natural** or passive measures, including orientation of building, position and opening dimensions, quality of materials, thermal isolation, planting of trees in the vicinity of buildings, etc.

**Artificial** or active measures, including mechanical means, such as heating, ventilation.

Regarding heating system, it shall be envisaged a boiler using wood pellets.

238.

239. Regarding cooling system, school shall be designed to guarantee an air temperature of 26°C which is the limit for a normal activity in schools, where with the proper movement of air, natural air stream from the open windows and air circulation means, such levels can be achieved in all class all year long.

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242. Ventilation of the object is designed to guarantee the air quality through natural ventilation. In venues where natural ventilation is not possible, then it is considered a solution through artificial ventilation systems.

For the control of thermal effects in school spaces, the designer shall undertake some simple measures at the beginning of the designing process. These measures consist of :

**Orientation of buildings:** It recommended that orientation of classes spaces shall be toward the east and west, because this orientation offers protection from direct sun rays. This preferable orientation may be changed for about minus or plus 30° (due to location requirements or due to orientation of dominating odors) without any great impact on convenience of teaching classes (see the picture below):

**Establishment of buildings:** distance between buildings shall be in proportion with the height of the buildings to allow circulation of fresh air and natural light also in the lowest levels. For the same reason, a minimal distance of about 4m shall be kept between the main sides and surrounding wall.

Likewise, the southern facade of the school shall not be closer than 10m from the nearest building.

Shape and design of buildings, such as possibility of indirect air circulation for regeneration of fresh air with natural ventilation during the hot season or option of the culmination with four inclination levels in zones with heavy snowfalls;

Planted surface : planting of herbs may play a fundamental role in creation of micro-climate, whenever necessary. The plating of herbs efficiently contributes in protection of dust, winds and sun rays. Nevertheless, planting of bushes enables protection of sun rays reflection from the ground;

Proper elements of the building: this includes draining from the roof and draining around the buildings, creation of shadows with regulated window shutters, sun tents, sun curtains, umbrellas and/or gallery that could provide additional protection from sun rays, especially when building orientation is not favorable.

- **Proper construction materials**, including materials of facades with potential sun reflection, isolating materials for increase of thermal action of the walls and culmination, with anti-allergic materials or not harmful for students health.

### **243. 4.3.3 Active Control of Temperature**

Low temperatures: amenity level of low temperatures may considered the one between 19°C, for countries where are exercised activities of work that do not include movement and 15°C for movement zones. Efforts to provide heating in order to achieve such levels of temperature in internal venues shall not be very high. Nevertheless, a much lower minimum can happen in each of the months of heating season, where the heating system may have a capacity of reaction against these low temperatures.

High temperatures: Albania climate is mainly dry and hot from May to September, where majority of this period is sunny. The hottest months are July and August with regional variations due to high level. Nevertheless, air temperature of 26°C is the limit for normal activity in schools, where with the right movement of air from natural air stream, from open windows and air circulators, these levels can be normally achieved in classes all year long.

### **244. 4.3.5 Isolation Standard**

The better the thermo-isolation of an external constructive element against external air, the smaller the possibility of warm air to go outside.

The badly isolated constructive elements have a low temperature of internal surfaces; the worse the isolation, the greater the risk that on surfaces under the influence of a relatively healthy humidity of air of about 40-60%, the minimal critical temperature reaches below 12,6 °C.

Special attention shall be paid to the so-called thermal bridges zones, such as ceilings of external walls, because the temperature of the surface here may be lower than the one of constructive elements in regular zones.

## **245. 4.3.6 Thermal bridges**

### **246.**

Thermal bridges are weak thermal points localized in the thermal transmittance cover of the building. In comparison to untroubled constructive elements, in these points there occurs a huge thermal loss from in out. The higher the energetic standard of a building the more important is the elimination of thermal waters.

#### Types of thermal bridges

### **247.**

Conditioned geometrical thermal bridges are created if size of thermal absorbing and emitting surfaces change, e.g. external angles of the building, different thickness of constructive element or columns.

Thermal bridges conditioned from the type of material are created during use of materials with different thermal conductivity and with such different isolating characteristics, which may be placed on the side or one over the other. Therefore, in the place of the construction material with the highest thermal conductivity is created a higher thermal stream. A typical example is the concrete constructive elements inside an external brick wall.

Thermal convective bridges are created when thermal energy of an air stream is transported through the thermal transmission cover of the building. They are caused from the failure to isolate the surface. Open connections of the isolation layer in the roof area or non-isolation of the window spaces are examples for creation of these thermal waters.

A big number of thermal waters may be avoided with the help of a good designing work, careful supervision and through selection of the right materials.

#### Advices during designing

- To avoid structures with many branches;
- To establish thermal divisions of constructive consol elements (concrete slabs of the balcony, columns, holding consols) with structures in the edge;
- Undivided layers of the isolation material, e.g. thermo-isolation systems of external walls and passages of special isolation levels without affecting the insulation values.

## **248. 4.3.7 Requirements of U-values $U(W/m^2K)$ (thermal transmittance coefficient)**

According to legislation in force (Law No. 8937 dt. 12.09.2002 “On preservation of heat in buildings” and respective by-legal acts, CoMD No. 38 dt. 16.01.2003 “On approval of norms, rules and terms of design, construction, generation and preservation of heat in buildings”) for climate zone A where Tirana

is situated (not less than 1500 heating degree days per year) The loss coefficient  $G_v$  for buildings is between  $0.54 - 1.03 \text{ W/m}^3\text{C}$ . The lowest value for buildings with a  $S/V$  ratio (external surface/warmed volume) lower than 0.3 and highest value for buildings with a  $S/V$  ratio higher than 0.9. For buildings with  $S/V$  between these values, the  $G_v$  coefficient is calculated in proportion. In order to have a loss coefficient that meets the law requirements by respecting at the same time even the economic criterion cost-gain, it is calculated that buildings in Tirana shall have an external insulation layer (cavity wall) of polystyrol EPS 5 cm ( $U = 0.35 \text{ W/m}^2\text{K}$ ) or with mineral fiber with the same transmittance parameters of heat and double-glass windows (6 x 12 x 6 mm) with a plastic or aluminum insulation profile. **Thermo-isolation (insulation) layer shall be installed from outside** and rigorously respect the requirements of producers about the way of fixing (beside glueing material also installation system with plastic screws) as well as the obstacle layer of water steam. Every other installation method may cause condensation in the internal walls, mold and damage of insulation layers.

#### **249. 4.3.8 Windows and Doors**

Penetration of natural light in internal venues from inside and outside the window and free bird-view within the entire building are very important elements for students premises.

Windows shall be places in the walls separating the classes from external venues, classes from classes and classes with internal corridors.

To meet these requirements, design shall take into account the students and teachers. Attention shall be paid. to elements such as height and window frames, type of glass, clearness of the view (not to be blocked horizontally neither from adults nor students) light control and risk assessment impact, as well as security factors. The evaluation of security may recommend that guard place shall be positioned within the center in order to monitor entries and exits can be monitored from the guards of the buildings. Or may be recommended any alternative way in this respect. The designer shall try to plan at least one window per class. If this cannot be realized and the internal space must be occupied by students, the designer shall envisage the best penetration of light and view from the windows, lateral windows, glass windows and doors (secure). Students' spaces in new constructions shall have a total surface with windows of at least:

8 % of the floor surface if windows are from south and directly connected to external venues.

(Note: glass surface viewing south is smaller because quality of light coming from south is better);

10% of room surface if windows are oriented from east of west;

15% of room floor surface if windows view north;

20% of room surface if windows are on an external wall

Surfaces that do not need windows are toilets, conference rooms, halls and storeroom.

The placement of metallic bars is not allowed.

External doors and windows shall have a case made of PVC material with thermal divisions or aluminum case with thermal divisions. Technical specification of windows shall be detailed and take into consideration at least the following points:

Coefficient  $U - 1.2 \text{ (W/m}^2\text{K)}$

Thermal division –

Resistance against the atmospheric factors –

Isolation ability – (class 4)

The glass coating can demonstrate a higher value of sun rays isolation ( $g$ ). This value does not specify the sun radiation. In today's glasses of thermo-isolated windows, this value is recommended to be about  $g = 60\%$ .

To avoid thermal bridges, the window shall be placed under the thermo-isolation level or at least installed in the external corner of the wall. Thus, the isolation is placed on the window frame. It is essential to

realize a continuous hermetical unification of the window during the installation. Foam fixing is not enough, because during the drying phase it shrinks, and therefore does not guaranty a hermetical isolation.

**250.**

**251. 4.3.9 Passive control of temperature**

Monitoring of penetration and creation of heat may be naturally minimized by a duly design of walls and plastering of the building. The main source of heat is sun, therefore elimination of the direct sun light from the internal side of the building is essential. As mentioned above, the external walls can be excluded from the important sources for creation of heating during the day in schools. This means that windows are elements that require attention. This is achieved with the help of two methods: orientation and sun reflection. Means for creation of shadows from the sun inside the glass are not efficient because the material gets hot and creates reflections inside. It is essential to prevent the sun hit on the glass, heating is not reflected outside through the glass, because the wave length changes and the venue gets warm. Use of double glazing is inefficient for prevention of sun penetration, this is efficient in prevention of the external heating loss.



252.

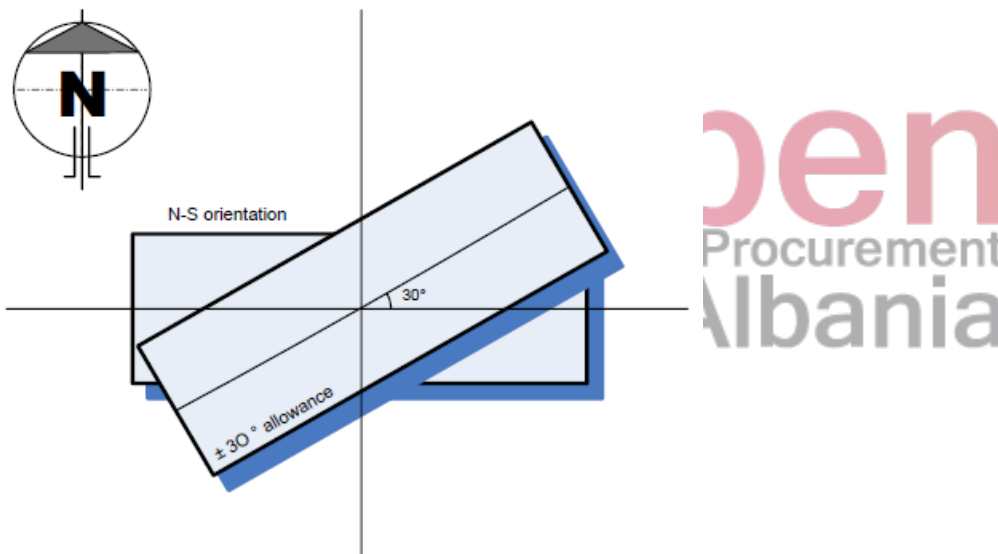
253. Sun orientation: orientation or the best orientation to have natural light during the day on the window is north-south (see picture below):

254. Orientation from North in Albania does not directly reflect the sunlight on the window, whereas orientation from south reflects minimal rays, on the window under the smallest and narrowest corner during the day: in the hottest part of the day, the sun will be on zenith and radiation corner of windows from South will be the narrowest.

255.

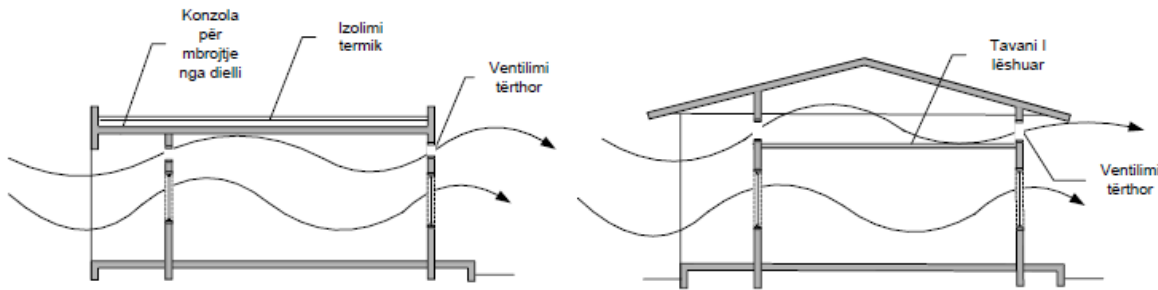
256.

257.



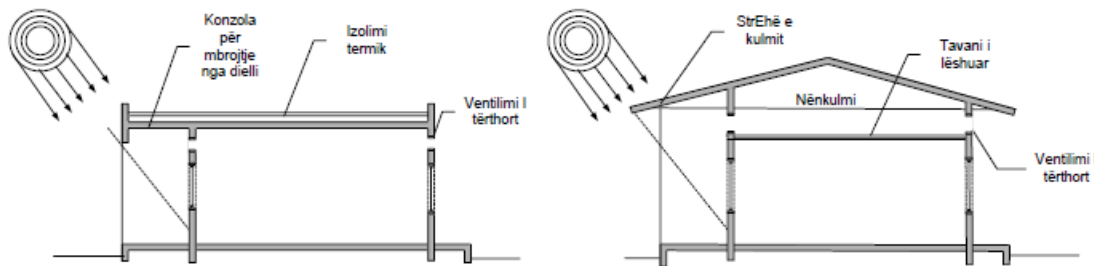
*Recommended orientation of school*

- **Ventilation (indirect ventilation)** will be a natural factor of comfort for the hottest periods of the year (see picture below) but also in the highest is more necessary to bring out the warm air passing through warm and dry land. Nevertheless, the buildings with spaces and option of openness on both sides are not economic, even though this method is recommended as the most optimal. School, as any other construction group shall have an inclination of suppression in different wind conditions and directions, in order to enable the air movement within the building from the positive and negative suppression, as much as it is allowed by divisions and internal spaces. Hence, potential fresh air during the night is enabled, which will be helped from the external lights entering from external windows of upper level.



*Thermal amenity / Indirect ventilation*

**Sun reflection:** efficient equipment for sun reflection may be designed to function for every orientation, as long as the sun angle is fully predictable. Nevertheless, due to seasonal change in height, exclusion of sun rays during the year will require movable elements. In practice, reflection is normally a compromise, and if an optimal reflection has been designed, then reflection after realization would be effective. Taking as an example the south orientation, the window shall be reflected from an external horizontal axis in the level of window peak, with a design that depends on the desired duration of time for prevention of sun rays coming into the hall or falling on the window. During winter, there shall be benefits from sun reflection, therefore the angle of sun reflection to be excluded is the one from May to October. It is essential to avoid sun rays falling on the window, because heat is very efficient when the environment and glass itself gets warm, by increasing the heat effect. The use of double glass is inefficient for prevention of the sun and it is efficient only in prevention of loss of sun from outside. Construction of a major peak coming out or windows with shutters are part of the normal solutions of sun protection (see picture below), but the project can not envisage other measures than enable reduction of radiation on the window, such as bri-slab, external tents, etc. The proposed solution shall not obstacle the entrance of light but only direct radiation on the glass, (not shutters).



*Thermal Amenity /Sun protection*

**258.**

**4.4 Visual Amenity**

*Definitions and terminology*

Need for high standards and a well-designed lighting for school buildings is based on :



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- **natural lighting resulting from the direct or reflected sun light from earth and other external or internal surfaces:**
  - **artificial lighting from sources of electrical current (lamps, fluorescent pipes);**
- **shine or intensity of light either from natural or artificial source or from another surface or in penetrating object which is not transparent;**
  - **contrast of shine or color.**

*Average factors of light reflection*

<b>Materials</b>	<b>%</b>
Plaster	85
White letter	84
White paint	75
Cement	55
Gray stones	50
Natural wood material (light color)	33
Red bricks	20

Lightening is very important for each zone of activities because is a key element to create a warm possible venue.

The quality of light shall create a positive feeling to students.

Powerful lightening is suitable for spaces where is carried out moving activity; whereas lighting with focus on a specific task is needed for manipulative activity; weaker lighting is necessary for calm areas. Quantity and orientation of natural light shall be taken into account in the design and variety of light level.

In the rooms with poor natural lighting, it is allowed a maximum of about 500 lx. Rooms that do not have windows on the ceiling or external windows shall be equipped with conveying tubes of natural light. Spaces of lights that transfer the light deeper inside can be used in the entire sides from south. The designer can refer to the table about minimal values of light for different functions.

In this respect, designers shall take into consideration that: with the reflective light children cannot directly see the light source, a fact causing blinding shine and eye fatigue. Lights with focus, such as the hanging types for residences shall be used only when reading, painting or carrying out a delicate work. Design of variety in lighting with means as light level control, special switches, cables with regulating orientation and hanging cables shall be placed in working areas. There shall be tried the use of specific lighting to display works of art, several lamps to create a joyful atmosphere and high levels of lights to encourage physical activity.

The external light shall be controlled through curtains or other types of windows shades. The external light shall be sufficient to enable movement and security. All the lamps shall have lenses or covers to be resistant to refraction

*Recommended Lux in school spaces*

<b>SPACE</b>	<b>LIGHTING</b>	<b>LIGHTING LUX</b>
Classes	Natural light	300

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Classes (near the black board)	Natural light	500
Laboratories	Natural light	400 - 500
Labor room	Natural light	400 - 500
Music/drawing room	Natural light	400 - 500
Storehouse		300 - 500
Library		300 - 500
Multi-purpose space		300 – 400
Physical education hall	Natural light	300 – 400
Office of headmaster/deputy headmaster	Natural light	500
Secretariat	Natural light	250 - 350
Teachers room	Natural light	500
Space for additional staff	Natural light	250 - 350
Toilet		150 – 250
Office of the physician	Natural light	500
Office of the psychologist	Natural light	500
Depot		250 – 350
Hall	Natural light	300 – 400
Stairs	Natural light	300– 400



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**4.5 Acoustic Amenity**

In school buildings, a special attention shall be paid to acoustic isolation. In urban level, the school position, as mentioned above, shall be situated in quiet areas far from important road axis. It is preferred a location inside the residential areas.

If this is not possible then there exist different solutions, either physical barriers, such as walls, or green physical barriers, such as high plants.

Inside the school, structures shall guarantee a specified acoustic isolation according to the following table:

<b>Construction elements</b>	<b>Requirements in Rw in dB</b>
Walls between the classes venues and similar spaces	47
Walls between classes venues and corridors	47
Walls between classes venues or similar spaces and staircase of the building	52

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Walls between the classes venues or similar venues “particularly noisy” (e.g. administration space)	55
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During the design of systems and other structures shall be taken into consideration the following recommendations:

- all pipelines (air conditioning, hydric supply) crossing the walls that transfer noises shall be covered with material for acoustic protection;
- in venues where will be created high acoustic levels, there shall be placed furniture elements that would reduce the acoustic noise, such as linoleums, carpets, etc;
- to reduce acoustic levels, during design shall be used materials that could decrease the level of noise inside the kindergarten;
- glass of doors and windows shall be acoustically laminated glass with an acoustic isolation ability 35dB, with an air space from 50mm to 100 mm;
- doors opened from noisy zones shall secure a high acoustic isolation  
it is advisable to use textile materials to reduce the acoustic level;
- for a better isolation of the rooms zone from the external space or administration space shall be used double doors or tamboura system. The same is recommended also for the selection of double windows. This solution helps also in achievement of a better thermal isolation taking into account that doors and windows are the most delicate zones in relation to acoustic and thermal meaning;
- boxes of electrical sockets shall not be installed on the back

### 262.

Noises protection inside an object does not depend only on amount of voice transmission into the division construction elements but also from the amount of longitudinal voice-isolation of the related construction elements. Even though, this practice is often subject of lack of attention. The voice-isolation of an object achieved only with the special value of division construction elements is not sufficient because long voice-isolation of construction elements defines the limit of performance in voice-isolation. Only one weak point in the isolation of elements (e.g. uninterrupted plaques of the floor layer, light elements of the facade, walls with hollow bricks) reduces the voice-isolation amount, turning irrelevant the changes in the amount of voice-isolation of construction elements.

Responsible planning is first of all related to achievement of clearness of voice-isolation mass of construction elements and in this field are met the necessary conditions for positive results of longitudinal voice-isolation in the building. Later on, there shall be selected the division walls in harmony with circumstances.

### 263.

## **4.6 Colors and their usage**

### 264. **4.6.1 Meaning of colors**

Colors influence students in different ways by making them feel happy, sad, calm or meditative. Colors influence in the perception of the size, amenity of the venue, etc.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Colors may change our perception for dimensions and distances. A wall painted in a darker or warmer color may make it look nearer than it is. This is helpful when walls at the end of narrow corridors are painted with dark colors.

In case when the venues are small there shall be used light colors with cold tonality .

In this respect, their use in schools is necessary, but there shall be taken into consideration also their influence to children.

*Red* is related to the sun and increases the heart beats. It is a very stimulating color and symbolizes activity and desire to live life, as well as transmits warmness.

*Orange* is a less strong version than red. It is compared to joy that encourages yellow. Offers joy and helps get through traumas. It represents the sunny and beautiful nature.

*Blue* in therapy of colors is known as the color of transition. Blue offers support and protection and is the color of peace, calmness and wisdom

*Pink* same as blue has relaxation effects and suggest warmness and calmness.

*Green* is the color of youth, growth, hope, joy, life and freshness. It is also the color of harmony and equilibrium.

*Yellow* is the color of optimism and is efficient, a solar stimulating color. It provides clearness.

In particular, students need a dynamic and stimulating environment to improve and shape their intellect. Rooms painted in orange, green or blue go along with a didactic dimensions, stimulate their sensorial activities and make them feel calm.

In the general theory of colors, their division is made between warm and cold tonalities.

Warm tonalities are characterized by yellow, red, orange and all the intermediate tonalities. These colors are active, positive and are related to action, high sounds and continuous movement. An experiment shows that heart beats faster in a red painted room than in a light blue room.

Cold tonalities are light blue, blue, purple, which are calm colors, passive that stimulate meditation and calm.

In spaces used for games and active work is recommended the use of warm colors, between light yellow, orange yellow or light orange because they stimulate production of adrenaline and as a result affect the creativity and capacity

- In calm zones are preferred cold colors and tonalities because in the philosophical point of view, an environment with green-blue-light blue tonalities affects the reduction of heart beats offering a feeling of calmness.

### 265.

#### 266. 4.6.2 Use of colors

Before thinking of specific colors, it is important to determine the natural light of the venue and identify the small and difficult areas. To define the function of the rooms and classes and later on define the atmosphere that is needed, i.e. if it is necessary a cold, harmonic or warm, welcoming or cosy.

Colors shall be chosen attentively to create an emotional equilibrium. If the activities performed in these zones would require different color schemes by keeping the main scheme soft, there shall be used strong and brighter colors in some zones, such as windows, doors, corners and frames. As a solution to maintain the equilibrium, one of the simplest and most successful ways is the use of two, three or more colors that

suit each other in the point of view of colors, such as peach, apricot and orange, or green, blue green, aquamarine and light blue.

Use of these schemes is called mixture or harmony, because all the colors are combines, balanced without clash of two colors.

If it is required a calm and fresh atmosphere, then there shall be chosen green colors, such as green blue or blue green. If the atmosphere shall be warm then this is achieved with red, pink, orange or yellow colors.

## • **5.PLANTS AND INSTALLATION SYSTEMS**

### **General**

The plants and installation system projects shall refer to the technical terms of design and standards in the Republic of Albania (K.T.P - STASH) and for special elements not envisaged in these norms, the designers shall before the Euronorms (EN) and Eurostandards (EN,HD) as well as recommendations of CEI, CENELC, DIN, VDI/VDE, or local norms and European Community standards.

Installation projects shall include :

Full project of heating and ventilation accompanied with respective details, list of materials and technical specifications of materials.

Full project of electrical system (including telephony and computer system) accompanied with respective details and table of materials and technical specifications of materials.

Full project of water supply system accompanied with respective details and table of materials and technical specifications of materials.

Full project of sewerage network accompanied with respective details and table of materials and technical specifications of materials.

Full project of fire protection accompanied with respective details and table of materials and technical specifications of materials.

Final specifications of materials and equipment.

Full schedule of works.

Methodology of works implementation specifying the manner of preservation of environment from pollution (environmental project)

Detailed IPR of construction costs in the budget agreed by parties for each object conditioned by the geographical zone where is built. For the key categories shall be presented the respective construction analyses.

**267.**

**268.**

**Full project of heating and ventilation**

**269. Meteorological data and external conditions of the environment**

During the initial phase of design of mechanical plants, shall be taken into consideration the geographical position of the object which conditions the way of design due to external meteorological conditions of the areas, as well as the internal factors affecting the venue’s temperature, such as lighting, equipment transmitting heat, etc. Among many factors influencing the thermal amenity can be listed the following:

- Temperature
- Air Humidity
- Solar radiation
- Winds

The following table shows the external designing temperatures for winter period and geographical data according to cities in the Republic of Albania.

**270. Table No.1. Table of external designing temperatures**

No.	City	Height above sea level (m)	Geographical width (grad,min)	tlog
35	Tirana	110	41 20	-1.0

\* In these cities, the climatology series is less than 30 years

**271. Designing norms and recommended values of temperatures in venues**

Thermal conditions within the education buildings shall be in harmony for the activity performed in them. It is necessary for the designer to take into consideration the function of activities and the activity to be performed. The following table offers the recommended values of internal temperature, relative humidity, quantity of fresh air, level of noise and speed of air movement that shall be taken into consideration during design phase of school venues.

**272. Table No.2. Table with recommended values of internal climate parameters**

Destination of the venue	Winter	Summer	Humidity	Quantity of fresh air	Volumes of air per hour	Noise level	Air speed m/s
Classes	22	26	35-60%	8 (L/s*person)	6	35-40 dB(A)	0.15
Auditors	22	26	35-60%	8-10	12	30-35	0.15

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				(L/s*person)		dB(A)	
Laboratories	22	26	-	10 (L/s*person)	10	40 dB(A)	0.13-0.15
Reading room	20	25	55% +/-5%	8 (L/s*person)	-	45 dB(A)	0.07-0.15
Offices	22	26	55% +/-10%	8 (L/s*person)	6	45 dB(A)	0.07-0.15
Library	22	26	45-50%	8 (L/s*person)	-	40 dB(A)	0.13
Dressing rooms	24	-	-	2.5 (L/s*m2)	10	55 dB(A)	0.15
Corridor, staircase	20	27	-	0.5 (L/s*m2)	4	50 dB(A)	0.15
Storehouse	18	-	-	-	4	55 dB(A)	0.15
Technical venues	16	-	-	-	-	55 dB(A)	0.15
Bars, refectory	21-23	23-26	20-30% / 55-60%	10 (L/s*person)	12	50 dB(A)	0.13-0.15
Gym	20-22	25-26	30-70%	8 (L/s*person)	6	45 dB(A)	0.12-0.15
Swimming pool	26	30	50-60%	-	4-6	45 dB(A)	0.13
Hostels	20	25	50%	15 l/s/ dhome	4	30 dB(A)	0.15
Sanitary system	24	-	-	2.5 (L/s*m2)	6-10	55 dB(A)	0.15
Services, shops	22	26	50%	1-1.5 (L/s*m2)	-	47-56 dB(A)	0.015-0.2
Museum	20	25	55% +/-5%	10 (L/s*person)	-	40-50 dB(A)	0.13
Cooking facilities	20-23	28-30	-	508-762 l/s/m2	12	55 dB(A)	0.15-0.25

Mechanical plants are very important for functioning of a building and normal development of activity destined to be used by users.

Irrespective of the function and use of buildings, mechanical system shall meet the basic necessary criteria toward design, implementation of works in the object and exploitation from users that are :

Harmonization and comfort in use,

Function reliability,

Full technical control,

To guarantee hygienic conditions and technical security,

To enable a partial dedicated use,

To guarantee saving of used energy,

To respect environmental conditions,

To guarantee low maintenance costs,

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

To construct with standard components.

Projects, implementation works and exploitation from uses are based on legal framework and Decision of Council of Ministers of the Republic of Albania, and in cases when this framework does not envisage special terms or arguments, they are based on Italian standards, norms and instructions (UNI, UNIEN) and European (ISO, EN).

Heating system shall be boiler operating with pellet, with panel radiators equipped with thermostatic valves, The sending-return network of water shall be:

For pipes with a diameter smaller or equal to 28 mm, with Pex-Al-Pex material or copper with a insulation coat according to the standards

For pipes with a diameter bigger than 28 mm shall be with black steel pipes without dart or with any other material, thermo-isolated according to necessary standards for pipe dimensions

For gyms may be applied heating systems on the floor or heating systems with hot air (aero-therms type).

Inverter circulation pumps

The designer together with the project shall present also the calculation of thermal losses

The design of heating system with pellet shall meet the following criteria :

To have a pellet tank with a considerable autonomy (up to two months based on thermal calculations of the object)

The pellet tank of deposit shall guarantee the filling without the need of extra labor forces, but directly from the standard self-emptying machineries

The pellet tank of deposit shall guarantee protection of pellet from atmospheric factors

The system shall be automatic, equipped with respective mechanisms of pellet transport from the pellet depot in the intermediate deposit (if necessary even at the boiler) without the need for extra labor force.

The pellet deposit, tank of intermediate sillos, as all as the boiler shall be placed in venues by respecting all the necessary norms of fire protection, ventilation, necessary spaces for maintenance and repair works, etc.

The boiler shall be monoblock or several pellet boilers with pellet placed in the position to generate the required thermal power. In any case, the efficiency is of each boiler shall at least be 89% calculated according to BS 845-2:1987 norm or any equivalent norm.

It should be taken into consideration the light discharge of ashes from burning and removal of wastes in determined places as suitable waste deposit place.

### 273.

#### **Ventilation**

As long as school venues are high density zones and considering also the immunity system of students to attend these premises is relatively low, the ventilation system of venues is of great importance and requires a special care in calculation and selection of typology that will be used according the each case. The ventilation system in school venues shall enable to meet the main purposes of its application, such as :

*To meet the requirement for ventilation and fresh air supply for breathing needs of persons to use these venues.*



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

*To enable the elimination of pollutants and bad odors from the venues and enable improvement of air quality.*

*Possibly to regulate the air humidity in these venues*

*Improvement of thermal amenity by preserving thermal regime of heating/cooling systems.*

Value of air exchange in school venues and schools depends on the destination of use of the venue.

**Table no 2** presents the recommend quantity of air change according to the venue’s destination of use.

All the classes, gym, library, laboratories and other venues of mass use shall have mechanical ventilation systems with recovery of heat (at least 60%) and shall be equipped with a filter of minimum F7 class. Air pipes and grills shall be positioned in order to guarantee a good distribution of air and level of noises shall be within then allowed norms for each venues. The air pipe values shall be insulated. Ventilation system shall take into consideration that in case of fire it shall go off automatically and in case of a design as central units (serving to more than one venue), shall include also the fire dampers.

### **Ventilation of sanitary system**

During ventilation of sanitary system, it shall be considered that:

Air speed shall not pass 6m/s.

Flexible piles shall not pass the length of 3000 mm.

Points of air absorption shall be placed in every closed venue.

274.

### **275. Thermal Power Station**

During the design phase, special attention shall be paid to the right concept of thermal power station. In order to have a well-functioning thermo power station, it is necessary to avoid at maximum problems during operation time, the designers shall take into account:

There should be space of at least about 10% of gross surface of the building for mechanical systems.

Technical venue shall be completed with stairs and in some cases even some elevating means for necessary maintenance and to enable the replacement of equipments.

The doors of technical venues shall at minimum have the dimensions of 230x180. External doors shall be possible to open and removable in case of replacement of large equipment which do not come in pieces.

The underground technical room shall be equipped with special spaces and dimensions that allow replacement of large equipment in the technical venue.

Ventilation points of technical premise shall be positioned at least 50 cm above land level

All the outputs of lines or channels shall be accompanied with collars for fire protection.

Technical venues shall not be used as an area for output and input of air from machineries.

A condensation pipe shall be placed in every part of equipment using steam. Condensation pipe shall discharge with self-flow which will later on end up in the drain or drainage pumps.

There should have suitable spaces for passages around the equipments in the technical venue in order to allow the maintenance, to bring the repaired equipment, temporary equipments, replacement of old equipments and security of high voltage.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

There should be sufficient lighting inside the technical venue to facilitate the work of maintenance workers.

**276.**

**Complete project of electrical network:**

The electrical project shall consist of the following systems:

Middle voltage TM supply system.

Electrical transformation cabin TM/TU.

Structure of venues

Typology of devices

Schemes and calculation of loads according to requirements

System of emergency energy supply - Generators

Structure of venues

Typology of equipment

UPS security system of energy supply

Main energy supply lines of electrical panels from electrical substation

Functional characteristics of main distribution network

Secondary Distribution network

Electrical box

Electrical box of the floor, zone ....

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Secondary Distribution network

Special venues box

General Power Grid

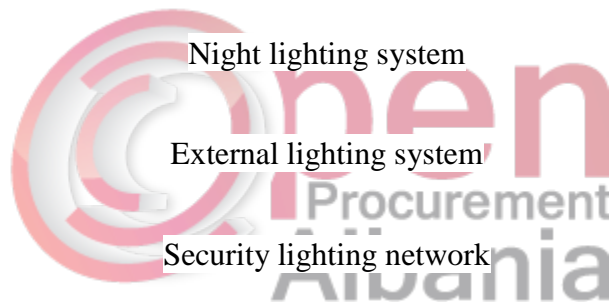
Supply of general consumers from normal network

Supply of preferential consumers from generator

Supply of important consumers from UPS

Lighting network

Network of general normal lighting



Emergency lighting network

Evacuation lighting network etc.

Earthing grid, atmospheric discharges and equipotential schemes

**Project of special installations shall contain the following systems:**

Security system

Fire and gas detection and alert system

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Sound alert system

System for blocking unwanted entries

Doors control system

CCTV monitoring system.

Communication system installation

System of structured cables, optical fiber

Active devices of data transmission network

TV-SAT signal system .

Video-doorbell system

The above-mentioned system shall be accompanied with all the calculations and selected technical specifications.

**Power supply system.**

This system will be designed to enable the uninterrupted power supply in all the venues. In this case, there shall be 3 sources of power supply.

**From the network of electricity system - normal voltage**

The distribution of power supply lines depends on the organization of venues. E.g. security systems shall have uninterrupted supply from UPS, same for high sensitivity zones for children, the UPS lines will supply also the informatics systems and those of preservation of uninterrupted information, if any.

With critical voltage (from generator after 15-20 sec) will be supplied those consumers who for 15-20 sec period will not lose the work parameters and do not influence in the normal development of the garden's activity.

With this voltage will be supplied consumers of general lighting, emergency lighting, security systems, etc.

With normal voltage will be supplied all the venues of the garden considering it as basic supply, but for security and continuity reasons shall be doubled with voltages from the generator and UPS automatically, which shall be envisaged in the designing schemes.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

For the power supply of the object in cases when the required power passes the value of 150 kW and when there is no possibility of power connection of low voltage in that area, it shall be envisaged the construction of a substation, which will included the following technical rooms:

middle voltage room

This room will be equipped with middle voltage boxes according to the following listing:

20kv middle voltage input box  
20kv middle voltage output box  
20kv middle voltage measurement box  
Control and protection box of TR1

### 277.

In the second room, it is envisaged the establishment of middle voltage transformers TM 20/0.4 kv with resin.

Transformers are divided from the venue with an iron grill 40x40x4 (mm) with secured doors and protection elements in case of doors opening.

The third room envisages establishment of generators and after necessary calculations shall be determined even their power.

In the fourth room will be established the panel of automatic passing into generator network, and regulation panel of  $\cos \Phi$  which will be calculated based on the installed power and calculations shall be presented, etc.

It is better to place the low voltage box nearer to the venues that they supply for saving energy and having a stable voltage. Middle voltage panels and generators shall be placed outside the object. Establishment of low voltage boxes within the kindergarten building makes them more controllable, manageable and economic. During the design of electrical installation, we recommend that the low voltage lines shall be carried out by respecting TNS system for three phase voltage and by respecting TS system for mono phase system. The realization of TU panels design is carried out in conformity with CEI norms, programmed by implementation of powers, dimensions, temperature, lines length and type of consumers. During the design of the project, there shall be considered that lines shall be straight, no joints, labelled according to destination, different from one another, i.e. Grid, Generator, UPS as well as derivation boxes shall be labelled and easily readable. The electrical boxes must contain the protection controlling and measuring elements, protection from atmospheric discharges, etc. Voltage boxes shall provide sustainability REI -120.

The designer shall provide the Approval of Electrical Projects in ISHTI and CEZ, as well as determined the point of power connection from power grid (sub-station or zone transformer).

The electrical project shall be accompanied with the certified license of the electrical engineer, which will serve for further procedures for approval of connection point with CEZ.

## Lighting System

The design shall take into consideration that this system will clearly include :

Schemes of normal lighting  
Schemes of emergency lighting  
Schemes of evacuation lighting (indication)

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Lighting flow shall be respected according to the venues where will be installed by respecting Lux per m<sup>2</sup> in relaxing venues, eating, teaching, corridors, kitchen, toilets, etc.

The control mode of lighting shall be used with efficiency in order to save as much energy as possible.

The lighting shall be with LED lamps with high energy efficiency and minimal consumption. LED lamps shall be specified so that the lighting body (lamp) shall be changeable without needing to change the entire lighting set in case of a defect and capable to operate for 50.000 working hours and meet the DIN EN 60598-1 requirements (VDE 0711-1): 2005-03

Technical specifications of lights shall take into consideration all the necessary standards in order to avoid installation of uncertified products.

### Power System in venues

In all venues shall be envisaged monophase sockets working with normal voltage and generator in harmony with furniture as well as lighting output in the toilets and aspirator if necessary. Në të

In corridors in 15 -20 m distance shall be envisaged installation of mono phase sockets with normal voltage for cleaning equipment.

### Equipotential scheme

In special venues, such as technical, mechanical, electrical, kitchen spaces, etc, during the realization of the project shall be equipped with a equipotential busbar placed after each door where all the metallic parts will be connected on the floor, walls or ceiling with the equipotential scheme.

VO!

Realization of equipotential scheme during the design shall be absolutely separated from the earthing scheme and lightening rod system.

Inside the equipotential box is envisaged a copper busbar with holes for realization of all connections in equipontetial points. The equipotential scheme begins in every venue and ends in the electrodes places on the ground outside the object.

### Earthing scheme

During the design of earth scheme shall be taken into consideration all the elements, such as sigma of the earth, type of earth, humidity, so that during the calculation the final resistance shall be less or equal to 4  $\Omega$ . The quantity of electrodes depends on RT realization. During the measuring with controlled currents differential from 2mA-30mA, the differential relay shall act within this diapason.

### Lightening rod system

The scheme shall be realized by the designer taking into consideration that  $R_r$  shall be smaller or equal to 10  $\Omega$ . The counture on earth surface and terrace shall be realized with a zinc stripe 30x3 and zinc rods  $L=1.5m$ , whereas surrounding counture and connector of electrodes on the ground with bare copper conductor  $S= 50mm^2$ . For every discharge shall be placed the disjoint for measuring. Number of discharges shall address the report  $n=P/15 +2$  and resistance of the lightening rod will be calculated with a smaller value than 10 om.

### Schemes of supply and control of mechanical and hydronic devices

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

278. During realization of the project shall be taken into consideration the realization of schemes of supply and control of heating system, ventilation and water supply. Therefore, in the framework of the prepared schemes by the mechanical and hydrotechnic designer, the electrical project shall contain the following:

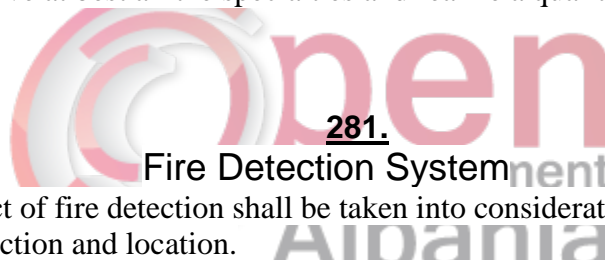
panel and cables of ventilation units  
panel and cables of pumps (heating, cooling, twins)  
panel and cables of boiler  
panel and cables of fire pump  
panel and cable of water supply pumps 1  
panel and cables of submersible pumps (if any)

### **279.**

### **280.**

#### **Security systems**

Cameras, alarms and control access shall be placed in order to provide uninterrupted information through venues, as well as monitoring of the entire situation in all the venues of the garden - inside and outside. For realization of the electrical installation project shall be carried out a coordination of work with all the designing groups in order to serve at best all the specialties and realize a qualitative service of the staff and apparatus.



### **281.**

#### **Fire Detection System**

During realization of the project of fire detection shall be taken into consideration the selection of detectors according to their function and location.

During completion of the project shall be taken into consideration the distance of establishment of detectors, sirens, alerts, so that the entire zone could be covered. The project shall envisage multifunctional detectors, optical, CO<sub>2</sub>, NO<sub>2</sub>, and temperature detectors. The alerts shall be placed on the corridors in the quotes 1 m and 40 cm from quote 00 of the floor. Internal and external sirens shall be placed in the most positions with the best acoustics. The station to be used shall offer all the informations to the system, location of all elements of the scheme and be equipped with GSM. The station shall have a voltage 24 and 48 V for controlling electromagnetic dampers, etc.

The magnifying glass of this station shall not pass 80-125 elements including detectors, sirens, etc. The station shall be connected with the public system of the zone without causing panic in other zones. The fire system software shall be accessible in more than two points and display in a clear situation of the entire system.

#### **Satellite and terrestrial TV system**

During the design, this system shall take into consideration the equipped of all entertaining and relaxing rooms of children with territorial and satellite system.

#### **Sound alert system**

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Sound alert system shall be used to offer information to the staff in cases of emergencies and special occasions. All the components, such as voice center, central, distribution and connection components shall be envisaged and adjusted for every venue. They can be connected with the central CD player device to play music in suitable hours.

Following zones/rooms will be equipped with sound alert

- Corridors
- common venues

During the designing phase, planned exits shall be coordination with those of the client.

### CCTV System

In line with requirements and standards of the installation, the project shall envisage a CCTV system for common school venues. It shall cover the necessary fields required by the benefiter, which are divided into categories. Based on these special requests in every field, the selection of equipment shall meet these requirements. For the outside areas, there will be the main entries and other requirements that will be coordinated with the benefiter, mobile cameras, suitable for the installation, anti-intervention protection, with IP-66 case and motion detection, etc.

For the internal area will be used high-resolution cameras placed in key monitoring points. All the data will be registered with NVR registration equipment, which shall be placed in the server room with a calculated capacity with the time required by the benefiter. The monitoring room shall display the images of the cameras of the monitor covering the entire divided space in the screen with all the envisaged cameras.

**282.**



**283. The supply with cold sanitary water is necessary for normal performance of teaching activity.**

Water supply in education venues can be carried out from the urban network or wells in cases when the urban network does not guarantee the needs for water supply of these venues.

Likewise, beside the need for water reserves that will serve for fire protection system, there shall be provided also the quantity and necessary reserve quantity for consumption needs on the users bases.

The referring values for necessary flow in all the hydrosanitary equipments used in the teaching venues is indicated in the following table expressed in “l/s”.

<b>NOMINAL FLOW TO BE PROVIDED IN EACH TAP</b>			
Hydrosanitary equipment	Cold water (l/s)	Hot water (l/s)	minimal pressure mk H2O
Sink	0.10	0.10	10
Bide	0.10	0.10	10



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

WC	0.10		10
Shower plaque	0.15	0.10	10
Basin	0.20	0.20	10

284.

285.

Full project of heating and ventilation

**286. Meteorological data and external conditions of the environment**

During the initial phase of design of mechanical plants, shall be taken into consideration the geographical position of the object which conditions the way of design due to external meteorological conditions of the areas, as well as the internal factors affecting the venue’s temperature, such as lighting, equipment transmitting heat, etc. Among many factors influencing the thermal amenity can be listed the following:

Temperature  
Air Humidity  
Solar radiation  
Winds

The following table shows the external designing temperatures for winter period and geographical data according to cities in the Republic of Albania.

**287. Designing norms and recommended values of temperatures in venues**

Thermal conditions within the education buildings shall be in harmony for the activity performed in them. It is necessary for the designer to take into consideration the function of activities and the activity to be performed. The following table offers the recommended values of internal temperature, relative humidity, quantity of fresh air, level of noise and speed of air movement that shall be taken into consideration during design phase of school venues.

Minimal daily consumption necessary to support the European Standards shall be provided to meet the requirements for sanitary water is 25 liters/user.

Sanitary cold water supply is done through the external network from the controlling manhole.

**Connection point shall be coordinated with the water supply enterprise.** Water supply system from external network shall guarantee sufficient water for sanitary use. Through the flow and pressure of external network is enabled the supply of general water reserves. A water supply group shall consist of: water measuring, pressure reduction tool, non-return valve and “Y” filter. The pumping group shall be placed in the technical venue.

Water reserve basins shall be calculated in order to provide water quantity for the required amount (maybe 1 day). Specifications (quantity, capacity, etc) shall be defined from the designer based on the diagram of daily use by consumers. **Beside sanitary cold water reserves placed in the technical premise, the project shall contain also a water tank in free flow as well as its connection with toilets and pissoirs in**

cases of power cut. The tank volume shall be calculated by the designer and cover the needs for at least 1 day.

The taps in sanitary connections shall be equipped with water flow timer time press to enable water saving, as well as the hot water mixers shall have thermostatic valve.

The pumping station is the most important part of the system. The pumps parameters shall be calculated in line with daily needs diagrams for water and network configuration.

In this respect, there shall be calculated the pressure, flow, pump power and other technical specification. The project design shall include a pumping station, which is installed in line with the project requirements.

The distribution network comes from the pumping station to the technical building and sanitary connections. Every joint from the main magistral serving as a supplying branch or a columns for shall be equipped with a stopper valve for interruption of water when is necessary to intervene in the system without interrupting the supply for other consumers. The pipeline system of sanitary water needs all the requirements of defined norms and standards. The entire distribution network will be insulated to eliminate the condensation phenomenon and will be equipped with stopping valves wherever necessary, in case of necessary interventions for potential repairs. The system of sanitary water pipes will meet the requirements of norms and standards defined and selected since the designing phase by the engineering staff, as well as preliminary requests of the investor. The pipes shall be sustainable against mechanical blows and resistant to atmospheric agents. The pipes of this system are divided according to the function of their material as following:

- Zinc-plated steel tubes without dart for columns;
- Tubes PE-Xa – (Reticulated Polyetilen) for distribution into floors;
- Tubes PPR;
- Tuba PEHD (polyetilen with high density).

288.

289. Before use, the sanitary water shall be treated (filtered) based on its physical-chemical characteristics. Filtration may be:

- Mechanic filter;
- Cartridge filter;
- Sand filter;
- Carbon filter;
- Ultraviolet filter.

#### Plant for supply with hot sanitary water

The hot sanitary water shall be prepared in solar panel systems for hot water, where shall be taken into consideration at least 1 m<sup>2</sup> solar panel over every 100 liters of hot water per day. Panels may be either with a thermosiphon system, without electrical resistance, but designed in order to supply the boiler directly or with central system with pumping circulation.

Hot water accumulation shall have a temperature not less than 60 °C. Nevertheless, for the children security, for reduction of risk from very high water temperatures, regulations of kindergarten venues

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

require that the temperature for use (in the output of hydro-sanitary equipments) shall not be higher than 43 °C for all the hot water equipment. Such thing is achieved through thermostatic mixture completed by the mixer.

The dimensions of sanitary hot water network shall be carried out based on the designing norms and standards.

The sanitary water system shall serve for providing cold and hot water from the pumping station to collectors and after this shall provide the water distribution in equipment of sanitary venues. the distribution of sanitary water is realized through:

- Hot water distribution lines;
- Re-circulation of hot water (if it is chosen the version with hot water central boiler)
- Water supply collectors (if it is chosen the collector version from the designer)

### 290.

### Full project of sewerage system

The sewerage system consists of the network of collection of atmospheric waters, sewers, gray waters and waters containing fats.

- Atmospheric waters are waters falling on the earth surface in the form of liquid falls (rain) and solid form (hail and snow)

Sewers are all the waters collected by the sewerage system of WC of all schools.

Gray waters are waters collected by the draining network of sinks, bidets, showers, washing-machines, etc.

Waters containing fats are collected from the draining network of all kitchens in different building.

In the water draining system in which we have presence of waters containing fats, it is installed the plant of collection of fats before outflow in the main collector of sewerage system.

### **291. Dimensions of draining plants, normative values of draining**

Dimension of draining network of waters is made based on calculations of flows for draining units of different equipment, velocity of flow of liquids in pipes and inclination of pipes. The water flow in the draining system shall not create pressure that could create hydraulic blows in the pipes. Pipes shall have a sufficient diameter to enable free circulation of air ventilation that provides the stability of network pressure.

### **292. Values of drain units accompanied with respective details and table of materials and technical specifications of materials.**

Every sanitary equipment is characterized by a defined norm of water flow, which depends on its size and functioning. Norms of dimensions addressed for the draining network are proposed by **UNI 9183** standards.

**Table 1 – Amount per draining unit for equipments (UNI 9183)**

<b>Equipments</b>	<b>Draining unit</b>
Tube (no shower)	2
Shower (per one siphon)	2
Shower (per every siphon installed together)	3
Sink	1
Bidet	2
WC with cassette	4
WC with cassette incorporated in the walls	8
Kitchen sink	2
Sink	3
Dish washer	2
Washing machine	2
Floor drain	1
Combination Sink-Bidet-Tube-WC with cassette	7
Combination Sink-Bidet-Tube-WC with cassette incorporated in the wall	10
Combination Sink-WC with cassette	4
Combination Sink -WC with cassette incorporated in the wall	8

### **Dimensions of joints**

The internal system of collection of sewage waters is composed of the joints of all sanitary equipment. From the internal network, water is send to the vertical draining column. The flow in one joint is the unit flow of the apparatus that will drain to the joint. Diameter is defined based on the following table:

**Table 2 – Diameter of draining joints ratio to maximal number of unit joints of drains in them (UNI 9183).**

<b>Diameter of branches (mm)</b>	<b>Total load</b>
40	3
50	6
65	12
80	20
100	160
125	360
150	620

200	1400
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293.

294.

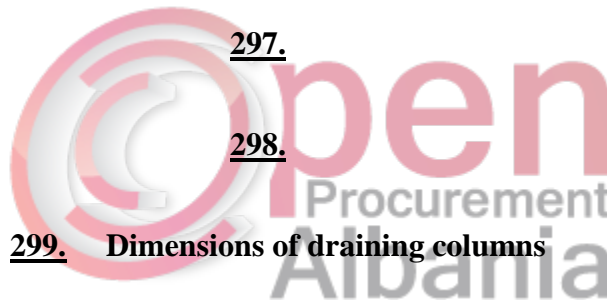
295.

296.

297.

298.

299. **Dimensions of draining columns**



A draining column normally counts different joints in different floors.  
 The maximal flow in a draining columns increases with the height of the floors where there exist joints.  
 The dimensions of the vertical draining column pipes depend on the maximal flow of the column.

**Table 3 – Diameters of the draining columns ratio to maximal number of units per drain, number of floors and loads in the draining units in the busiest floor (UNI 9183)**

<b>Columns Diameter (mm)</b>	<b>Built up to 3 floors</b>	<b>Maximal load per one floor</b>
50	10	6
65	20	9
80	30	16
100	240	90
125	540	200
150	960	350

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

200	2200	600
250	3800	1000
300	6000	1500

**300.**

**301.**

**302. Ventilation of sewerage network**

The main purpose of ventilation of sewerage system aims to bringing out the gases collected from sewers, as well as encourages the normal function of the installed siphon in each equipment and to keep them under the atmospheric pressure. An efficient ventilation system is also useful in fight against creation of mould. Ventilation columns are divided into four categories:

- Primary ventilation
- Direct parallel ventilation
- Indirect parallel ventilation
- Secondary ventilation

**303.**

**304. Processing of drain waters**

Processing of sewerage waters consists of removal of pollutants in these waters  
Processing of sewerages is done through the construction of water treatment plants

These plants are built outside the inhabited centers  
After the cleansing these waters are used for communal purposes

**305.**

**306. Materials of pipes and main components of sewerage system**

Pipes of internal network feeder and sewerage columns are made of different materials, pressure pipes: geberit piping system with welding.

Pipes without pressure: Politelien and PVC

Collectors pipelines are divided into pipes with loads and pipes without pipes.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

When pipes pass through pavements or green spaces, there shall be used junction pipes without loads SN4, PVC SN4.

When pipes pass through a road soil where there are dynamic loads and it is used by high tonnage vehicles, there shall be used junction pipes with loads SN8, PVC SN8. Materials shall be accompanied with manufacturing certificates. Based on **UNI 9183** and **UNI EN 1091** norms.

### **Rain water draining system**

Dimensions of roofs and terraces draining network

Dimensions of ruts.

Dimensions of descending columns.

Dimensions of pipelines collectors

Dimension of superficial drainage

White water draining plants

- Condense waters
- Accidental waters from fire protection plant
- Waters in underground floors, from infiltrations, etc.

Water rain draining networks and main elements

Materials of pipes and main elements of plants

Preservation and use of rain waters



307.

308.

309.

**310.**

### **Complete project of fire protection system (MKZSH)**

This system includes the total of architectonic, constructive, mechanic and electrical measures for “Prevention, protection and construction of Fire Protection System”.

These measures according to their function and way of application are divided into measures for “Passive Protection” and measures for “Active Protection”.

Passive protection that deals with architectonic and constructive arguments of fire prevention and protection, such as compartmentalization of structures; realization of roads and secure escape exists; reduction of fire load its spreading. Passive protection is subject of architectonic and constructive projects.

Active Protection that deals with manual fire detection and extinguishing system, fire and heat control system. Detection plants will be treated by electrical systems.

### **311.**

Fire protection system shall consist of hydrants. Hydrants shall be designed for the necessary flow and standards and shall be completed with all elements (cassettes, valves, rubber pipe, etc.). They need to be positioned in such a way that every point of the object could be covered by at least two hydrants and shall be placed nearest possible to passages of escape and evacuation (object shall have at least two escape and evacuation passages). If the building is more than story high, in the hydrants of each floor shall be a valve for connection of the fire-fighting teams.

Internal hydrants shall meet the following criteria:

- To be installed separately for each compartmentalization;
- To be positioned in the vicinity of exits of escape passages without being an obstacle;
- To be positioned on both sides of the gate if there exists a REI gate;
- To cover every space of the activity;
- Every hydrant shall protect a zone up to 1000 m<sup>2</sup>;
- Every point of the protected zone shall be in a maximal distance of 20 m per mural hydrants and 30 m per naspot;

### **312.**

External fire hydrants that consist of the type of columns on the ground with a flow of 350 l/m and output pressure not less than 2.5 bar are composed of a column coming from underground in which are positioned the connections that enable the water supply. The hydrant consists of columns with two exits respectively DN 70 and DN 100 with stoppers linked with a chain and maneuver key (optional). The column hydrants on the ground and underground hydrants shall be installed in order to:

- To be not more than 60 m far from each other ;
- Outside the building is recommended the use of column hydrants above the ground;
- Where possible shall be installed in relation to exits from the building in order to be in a secure position in case of fire;
- Distance between them from the external walls of the building is recommended between 5 m and 10 m .

### **313.**

The connection with auto-pump is a mean that helps fire extinguishing linked to the hydric network which can supply water in case of fire emergency. Every connection with the auto-pump shall provide:

- 1 or 2 linkages with a diameter not less than DN 70;
- To be well-fixed in the lateral walls outside the building, easily identified and accessible by fire-fighting vehicle;
- Output pressure not less than 1.2 Mpa.

### **314.**

Water supply system shall be able to provide at any time the necessary flow and pressure required by the plant in case of fire. As a water source shall serve:

- Fixed connection from the water supplying system of the city, uninterrupted;
- Fixed abundant basins with the necessary quantity of water anytime.



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Wells, fountains or other insecure connections cannot be used as a source or water reserve. Measures shall be taken in order that the water shall contain no :

- Kelps or other blocking materials
- Corrosive Materials

The pumping group shall be positioned in a protected venue, in the same level of the water reserve and shall be composed of :

- 1 or 2 pumps in line with EN733 norm together with the pilot pump (jockey) and diesel.
- Control Panel equipped with buttons in the frontal part and LCD screen.

There shall be taken measures for providing power supply from the normal grid and moro-generator.

The distribution network includes the underground network, visual external network and internal network of the building. It is preferred a ring system equipped with controlling interrupting valves.

The distribution network shall take into consideration:

- **To consist of materials according to the norms;**
  - **To be painted with anti-mould paint;**
- **To be protected from fire, damage and freezing;**
  - **To ensure the mechanical resistance;**
- **To take measures for seismic zones, passages in the walls or anti-fire division.**

The MNZSH project shall also define the positions and necessary equipments for evacuation of fire (space with an automatic opening, ventilators for removal of fire, etc.).

The MNZSH Project shall also include the evacuation signaling system. Signals system enables persons to find the escape ways, emergency exits, fire extinguishing equipments or emergency phone numbers.

The fire alert, dimensions (depending on the sight distance) colors and their dimensions are determined in line with EN ISO 7010 norm. Signals system shall also be realized with other means :

- through a sound communication system;
- through a different consistency surface;
- through chromatic contract on the floor visible in all illumination conditions

315.

## 316. 6.CONSTRUCTION

317.

### 6.1 Standards for the construction project

STANDARDS OF REFERENCE

Eurocodes

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- EC0 Basis of structure design
- EC1 Load in structures
- EC2 r/c structures design
- EC7 Geotechnic design
- EC8 Seismic structures design

Albanian Designing Terms and in concrete

- Technical Designing Terms KTP -1978
- Technical Terms for designing of anti-seismic constructions KTP-N.2-89

**318.**

Schools design shall be based on structural design standards and also long as in our country there are still in force 1978 -1979 Technical Conditions of Design, which do not reflect the developments and recent norms drafted in this respect, we recommend that the school design could be done based on Eurocodes norms.

The eurocodes determine in details the types of loads (permanent, temporary, snow and wind, as well as their combination), which shall be taken into analysis during the structural analysis.

In this respect, we also underline that:

Before completing the design there should be carried out a geological and seismic study about the soil where the object will be built.

The school design shall be made with r/c structures and concrete make shall not be smaller than C25/30, whereas the steel to be used shall be from the make S500 (sidenor) or its equivalent (e.g. FeB44k).

Likewise, we recommend that foundations of the schools shall consist of r/c slabs, hydroisolated from outside.

Slabs of inter-floors of schools shall consist of monolite slabs with deep beams.

**319.**

**320.**



BASHKIA  
TIRANË

**Tirana Municipality**

**GENERAL DIRECTORATE OF PUBLIC WORKS**

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321.

322.

323.

324.

325. DESIGNING TASKS

**FOR REALIZATION OF STUDY AND DESIGN**

“New construction of Type 2 school in Administrative Unit no. 2  
(Site2/3)

• TABLE OF Contents

.....	<a href="#">DESIGN</a>	
<a href="#">ING TASK</a> .....		45
1.....	GENERAL DATA AND EXISTING SITUATION OF THE <a href="#">OBJECT</a>	47
	<a href="#">2.GENERAL DESIGNING REQUIREMENTS FOR SCHOOL CONSTRUCTION</a>	71
301 .....		<a href="#">2.1</a>
<a href="#">Main space</a> .....		72
.....		<a href="#">2.1.1</a>
<a href="#">Teaching classes</a> .....		72
.....		<a href="#">2.1.2</a>
<a href="#">Laboratories</a> .....	<b>Error! Bookmark not defined.</b>	
.....		<a href="#">2.1.3</a>
<a href="#">Furniture</a> .....	<b>Error! Bookmark not defined.</b>	
.....		<a href="#">2.1.4</a>
<a href="#">Laboratories</a> .....	<b>Error! Bookmark not defined.</b>	
.....		<a href="#">2.1.5</a>
<a href="#">Working space</a> .....		83

“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

.....	<a href="#">2.1.6</a>
<a href="#">Music and dancing halls</a> .....	<b>Error! Bookmark not defined.</b>
302 .....	<a href="#">2.2</a>
<a href="#">Social space</a> .....	89
.....	<a href="#">2.2.1</a>
<a href="#">Libraries</a> .....	89
.....	<a href="#">2.2.2</a>
<a href="#">Multi-purpose space</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.2.3</a>
<a href="#">Space for physical education</a> .....	97
303 .....	<a href="#">2.3</a>
<a href="#">Administrative space</a> .....	98
.....	<a href="#">2.3.1</a>
<a href="#">Headmaster’s Office / Deputy Headmaster’s Office</a> .....	79
.....	<a href="#">2.3.2</a>
<a href="#">Secretariat / administration rooms</a> .....	98
.....	<a href="#">2.3.3</a>
<a href="#">Teachers’ room</a> .....	99
.....	<a href="#">2.3.4</a>
<a href="#">Assisting Staff</a> .....	100
304 .....	<a href="#">2.4</a>
<a href="#">Other facilities</a> .....	100
.....	<a href="#">2.4.1</a>
<a href="#">Hygiene-sanitary venues</a> .....	100
.....	<a href="#">2.4.2</a>
<a href="#">Office of the physician</a> .....	<b>Error! Bookmark not defined.</b>



.....	<a href="#">2.4.3</a>
<a href="#">Office of the psychologist</a> .....	<b>Error! Bookmark not defined.</b>
305 .....	<a href="#">2.5</a>
<a href="#">Communication spaces, entrances, staircase, corridors, halls</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.1</a>
<a href="#">Corridors</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.2</a>
<a href="#">Staircase</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.3</a>
<a href="#">Elevator</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.4</a>
<a href="#">Hall</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.5</a>
<a href="#">Storeroom, additional corners</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.6</a>
<a href="#">Wardrobe</a> .....	<b>Error! Bookmark not defined.</b>
<a href="#">3</a> .....	<b>FURNITURE AND EQUIPMENT Error!</b> <b>Bookmark not defined.</b>
306 .....	<a href="#">3.1</a>
<a href="#">Antropometry and furniture dimensions</a> .....	<b>Error! Bookmark not defined.</b>
<a href="#">4</a> .....	<a href="#">SPECIAL REQUIREMENTS</a> <b>Error!</b> <b>Bookmark not defined.</b>
307 .....	<a href="#">4.1</a>
<a href="#">Design for people with disabilities</a> .....	<b>Error! Bookmark not defined.</b>
308 .....	<a href="#">4.2</a>
<a href="#">School as a Community Center</a> .....	<b>Error! Bookmark not defined.</b>



309	<a href="#">Thermal Amenity (Temperature)</a>	4.3	Error! Bookmark not defined.
	<a href="#">Definitions and Terminology</a>	4.3.1	Error! Bookmark not defined.
	<a href="#">Improvement of thermal amenity</a>	4.3.2	Error! Bookmark not defined.
	<a href="#">Active control of temperature</a>	4.3.3	Error! Bookmark not defined.
	<a href="#">Temperature and humidity levels</a>	4.3.4	Error! Bookmark not defined.
	<a href="#">Isolation standard</a>	4.3.5	Error! Bookmark not defined.
	<a href="#">Thermal bridges</a>	4.3.6	Error! Bookmark not defined.
	<a href="#">Requirements of U values (W/m<sup>2</sup>K)(thermal transmittance coefficient)</a>	4.3.7	Error! Bookmark not defined.
	<a href="#">Windows and Doors</a>	4.3.8	Error! Bookmark not defined.
	<a href="#">Passive control of temperature</a>	4.3.9	Error! Bookmark not defined.
310	<a href="#">Visual Amenity</a>	4.4	152
311	<a href="#">Sound Amenity</a>	4.5	154
312	<a href="#">Colors and their usage</a>	4.6	Error! Bookmark not defined.

.....	<a href="#">4.6.1</a>
<a href="#">Meaning of colors</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.6.2</a>
<a href="#">Use of colors</a> .....	<b>Error! Bookmark not defined.</b>
<a href="#">5</a> .....	<b>PLANT DESIGN AND INSTALLATIONS Error!</b>
	<b>Bookmark not defined.</b>
313 .....	<a href="#">5.1</a>
<a href="#">Standards for electrical projects</a> .....	<b>Error! Bookmark not defined.</b>
314 .....	<a href="#">5.2</a>
<a href="#">Mechanical plant</a> .....	<b>Error! Bookmark not defined.</b>
315.....	<a href="#">5.3 Fire</a>
<a href="#">protection installation</a> .....	<b>Error! Bookmark not defined.</b>
316 .....	<a href="#">5.4</a>
<a href="#">Sanitary cold water supply system</a> .....	<b>Error! Bookmark not defined.</b>
317 .....	<a href="#">5.5</a>
<a href="#">Sanitary hot water system</a> .....	<b>Error! Bookmark not defined.</b>
318 .....	<a href="#">5.6</a>
<a href="#">Sewerage system</a> .....	<b>Error! Bookmark not defined.</b>
319 .....	<a href="#">5.7</a>
<a href="#">Plant for draining of rain and waste waters</a> .....	<b>Error! Bookmark not defined.</b>
320 .....	<a href="#">5.8</a>
<a href="#">Heating, Ventilation and air-conditioning (H.V.A.C)</a> .....	<b>Error! Bookmark not defined.</b>
321.....	<a href="#">5.9 Fire</a>
<a href="#">protection plant</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.9.1</a>
<a href="#">Passive Protection</a> .....	<b>Error! Bookmark not defined.</b>



<a href="#">Active Protection</a> .....	5.9.2	Error! Bookmark not defined.
<a href="#">Terms and graphic definitions of signal charts technical symbols</a> .....	5.9.3	Error! Bookmark not defined.
<a href="#">Terms and terminology of construction elements, distances, rescue ways, evacuation of smokes and active tools of fire alert-detection and extinguishing</a> .....	5.9.4	Error! Bookmark not defined.
<a href="#">Classification of fire dangel level</a> .....	5.9.5	Error! Bookmark not defined.
<a href="#">Hand-held (vessels) fire extinguisher</a> .....	5.9.6	Error! Bookmark not defined.
<a href="#">Half-portable system (hydrants, naspot) of fire extinguishing</a> .....	5.9.7	61
<a href="#">Fire Sprinkler System</a> .....	5.9.8	Error! Bookmark not defined.
<a href="#">Pressured Plants and water reserve for fire extinguishing</a> ..	5.9.9	Error! Bookmark not defined.
<a href="#">Distribution network, main installation and design components</a> .....	5.9.10	Error! Bookmark not defined.
<a href="#">Smoke and evacuation control system</a> .....	5.9.11	Error! Bookmark not defined.
<a href="#">Graphic presentation of additional necessary documents in drafting Mechanical Project of Fire Protection</a> .....	5.9.12	Error! Bookmark not defined.
<a href="#">Role and duties of staff in recognizing, maintaining and using fire extinguisher tools and action in case of a fire</a> .....	5.9.13	Error! Bookmark not defined.

defined.

.....	<a href="#">5.9.14</a>
<a href="#">Standards, norms and international and national normatives</a>	<b>Error! Bookmark not defined.</b>
322 .....	<a href="#">5.10</a>
<a href="#">Cold hydro/sanitary (H/S) water supply plant</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.1</a>
<a href="#">Use of cold sanitary water</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.2</a>
<a href="#">Need for cold hydro/sanitary water</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.3</a>
<a href="#">Methods of primary water supply and provision of reserve water</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.4</a>
<a href="#">Pumping station</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.5</a>
<a href="#">Distribution network and components of design and installation</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.6</a>
<a href="#">Pipes materials and installation and design components of internal network</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.7</a>
<a href="#">Filtration of sanitary water</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.8</a>
<a href="#">Design and installation of hot sanitary water</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.9</a>
<a href="#">Parameters of hot sanitary water</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.10</a>
<a href="#">Needs for hot sanitary water accordign to standards</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.11</a>
<a href="#">Preparation of hot sanitary water</a>	<b>Error! Bookmark not defined.</b>

.....	<a href="#">5.10.12</a>
<a href="#">Dimensioning of hot sanitary water</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.13</a>
<a href="#">Network Distribution, installation components</a> .....	<b>Error! Bookmark not defined.</b>
323.....	<a href="#">5.11</a>
<a href="#">Sewerage and wastewater plant</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.11.1</a>
<a href="#">Classification of drained waters</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.11.2</a>
<a href="#">Dimensioning of draining system, normative values of draining</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.11.3</a>
<a href="#">Values of draining units according to devices</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.11.4</a>
<a href="#">Dimensions of draining columns</a> .....	173
.....	<a href="#">5.11.5</a>
<a href="#">Ventilation of draining networks</a> .....	174
.....	<a href="#">5.11.6</a>
<a href="#">Treatment of drained waters</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.11.7</a>
<a href="#">Materials of pipes and main components of draining</a> .....	<b>Error! Bookmark not defined.</b>
324 .....	<a href="#">5.12</a>
<a href="#">Heating, ventilation and air-conditioning system (H.V.A.C)</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.12.1</a>
<a href="#">Meteorological data and external conditions of the environment</a> .	<b>Error! Bookmark not defined.</b>
325 .....	<a href="#">5.13</a>
<a href="#">Designing Conditions</a> .....	<b>Error! Bookmark not defined.</b>



.....	<a href="#">5.13.1</a>
<a href="#">Designing Norms and recommended values of temperatures of premises</a>	<b>Error! Bookmark not defined.</b>
326 .....	<a href="#">5.14</a>
<a href="#">Air-conditioning plant</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.14.1</a>
<a href="#">Heating</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.14.2</a>
<a href="#">Typology of heating plants</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.14.3</a>
<a href="#">Heating system</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.14.4</a>
<a href="#">Cooling</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.14.5</a>
<a href="#">Ventilation – Fresh air</a>	<b>Error! Bookmark not defined.</b>
327 .....	<a href="#">5.15</a>
<a href="#">Thermal power station and mechanical equipments</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.15.1</a>
<a href="#">Thermal power stations</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.15.2</a>
<a href="#">Mechanical equipments</a>	<b>Error! Bookmark not defined.</b>
<a href="#">6.</a>	<a href="#">CONSTRUCTION</a> 177
328 .....	<a href="#">6.1</a>
<a href="#">Standard for the construction project</a>	177
.....	<a href="#">7.</a>
<a href="#">ACCESSIBILITY FOR THE DISABLED/ARCHITECTURAL BARRIERS</a>	<b>Error! Bookmark not defined.</b>

## **MATERIALS TO BE PRESENTED BY PROCUREMENT ENTITY**

3. The Designing tasks for each educational object
4. Feasibility Study for pre-university educational infrastructure

## **METHOD OF PROVIDING COMPLETE PROJECT**

*c. Schematic and conceptual phase of design, which will be completed by companies participating in the competition:*

- Concept of the object
- Genplan of the object and external organization, staircase 1-500
- Distributive scheme, organization of school spaces
- Plan of all proposed floors with furniture, scale 1-200
- At least a A-A elevation scale 1-200
- Facades of the object, scale 1-200
- At least 4 render images of the external venues, 2 render images of internal space
- At least 1 axinometric drawing
- Report on the project
- Complete IPR of construction-installation and furniture of the object
- Methodology of works implementation

*d. Project implementation phase which will be completed by winning companies:*

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Project of “New construction of type 2 school in Administrative Unit No.2 (Site 2/3) shall consist of:

- Plan of the structure establishment, which will be compiled in cooperation with General Directorate Territory Planning and Development in Tirana Municipality.
  - Technical Architectonic and Constructive Report.
- Architectonic project: Facades, object plan, furniture plan, terrace plan, etc.
- Object construction project: Plan of structures and details, plan for foundations, etc.
  - The movement plan for the disabled
  - Project Implementation of hydrosanitary and sewerage systems
- Project implementation of electrical installation, telephone and internet network accompanied with the certified license of the designer
- Project Implementation of heating system, fire protection approved by Fire and Rescue Directorate of Tirana Region Prefecture
- Project for arrangement and green spaces of the yard, project of sports venues
- Technical Specifications for categories of works and furniture of the project
  - Detailed schedule of works according to categories.
  - Architectural details, layers, doors/windows, furniture etc
    - Construction Materials to be used
      - Geological Report
      - Seismicity Report

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Report of Assessment of Impact on Environment (VNM)

The entire material prepared for the project implementation phase will be submitted in six printed copies and electronically in CD.

Likewise, the designer shall present :

- Licence of the designing company + extract of Trade Registry
- Licences of designing engineers, licence of environmental expert + notarial declaration of the designing engineers
- Plan of settlement of the object at scale 1 : 1000 A3 form (original copy);

*VERSION 1*

**Preparation of the Interim Payment Report**

Total cost of the intervention will be defined in the final IPR of the object that will be prepared based on the implementation project, technical specification, taking into consideration special requirements of the Municipality regarding accepted standards and prices per unit according to the **Technical Manual of Prices in force or Technical Analysis of prices for categories not included in the manual.**

326.

*VERSION 2*

**Preparation of the Interim Payment Report**

*IPR of the object*

The final IPR of the object that will be prepared based on the implementation project, technical specification, taking into consideration special requirements of the Municipality regarding accepted standards and prices per unit according to the **Technical Manual of Prices in force or Technical Analysis of prices for categories not included in the manual.**

*Cost of construction and installations*

The total cost of the construction-installation and furniture will be based on the final IPR of the object providing the implementation company with the prices of every category envisaged in this IPR. This IPR shall be within the limit fund envisaged by the Contracting Authority. This cost will be exactly part of the

general bid, thus, the project quality will be compared to the implementation quality within the same limit fund.

**327.**

**Standards**

***Design Standards***

The Project will be drafted in line with all norms and standards of designing envisaged by the legislation in force. The design shall take into consideration the respect of standards, even during the implementation. The Designer is responsible for the accuracy and respect of all the respective norms and standards. The Designer may recommend also the introduction of new standards of harmonization with EU norms, as well as the best international practices of design and implementation. Recommendations shall contain feasibility and profitability elements of the Albanian practice and financial limits for the project. During the drafting of the project, there shall be considered all the norms approved for the disabled, eye problem person, etc. The project shall envisage the necessary infrastructure for this category.

Technical infrastructure details for this category will be presented by the Designer in special sheets of the project.

**Recommendations for the designer**

- The Project will be drafted in close cooperation with the task force in Tirana Municipality for consultations and supervision of designing process.
  
- The designer shall use and review all the existing information in relation with the zone where the school will be built. Necessary data for the design, such as situation of the existing water supply and sewerage systems, illumination, high voltage cabins, regulatory plan of the zone, etc, shall be provided by the designer through request for information in the respective institutions.
  - The designer shall use preliminary studies and data of Tirana Municipality.
  
  - Quality of study shall meet the required standard

**Calculation, technical specifications and IPR**

The technical report accompanying the project shall contain :



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Technical report of the architectonic design
  
- Technical report of the constructive design including report on calculation of all structures (foundations, staircase, slabs, beams, etc), as well as engineering measures, security in the object during construction works. Attached to the report will be also the respective annexes with all the calculation including computer method of calculations for potential controls by the investor
  
- Seismic report of the soil (general description in case of no study)
  
- Technical Specification for each category of works
  - Full IPR of implementation works
  
- Geological report and physical-mechanical characteristics of the earth including physical-mechanical characteristics of soil and layers in the foundations of the new and existing object
  
- Recommendations and proposals for special cases

### **Presentation of drawings**

Drawings of the project implementation phase will be presented in a A3 version, readable and at the minimum consisting of the following sheets:

25. Topography of the existing situation updated with current constructions (formal and informal) and respective report
  
26. General plan of the object at Sc. 1:200; 1:500
  
27. Plan of floors in the object at Sc. 1:100, 1:50
  
28. New Facades in 2 D and 3D Sc.1:100
  
29. Elevation of the building (on both sides) Sc.1:100
  
30. Plan of foundations Scale1:100
  
31. Elevation of the foundations and details Sc.1:20; 1:10

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

32. Detailed Plan of Structures Sck.1:100; Shk.1:50

33. Plan of school furniture Sc.1:100

34. Plan of sewerage system Sc. 1: 100

35. Manholes and other details of sewerage system Sc.1:10, 1:20

36. Plan of water supply system Sc. 1: 200, 1:100

37. Axonometric schemes of water supply, details of hydrosanitary equipments Sc.1:100

38. Manholes and other details of water supply system Sc.1:20, 1:10

39. Plan, axinometry and heating system details Sc.1:100

40. Plan and details of fire protection system Sc.1:100

41. Plan of boiler room, construction, details Sc.1:100;1:50

42. Plan and details on lighting, installation of lights in the ceiling, installation of main box sc.1:100;1:50

43. Plan of power distribution scheme in the entire object, Sc. 1:100

44. Plan of telephony, internet network Sc.1:100; 1:50

45. Plan of external lighting and its details Sc.1:100; 1:50

46. Plan of sports venues, green spaces and details Sc.1:100; 1:50.

47. Plan of surrounding wall, type and details of placement of benches Sc.1:100; 1:50.

48. Plan of superficial waters draining and respective details sc. 1:100; 1:50.

Each sheet of the object construction drawing shall be provided even the tables of specification for each material, steel, concrete, bricks, etc.

## REFERENCES

### General References

- Existing Guidelines for Albanian schools that are now used as reference by planners, designers and supervisors of work areas;
- Law on Education of MoES;
- ISO Norms of Construction;
- Other Albanian Laws, including Law on Protection of Environment, Law on Territory Planning, Regulations on Fire Protection, Law on Construction, Guideline on Technical Conditions of construction objects for movement of the disabled, technical regulation for saving of thermal energy and thermal protection in buildings;
- New curriculum on general education
- Different standard projects for construction of schools in Albania
- Other guidelines prepared in advance from the consultant .

### Specific References

- CoMD no.319, dt 12.04.2017, “On approval of designing standards in schools design”
- CoMD no.98, Dt. 06.02.2013, “On approval of List of Harmonized Albanian Standards of referring character for presumption of conformity for construction product
  - ISO Norms for Constructions
- CoMD No. 68, datë 15.2.2001, “On approval of Standards and Technical Conditions of design and implementation of construction works”.
- CoMD, No. 1503, Dt. 19.11.2008, “On approval of regulation “For exploitation of spaces by the disabled”.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Order of Ministry of Interior No. 425, Dt. 24.07.2015 “On acceptance, administration of technical and graphic documents of the fire protection and rescue project and issuance of technical acts”
- Order of Ministry of Interior No. 424, Dt. 24.07.2015 “On approval of technical rules for fire protection and rescue in residential buildings”
  - Law No. 152/2015 “On fire protection and rescue service”.
  - Law No.107/2014, Dt. 31.07.2014 “On Territory Planning”
- Law No. 69/2012, Dt.21.06.2012 “On pre-university education system in the Republic of Albania”.
- CoMD No. 408, Dt. 13.05.2015 “On approval of territory development regulation”.
- CoMD. No. 626, Dt. 15.07.2015 “Normative of designing of residences”.
- CoMD No 628, Dt. 15.07.2015 “Technical rules of designing and construction of roads”.
- CoMD No, 691, Dt. 29.07.2015 “Inter-sectorial strategy for decentralization and local government”.
- CoMD. No.38, Dt. 16.01.2003 “On approval of norms, rules and terms of design, construction, production and preservation of heat in buildings”.
- Normative provisions on Pre-University Education System, MoES, Tirana, 2013.
  - Zevi, B. Architectura-Zevi, Il Nuovissimo Manuale Dell Architetto.
    - Neufert, E. & P. Architectural Standard

*Electrical*

- CEI 0-2 Guideline for definition of documents
- CEI 11-35 Guideline of execution of substations
- CEI 11-1 Electrical systems for alternative voltages higher than 1 kV.
- CEI 11-17 Plants of Production, Transport and Electrical Power Distribution
- CEI 11-20 Plants for Production of Alternative Energy, groups of electrogenerators connected in networks of I and II category.
- CEI 11-25 Short circuit currents in three-phase alternative systems. Their calculations.
- CEI 11-26 Short circuit currents, calculation of effects. Definitions and calculation methods
- CEI 17-13/1 Security of equipment of low voltage use (low voltage boxes)
- CEI 31-30, 31/33, 31/35 Electric constructions of equipment installed in zones risking explosion due to gas presence. Classification of dangerous zones .
- CEI 64-8/1 Use of electrical plants in nominal voltages not higher than 1000 V alternative and 15000 V direct.
- CEI 81-10/1-4 Protection from atmospheric discharges (lightning).
- CEI 103-1/1 a 103.1/16 Plant of internal telephony
- CEI in CT 210 (electromagnetic compatibility) and CT 211 (exposure of man toward electromagnetic fields).
- UNI EN 12464-I Internal lighting system of labor posts

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- UNI Standard 9795 – Fixed systems of detection and automatic signal and fire alarm.
  - UNI EN 1838 Lighting equipments. Emergency lighting .
- CEI EN 50173-1 Information Technology – General cabling system - Planning and criteria of installations within internal venues .
  - IEC 60076-11 Use of dry three-phase transformers .
    - IEC 103-1 / N PABX central.
  - 60617/1-2 CEI EN Symbols– Graphics used for diagrams, etc.
  - CEI 3-8 Abbreviations and symbols for sketches in plans
    - CEI electrical users 64-8/1-2-3-etc.
- CEI / UNI Products applied for design, construction, testing in plants and installation of materials, components and electrical equipments.

### *Mechanics*

- UNI/EN 12845 General Norms of Fire Protection;
  - UNI 10779 Hydrants network. Designing, installation and use;
- EN 671 Fixed Systems of Fire Protection. Anti-fire flexible pipes;
  - EN 54-1 System of detection and alert – Introduction;
  - EN 54-3 System of detection and alert – Alert Equipments;
  - EN 12723 Pumps – General Terms of pumps and installations, definitions, quantity, symbols and units;
  - EN 60529 Protection Scale (Code IP) (IEC 60529:1989);
- ISO 65 Steel pipes with threads in line with Standard ISO 7-1;
  - EN 12094 Gas extinguishing systems;
  - EN 1356 Foam extinguishing systems;
    - UNI 9994-1 Portable vessels;
    - UNI EN 12416-2 Dust system;
    - UNI EN 13565-2 Foam System;
  - UNI ISO 15779 Aerosol extinguishing system.

### *Constructive*

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- EC0 Bases of structures design
  - EC1 Loads in structures
  - EC2 Design of r/c structures
  - EC7 Geotechnic design
- EC8 Seismic Design of Structures
  - Technical Conditions of Design KTP -1978
- Technical Conditions of Design for anti-seismic constructions KTP-N.2-89

### TERMS

Terms used in this designing tasks are referred to terminology defined in Law No. 69/2012, Dt.21.06.2012 “On pre-university education system in the Republic of Albania”.

#### Architectural/Engineering Terms

- Acoustic Amenity: Acoustic Conditions in which schools and its users may act in maximal efficiency.
- Administrative spaces: Physical space of school dedicated to administrative activities.
- Movement spaces: Defined space for horizontal and vertical movement inside the building, such as halls, corridors and scales.
- Climate amenity: Environmental conditions in which school and its users may act in maximal efficiency
- Education spaces : Physical space of school dedicated to education activities .

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Hygienic environment: General Conditions of hygiene in school affected by level of comfort and health of users that depend on physical and sanitary conditions of the buildings, water supply and sewerage systems which enables efficient and secure functions of school buildings.
- Orientation: Orientation of school building (part of education spaces) influenced by natural climate factors, such as sun and wind direction .
- Location of school building: Land surface where the education buildings are situated.
- Additional Spaces: Physical spaces in school buildings dedicated to support of educational and administrative activities.



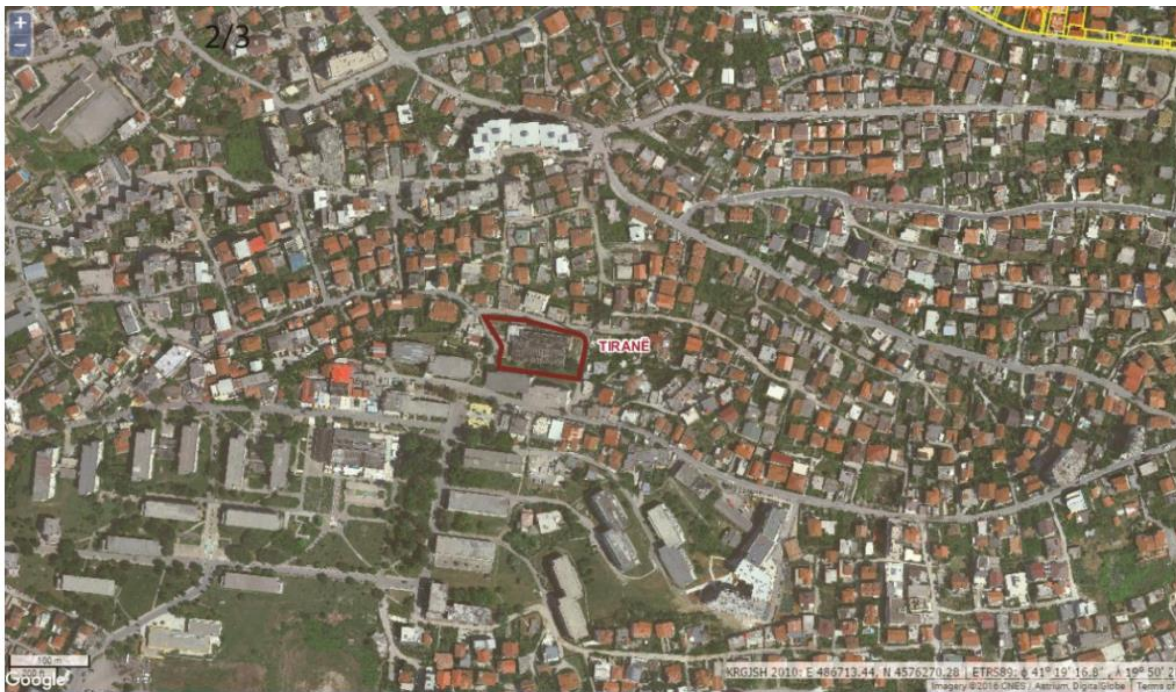


328.

## 1. GENERAL DATA AND EXISTING SITUATION OF THE OBJECT

**Location.** The proposed site no 2/3 for construction of type 2 school is situated near Hygiene Directorate. (Referring to Feasibility Study "Improvement of educational infrastructure in Tirana Municipality" November 2016). This school is located in Administrative Unit 2.

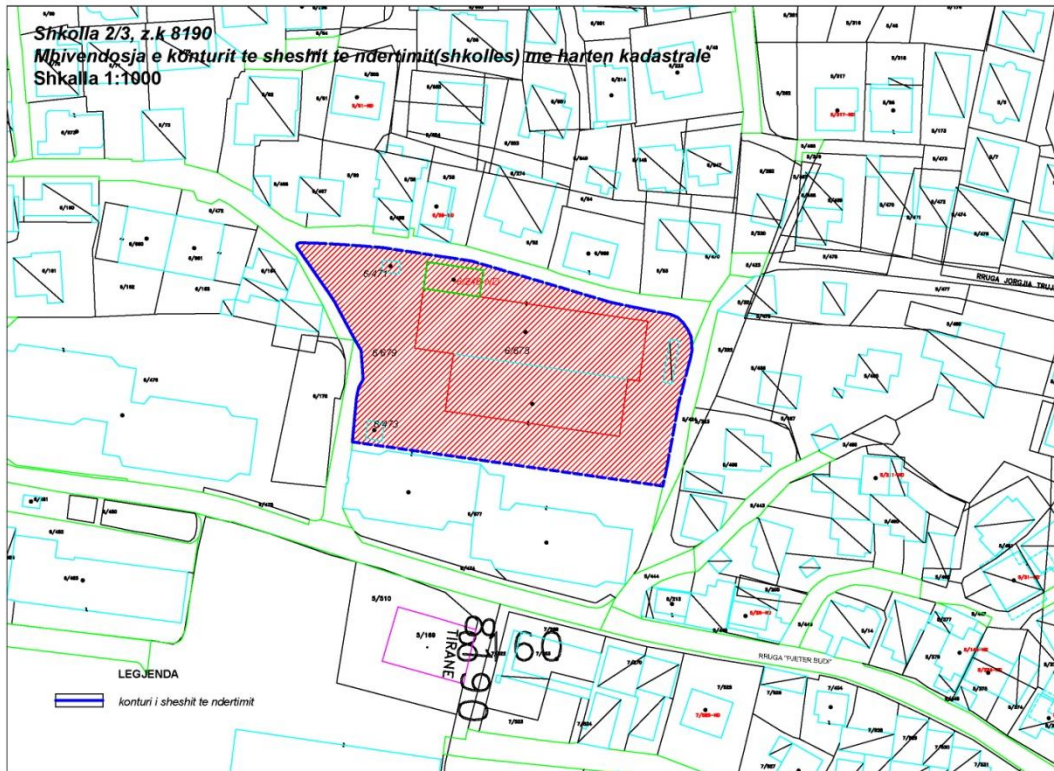
**Description of the site:** Site 2/3 is located in a zone owned by private subjects, surrounded and with a considerable inclination. No high schools in the area. Road infrastructure may be problematic. This site is found in the slope of hills where is situated the Students Campus. There is a surface of about 4,093.5 m<sup>2</sup>.



Picture 2 Location of site 2/3 according to feasibility study



Picture 2 – Photo of site 2/3



Picture 3 – Cadastral map of site 2/3

### 3. GENERAL DESIGN REQUIREMENTS OF SCHOOL CONSTRUCTION

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

In this territory will be built:

### A. Urban school for nine-year elementary education (Type 2)

Construction of these objects will meet the needs for educational objects in this zone, as well as will affect the reduction of students' number in existing schools that are located in the borders of this unit.

The nine-year elementary education school shall be equipped with all the necessary academic venues (teaching classes, including laboratories of physics, chemistry, biology, informatics, etc), gym with supporting spaces, administrative space, social space, etc. The object shall have an installed central heating system and fire protection system. Great attention shall be paid to organization of school yard. The external venues shall be systematized, including respective functional venues, sports premises, green spaces and external lighting.

### Functionality

During the school building design, there shall be created a balance between functionality and cost efficiency. This balance shall be achieved with different means, such as

Rational dimensions of spaces :

- (vi) Zones adapted to movement: movement spaces shall not be more than 25% of the fruitful built surface. They shall be adapted according to school users, they must be functional and respect the security demands;
- (vii) Optimal number of spaces: at first the number of spaces is calculated according to exploitation. In small schools, where the acceptable norm cannot be achieved, in particular for special teaching spaces, shall be considered creation of multi-purpose spaces;
- (viii) Maximal compatibility: spaces shall have a maximal compatibility that would make them suitable for different subjects and changes, in cases when it meets their functional requirements;
- (ix) Grouping of spaces: spaces shall be grouped in blocks according to function and interface. This would provide an easy identification of their corresponding activities and spaces, an easy communication between different spaces, without obstacles in movement and reception zones, an easy observation of spaces and an optimal exploitation of land at disposal;
- (x) Integration of needs: establishment of spaces within the school shall follow the fundamental necessities, such as sanitary and hygiene rules, regulations of functional comfort and security, as well as acoustic, visual and climate amenity.

### Flexibility

Designer shall design sufficient spaces for flexibility in order to enable :

- (iii) school staff to get used to schools venues and different teaching methods; and
- (iv) to enable planners to adapt the buildings for future needs of the school that correspond with the potential curricula and future program. a) Required flexibility for buildings (and furniture) that enables many teaching methods for normal classes (frontal teaching, work in groups, teaching through seminars, etc), laboratories and specialized halls (practical work in

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

half groups, whereas demonstration in full groups), as well as multi-purpose spaces and sports areas (possibility of grouping several classes).

### 2.1 Main spaces

Referred to Feasibility Study "Improvement of educational structures in Tirana Municipality" (November 2016), **Type 2** school belong to nine-year elementary education for urban zones with 30 classes.

For realization of the project according to school typology and locations, referred to “Guideline for schools design – norms and standards” of Ministry of Education and Sports, shall be taken into consideration the following parameters :

Basic education, classes 1-9, age 6-17 year-old;

Number of cycles (parallel): 3

Number of Classes: 30

Number of students /class 30

Total number of students 900

The above-mentioned data are summerized in Table 4.

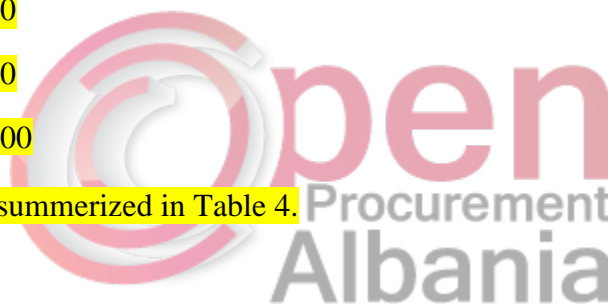


Table 4<sup>2</sup>

Type	Location	Cycle	No. classes	St/Class	No. st. total
Type 2	Urban	Basic education	30	30	900

<sup>2</sup>Referred to Table no 2, page 44\_ Feasibility Study "Improvement of education infrastructure of Tirana Municipality", November 2016. Guideline for design of school buildings norms and standards" drafted by Ministry of Education and Science

**329.**

**330.**

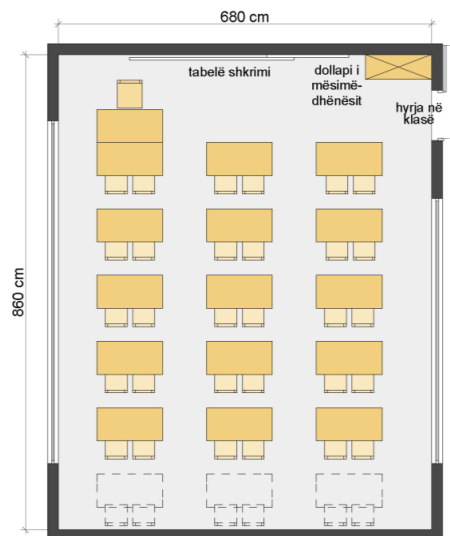
**331.**

**332. 2.1.1 Teaching classes**

The design of teaching classes shall be calculated for a  $1.94 \text{ m}^2 / \text{students} - 2.18 \text{ m}^2 / \text{students}$  surface (optimal) for regular teaching rooms and  $1.8 \text{ m}^2 / \text{students}$  per specialized teaching rooms. Minimal height of classes (floor-ceiling completed) shall be 2.8 m.

Teaching classes are the main venues in a school. They shall be very suitable for the performance of the teaching process. A special care shall be paid to determination of the shape, dimensions, lighting and natural ventilation, as well as furniture. The surface of a class depends on the number of students in a class and is about  $58 \text{ to } 65 \text{ m}^2$  in the zones with high density of population (class with 30-36 students). Number and dimensions of benches in frontal rows (3 double benches) as in length rows .

**Surface of windows:** surface of windows is recommended to be 1/5 to 1/6 of floor surface, according to zones where the school will be built. For wide classes, in order to have a uniform lighting, the height of windows shall go up to the ceiling. The materials shall ensure the fire protection. From the floor up to 90 cm shall not be openable, and over 90 cm windows shall be openable only in vertical side, thus the object can be ventilated and does not allow jumping, i.e. boosting security.



**DHOMË MËSIMI STANDARDE**  
30 dhe 36 nxënës  
Niveli i Mesëm i Ulët dhe i Lartë

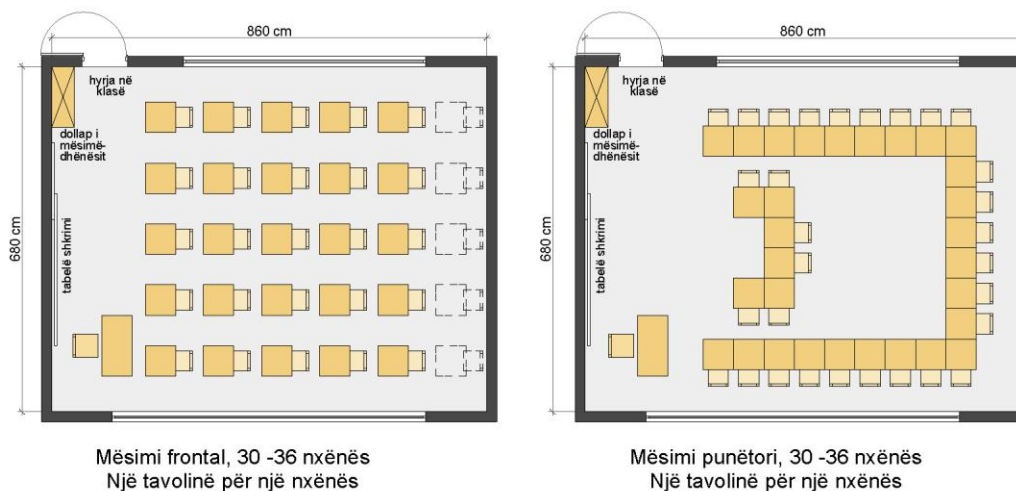
## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Plan of the classes are advisable to be rectangular (with a proportions of sides about 2:3) and almost square 6.8 x8.6 m.

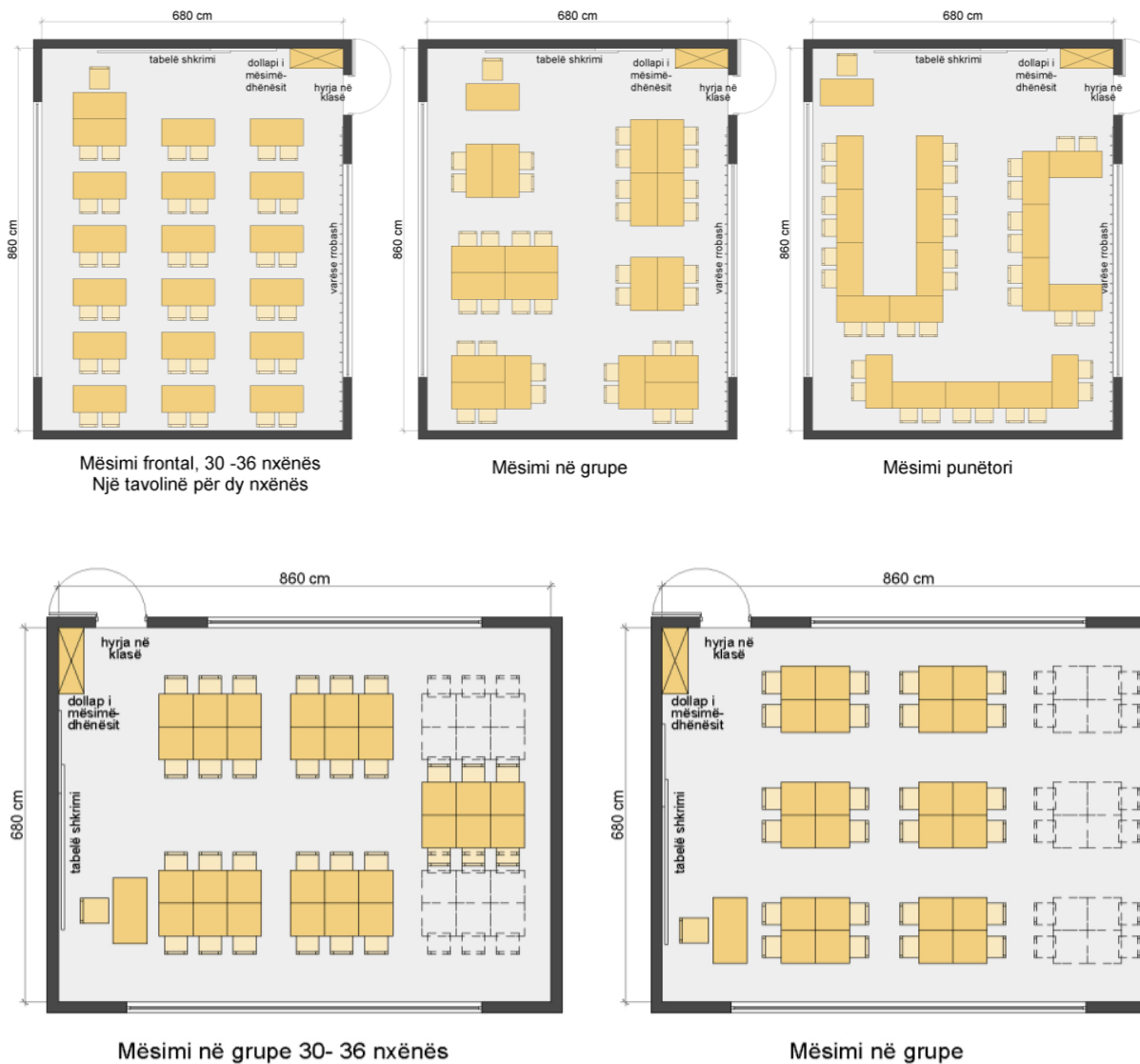
Depth of classes shall not pass 9m, nevertheless is obligatory that the student shall not be further than 6 meters from the window where the light comes. Classes shall minimally have two hours of direct light.

**Flexibility:** Designer shall design sufficient spaces for flexibility in order to enable the school staff to get used to schools venues and different teaching methods and planners shall adapt the buildings for future needs of the school that correspond with the potential curricula and future program.

The required flexibility for buildings (and furniture) enabling numerous teaching methods (see picture below) for normal classes (frontal teaching, work in groups, teaching through seminars, etc), laboratories and specialized halls (practical work in half groups, whereas demonstration in full groups), as well as multi-purpose spaces and sports areas (possibility of grouping several classes).



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”



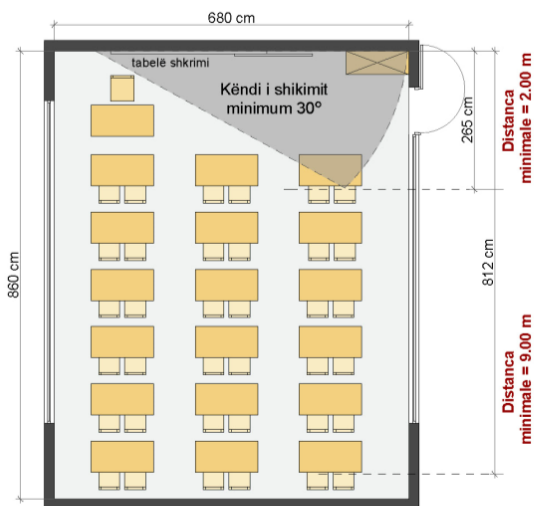
Types of separation of spaces in the design program shall be developed in structures that can be easily modified to meet other requests in the future. Flexible planning is essential in the schools design in order to meet the constant evolution in the education thinking and techniques of construction technologies. The same will help the adaptation of school with new exploitations through changes in planning and allow completion of these changes without big costs. In this respect, a flexible plan shall also enable easy adaptations for developments in the future regarding space planning, construction of buildings, artificial lighting, techniques of ventilation and acoustics. A flexible building (for example with a big of movable walls is in general very expenses and can be justified only in case changes are necessary and essential. There are not many reasons to determine several divisions and changes will happen only once a year.

**Visual angles and distances:** Often students complain that they are not able to see clearly the visual concretization means such as whiteboards and video-screens. Often the glow can cause difficulties in seeing clearly. Another important factor is the visual angle on which they see. Failure to see clearly may force students to stay in an uncomfortable position and this lack of comfort may cause loss of concentration. This is true for younger age students, whose eye angle distorts the image even in case of now powerful glow.

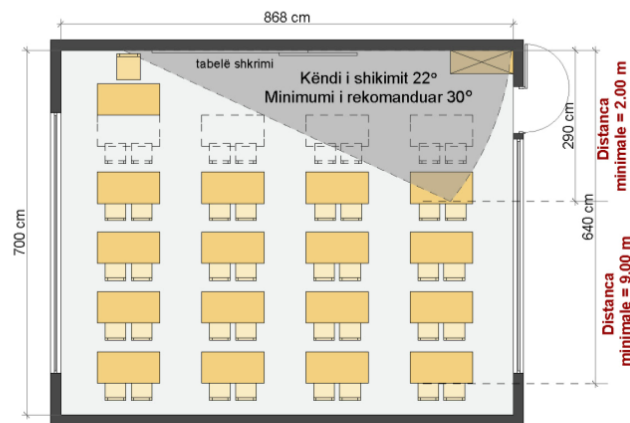
## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

There exists evidence that students who sit where the eye angle is extreme or distance from the concretization mean is too big have lower results. If there exists the principle that students shall all have equal education rights, irrespective where they sit, then the designer shall pay attention to the arrangement of seats in order to :

- Maximal distance between the last row of students and writing board shall be about 9.0 m. Beyond this distance, it is difficult to read what is written and students force themselves to concentrate, to be able to understand the written text;
- Minimal distance between first row and writing board shall be about 2.0 m. Further, the first row students will not be able to see the entire writing board from an acceptable visual angle (see picture below);
- Minimal visual angel up to the writing board shall be  $30^\circ$  (see picture 1.3.6 below) so that the angle from which the concretization mean is seen does not alienate the understanding of what students see. Less that  $30^\circ$ , reading becomes difficult ;
- Main natural light shall be at maximum, coming from the left side of the students, in order that the shadow of their hand shall not fall on their work .



KOMODITETI PËR DHOMË MËSIMI  
ME 3 RENDE BANKASH  
(30-36 dhe 42 nxënës në raste të jashtëzakonshme)



KOMODITETI PËR DHOMË MËSIMI  
ME 3 RENDE BANKASH  
(32 dhe 40 nxënës në raste të jashtëzakonshme)

### 333.

#### Space of the table for each student

*Width of the table for 1 student*

6 to 10 year old

60 cm



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

10 to 18 year old 65 cm

*Width of table for 1 student*

6 to 10 year old 50 cm

10 to 18 year old 60 cm

*Height of the table for 1 student*

6 to 10 year old 65 cm

10 to 18 year old 74 cm

**Distance between two tables**

*Distance of table on the side :*

Up to the table or maximal height equipment 55 cm

Up to walls, radiators or similar 20 cm

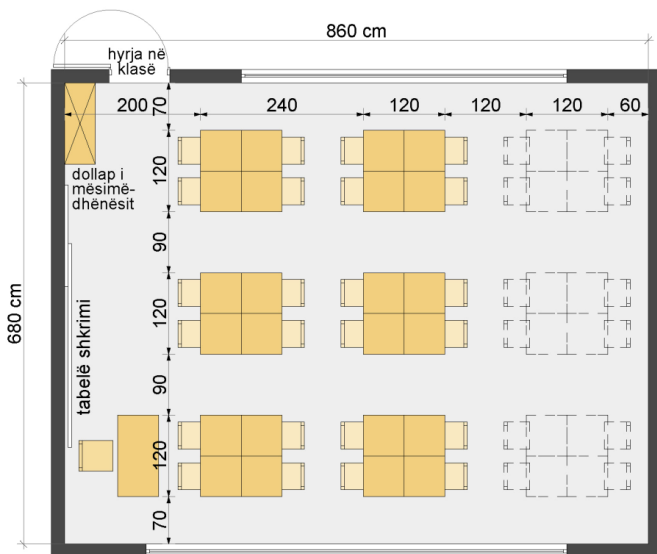
From the wall where the wardrobe is placed 70 cm

*Distance of table from each other*

For tables with maximum 2 places close to each other  
10 to 18 year old 60 cm

For more than 2 places close to each other  
10 to 18 year old 65 cm

After the last row shall be envisaged some extra 5 cm .



**Mësimi në grupe**

- ***Class furniture and their characteristics***

**General teaching class**

5. *Table for students, 2 students, dimensions: 1200 / 1300*

For tables for 2 students according to group age have the following dimensions:

First group : 1200 mm x 500 mm

Second group: 1300 mm x 600 mm

Material of working surface :

MDF board (Medium Density Fiber board).

Holding Construction :

Pipe skeleton in oval or paralleloiped shape. On both sides, outside of the table, a hook for hanging bags.

Made of plasticized or plated steel with a thickness of 1,5 mm.

6. *Piled chairs*

Skeleton

Realized in aluminium, molded, plated, combined with a steel pipe and plastic cover, resistant to scratches and blows, vertical model on four legs that are piled, with a sliding base that moves by enabling the piling.

**Seat and back**

Elaborated with plywood 8 – 10 mm thick in an anatomic shape, lacquered urface.

The color depends of the interested person.

7. *Universal double blackboard*



Two-sided table that can be folded, where is possible to use chalk

Classical communication over 5 side (after being written on 5 sides)

Technical data are as following :

Traditional appearance mode

Chalk writing

Surface painted in green, magnetic

Easy to be wiped, thanks to extreme smooth structure of the surface

Aluminum frame with PVC gray corners

Scratchless surface and acid resistant

Matt green color, with a non-reflective surface

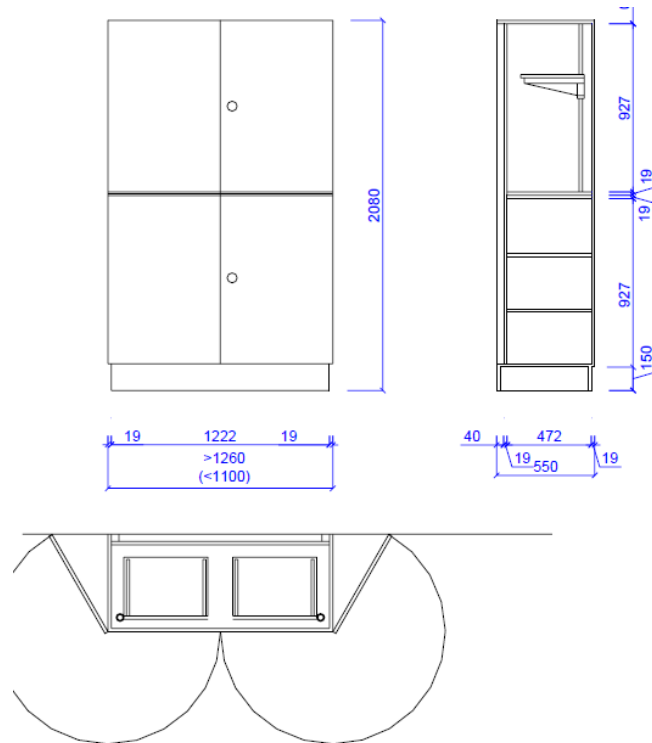
2 sided table that can be folded, enamelled on both sides

The delivery shall include also the chalk holder and mounting set .

Dimensions: 90 x (2 x 60) x 120 cm

100 x (2 x 75) x 150 cm

100 x (2 x 100) x 200 cm



Removable base – 150 mm high

Made of melamin or MDF.

The body, separations of the drawers and doors are well-attached with the plastic on both sides with 1,0 mm– top base at least 1,5 mm.

All edging of the doors, body and separations of the drawers are coated on all side with a 3 mm plastic stripe.

Skeleton:

2 pieces of cupboard drawers with a changeable height movable in two pipes.

8 pieces of folding bolts made of metal – opening angle 270 degrees

### 8. Cupboard for the class

Dimensions : about 950 x 500 x 2030 mm

Upper part of the cupboard (separations for establishment of equipment):

A double fixed floor (through a **shlice** system same as in the parket floors) which could serve as a separation between the back and lower part of the cupboard.

2 drawers with changeable heights with a screwed floor serving as a holding surface for the projectors or other equipment of the class (weight to be held is about 20-25 kg)

Composed of two cupboard parts.

For both parts of the cupboard two rotating folding rods 270 °, with a protection slat in closure

Procurement  
Albania

334.

2 rotating supporting pieces of a cylinder at a big size.

## 2.1.2 Laboratories

The designer shall envisage for the new school :

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- 1 (one) laboratory of informatics
- 2 (two) laboratories of physics
- 1 (one) laboratory of chemistry
- 2 (two) laboratories of biology

For the calculation of space of these laboratory classes shall be considered the space for each student, as well as shall be calculated the additional venues for the equipment and pre-preparations.

- *Furniture of laboratories and their characteristics*

**335. Laboratory of Chemistry**

- *Students table for two places with sockets and tap*

Dimensions: total : about 1200 x 700 x 700 mm, out of which

Upper surface : about 1200 x 700 x 40 mm

Skeleton: about 1200 x 700 x 700 mm

Two hooks for bags

Upper surface:

Enamelled ceramic material (without whirligig, as an only plaque) with three raised edges.

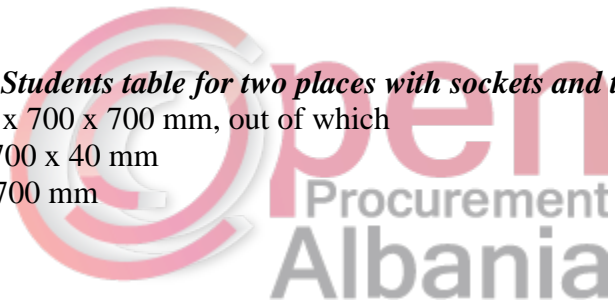
Connection to the energy pillar is acid-resistant and from the mechanic point of view

The upper surface is attached to the metallic skeleton by anti-mould screws.

Acid resistant.

Under the upper surface for each student there exists a space for putting books realized with a plated aluminium metallic net with the dimensions : 350 x 350 x 120 mm.

Skeleton:



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**



In the shape of a steel pipe, plasticified or plated, square (30 x 30 mm), with a shim 1,5 – 1,8 mm, realized to be mounted in the floor, composed of a plated frame (not made of pieces but as a whole) with two metallic leg; the metallic legs are equipped with seals of changeable heights to create a horizontal plane, independent from the floor level.

*- Laboratory table for techers with socket and acid*

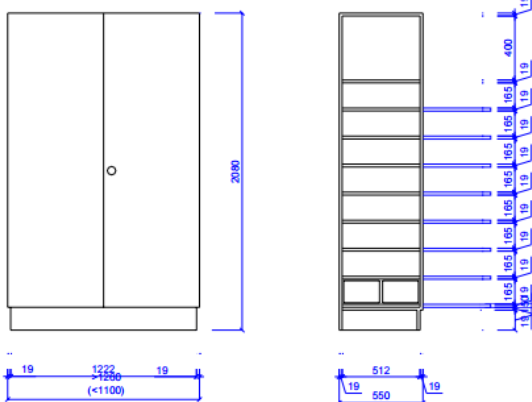
*resistant*

Dimensions: about 1800 x 750 x 900 mm

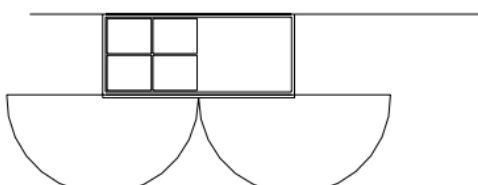
Upper surface :

Dimensions about 1800 x 750 x 40 mm, made of enamelled ceramic material, large surface with raised edges on all sides of the installed sink inside the upper surface (on the opposite side of the door leading to the laboratory) with an internal space of at least 510 x 360 x 300 mm, acid resistant with whirligigs resistant to acids.

*- Cupboard for preservation of chemistry lab equipment*



Dimensions: about 1260 x 550 x 2080 mm. Made of melamin coated with plastic and surrounding edges made of plastic stripes in a fixed of MDF manner. 1 melamin sheet or MDF (thickness min. 20 mm), separation of drawers of the cupboard with a changeable height, 8 melamin or MDF layers (thickness min. 20 mm), separation of drawers that can be fully opened with a protection cover of plastic material on all sides, 15 mm wide. 2 rotating doors with a protection slat against clashes. Lock with cylindric rotating with big handle.



***Laboratory table resistant to acids***

Dimensions about 2300 x 1500 x 900 mm

*Upper Surface:*

Dimensions about 2300 x 1500 x 40 mm

With an enameled ceramic material on a large isolated surface and resistant to acids.

In the frontal part a sink (with internal space minimum 600 x 400 x 300 mm), on the left and right of the sink an inclined surface for removal of water drops. In the horizontal axis two sinks in the shape of a funnel (with an internal space at least 210 x 210 x 280 mm)

Skeleton of upper part where are put the chemicals.

Dimensions about 1800 x 350 x 700 mm.

Skeleton with six legs in the shape of a tube with two drawers fixed in the upper surface of the table; the upper edge of first drawer about 550 mm above the upper surface; in the lower part in the entire length and width between the metallic skeleton prepared on an installation edge about 150 mm high. Upper frame of the second drawer about 700 mm on the upper surface; on the side of the sink returned in its position about 300 mm. Both drawers are fixed and immovable with the metallic skeleton.

*Lower tallboy*

General dimensions (including the top base) about 2180 x 1380 x 860 mm

The height of top base 150 mm. Isolated on the ground.

4 tallboys each with 4 drawers and 3 holders for each drawer

4 tallboys each with a drawer division and a rotating door.

1 free space down the upper surface to place the washer of lab tools

Down the frontal part of the draining sink a shelter and a rotating door. All metallic bolts shall be resistant to scratches and plastic coated.

*Water supply*

In the frontal part of the sink a vertical exit about 300 mm high in a good external position, with the draining of cold water in a 200 mm distance from the vertical tube, with 3 draining valves; out of which one is for the hot water with battery of mixture (sink group) connected to hot water supply (central system of hot water with a small boiler -10 liters under the table type)

Sink in the shape of a funnel: with a simple valve in a vertical exit about 300 mm high, draining about 150 mm from the vertical axis; a double valve in a vertical pillar about 300 mm high, draining about 150 mm from the vertical axis,

Distance about 120 mm.

***Laboratory of physics /biology***

***Table for students for 3 positions with sockets***

Dimensions: total – about 1800 x 600 x 760 mm; out of which

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Upper Surface : about 1800 x 600 x 25 mm

Skeleton: about 1800 x 450 x 730 mm

Data on height without including screws that serve for its regulation.

Free space: minimum of height 650 mm

Metallic legs are placed on the left (students view)

According to the accompanying plan-sketch

Free space: Minimum height 650 mm

Upper surface:

It is a melamin or MDF layer coming out on the skeleton from its long side; 75 mm

Skeleton: with a profile in the shape of tube or square, suitable to be mounted on the floor and composed of a frame plated construction (compact), without interruptions, with four metallic legs.

Metallic legs are equipped in the end with regulatory screws to create an independent horizontal axis from the floor level; metallic legs in the sector of installation sector with a distance of about 75 mm, covered from all sides with melamin or MDF plaques. The cover of box is movable from internal side in order to carry out the installation.

Six hooks for hanging school bags.

Electrical installations in the installations box:

From the teachers side: double socket 220 V, emergency stop button for power supply in all students tables, 4 sockets with free capacity, earthed socket. All sockets placed inside for 4 mm.

From the students side : a double socket 220 V

Students table is placed according to the plan of arrangements.

### ***Sink with a sub-construction (with tallboy)***

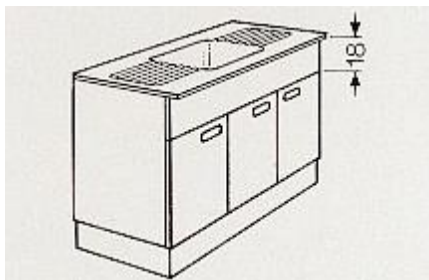
Laboratory sink with sub-construction with three doors (divisions) and an included dustbin.

Dimensions: length 1500 mm; width 560 mm; height 900 mm

Upper surface:

Sink with a hole of a light space from inside with a length of 510 mm, width 360, depth 195 mm and with two parts for drying the vessels (left and right) with total dimensions with a length of 1300 mm, width 560 mm.

The sink is made of stainless material.



Water supply: A vertical pillar about 300 mm high with a drain of 200 mm, equipped with a draining valve for cold and hot water (with a mixed battery)

Dressr :

Dimensions about 1500 x 500 x 860 mm; top base 150 mm high; divisions are 180 mm lower than the lower level of the upper surface; made of melamin or MDF.

Three rotating doors with protection slat against clashes.

### ***- Collection cupboard of biology / physics***

Dimensions about 1050 x 560 x 2050 mm or 1200 x 560 x 2050 mm

Material: melamin or MDF.

2 bases of drawers with a changeable height.



7 bases of drawers that can be withdrawn outside up to half width (steel construction) easily to be removed for demonstration purposes. All bases of drawers with a 15 mm fixing slat on both sides and with a holding force of minimum 600 N  
2 rotating doors in two thirds of the height covered with glass and with rotating slats and three bolts each  
Lock with clip and rotating latch with a big handle.

**336. Laboratory of informatics**

***- Students table for informatics with 2 positions (1600 x 800 mm)***

Tables of informatics are separated into tables for Deskops and table for Laptops

Dimensions of table for Deskop:

Total: about 1500 x 800 x 700 mm

Upper surface: about 1500 x 800 x 25 mm

Skeleton: about 1500 x 640 x 670 mm

Free space : minimum height 630 mm

2 hooks located in the inside for hanging bags of the students

1 channel under the table for passing cables and placing sockets

1 triple socket with a connection cable of minimum 1,5 m

Work upper surface:

Melamin plaque; coated with plastic substance and plastic lateral stripe coming out on the skeleton,

Skeleton:

In the shape of tube, realized to be mounted on the floor, composed of a construction with a plated frame (without interruptions) with metallic legs; the metallic legs are equipped with screws for changing the height in order to provide an horizontal level not depending on the floor level.

Channel for installation of the cable that provides the current and for the network cable on one side of the length, with a cover that can be unscrewed and a separation line in this cable channel.

The entrance of the cable is possible on one of two ending parts of the installation box. The Cable exits through the gap to sensitizing devices placed on the table.

Under the left or right upper surface is the holding construction of central unit made of melamin with dimensions : 500 x 250 x 600 mm.

***- Students chairs with changeable height***

Skeleton:

Vertical columns with a base of 5 crossed legs made of plated metal and with support on the floor with caps made of PVC (fixed) or with wheels.

Changeable height from 420 mm to 600 mm through an axis coated screw for the PVC cap type and 470 mm up to 670mm for the type with wheels.

The seat and back is made of pressed plywood material.



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Color according to the orderer’s wish

- **Movable one-sided tabled**

Dimensions : about 2000 x 1200 mm,  
Steel surface of glueing magnet without glow

- **UPS 1000VA Specifications**

<b>MINIMAL TECHNICAL CHARACTERISTICS</b>	
<b>“OUTPUT”</b>	
<b>“Power”:</b>	1000 VA
<b>“Power Factor”:</b>	$\geq 0.8$
<b>“Wave Form”:</b>	Sinusoidal
<b>Nominal Voltage:</b>	220-240 VAC
<b>Frequency:</b>	50 Hz +/- 5%
<b>“Volt, regul. (On +/-10% battery)”:</b>	
<b>“Output Connectors”:</b>	$\geq (4)$ IEC 320 C13 (from the battery)
<b>“INPUT”</b>	
<b>“Nominal Voltage”:</b>	220 - 240 VAC
<b>Frequency:</b>	50 Hz
<b>“Voltage Window :</b>	170 - 270 VAC
<b>Automatic Voltage Regulator “AVR”:</b>	<b>Yes</b>
<b>“Input Connectors”:</b>	(1) IEC 320 C14

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

**COMMUNICATION & MANAGEMENT**

**“Shutdown Software”:** Yes

**“Led Indicators”:** For all situations

**“Audible Indicators”:** For all situations

**Data Communication Connector “Data”:** (1) DB9 Serial ose USB

**”Protection”:** Overload, Discharge, and Overcharge Protection

**BATTERIES**

**“Transfer time”:**  $\leq 4$  ms

**“Back-Up Time”:**  $\geq 6$  min. full charge

**“Battery Type”:** 12 V DC 7 Ah Lead-acid

**ACCESSORIES**

**“Power Cord”:** (1) European IEC-C13

**“PC Power Cord”:** (2) IEC 320 C13 - IEC 320 C14

**“Data Cable”:** (1) DB9 Serial - DB9 Serial ose USB- USB

**WARRANTY**

**“Warranty” period:** 2 years

*Specification for computers (minimum one computer/student and one computer for the teacher)*

**MINIMAL TECHNICAL**

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	5400
<b>Min points for processor according to: cpu</b>	
“RAM”:	4 GB, min. DDR3 1600 MHz Non-ECC
“HDD Size”:	500 GB
“Media sizes”:	7200 Rpm SATA 6.0Gb/s
“Disk subsystem controller”:	Serial ATA 6.0 Gb/s
“Graphics”:	≥ 1 GB
“Media Device”:	DVD+/-RE
“Slots”:	Minimum (3) PCI/PCI-E, out of which (1) x16 PCI-
<b>COMMUNICATION &amp; MANAGEMENT</b>	
“Ports”:	Min. (8) USB out of which: c. min (2) USB before d. min (2) USB 3.0 (1) RJ-45, (1) audio in/out, (1) mic. and headphone, (1) VGA.
“Networking”:	(1) 10/100/1000 LAN Integrated Gigabit Ethernet Port.
“Sound”:	Integrated Sound Card
“Speakers”:	Internal or Built-in Monitor
“Security Management”:	Embedded Security TPM
“Preinstalled Licensed O. S.”:	OEM Windows 10 64-bit Professional
“Keyboard”:	Standart Keyboard QWERTY
“Mouse”:	Minimum 2 Button scroll Optical
“Power Supply”:	220 V AC, 50 Hz
<b>ACCESSORIES</b>	
“Power Cord”:	European
Recover CD :	Recover CD/DVD ose Recover Partition
<b>MONITOR</b>	
“Type”:	
“Size” :	21”
“Native Resolution”:	1920 x 1080 at 60 Hz
“Constrast Ratio Static”:	1000:1
“Display Port”:	(1) VGA and at least (1) of ports DVI/HDMI/DP
“Response Time”:	≤ 5 ms
“Energy Efficency”:	Energy Star
“Power Supply”:	220V AC, 50 Hz
<b>WARRANTY</b>	
“Warranty” period:	3 years

3. Specifications for Laptop (min. two laptop/ laboratory)

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<b>MINIMAL TECHNICAL</b>	
	3400
<b>Min. points for the processor according to:</b> <a href="http://cpubenchmark.net">cpubenchmark.net</a>	
<b>“Chipset”:</b>	Intel ose Ekuivalent
<b>“RAM”:</b>	8 GB shared Dual Channel min. DDR3 1600 MHz
<b>“HDD Size”:</b>	500 GB
<b>“Media sizes”:</b>	7200 Rpm SATA
<b>“Graphics”:</b>	Integrated Graphics with 1 GB video memory
<b>“Media Device”:</b>	DVD+/-RW with DL Memory Card Reader
<b>“Diplay”:</b>	15.6” LED display, Anti Glare
<b>“Battery”:</b>	min 4-cell battery
<b>COMMUNICACION &amp; MANAGEMENT</b>	
<b>“Ports”:</b>	Min (3) USB ports out of which min. (1) USB 3.0 DisplayPort ose HDMI Out Integrated digital mics Integrated Web Camera Headphone jack/Microphone jack
<b>“Networking”:</b>	10/100/1000 LAN (RJ 45) Wireless 802.11
<b>“Sound”:</b>	High Definition Audio2.0
<b>“Preinstalled Licensed O. S.”:</b>	OEM windows 10 64-bit Professional
<b>“Keyboard”:</b>	QWERTY
<b>“Pointing Device”:</b>	Touch pad & usb mouse
<b>AKSESORËT</b>	
<b>“Power Cord”:</b>	European
<b>“Recharger”:</b>	Yes
<b>Bag:</b>	Yes, from the producer. Suitable for laptops and other accessories
<b>“Recover” and “Drivers” CD/DVD:</b>	“Recover”, “Drivers” CD/DVD or Rec. Partition
<b>GARANCIA</b>	
<b>“Warranty” period:</b>	3 years

4. Specification for Printer/scan/photocopy

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>MINIMAL TECHNICAL</b>	
"Model":	print/scan/copy
“Print Speed” A4:	≥18 ppm
“Monthly duty cycle”:	8000
“Technology”:	Laser ose LED
“Print Quality”:	600 x 600 dpi
“Input Capacity”:	150 sheets
“Output Capacity”:	50 sheets
“Media format”:	A4
“Memory”:	≥32 MB
“Min. optical scan resolution”:	600 x 600 dpi
"OS supported"	Windows 7 and up (32 bit & 64 bit)
“Toner”:	Accompanied with Kit
<b>COMMUNICATION &amp; MANAGEMENT</b>	
“Interface”:	High Speed USB 2.0
“Ethernet” Communication Port:	Not specified
<b>ACCESSORIES</b>	
“Power Cord”:	European
Software/Drivers CD:	Yes
USB Cable :	Yes
<b>WARRANTY</b>	
“Warranty”:	1 year

**337.**

**338.**

**339.**

**2.2 Social spaces**

**340. 2.2.1 Library**

The users of the library may be the students and teachers, therefore the calculation of libraries spaces shall take into consideration this fact.

For high schools, the library space shall be calculated based on students number and necessary space for each student must be 0,15 m<sup>2</sup>. Designers shall take into consideration the space for books archive and

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

reading positions for students. Designers shall take into consideration that the reading venue of the library shall have a natural lighting as much as possible. Each reading post shall include sockets.

**- Library table (1000 mm)**

Square shape

Dimensions: about 1000 x 1000 x 720 mm

Upper surface:

Dimensions: about 1000 x 1000 x 25 mm

Skeleton:

Dimensions: about 1000 x 1000 x 690 mm

Tube shape – coated with plastic or chrome-plated material with 4 plastic sliding basements that regulate the height and frame in the shape of a tube, plated (uninterrupted).



**Cupboard for files**

Dimensions about 940 x 500 x 900 mm

Corpus (body)

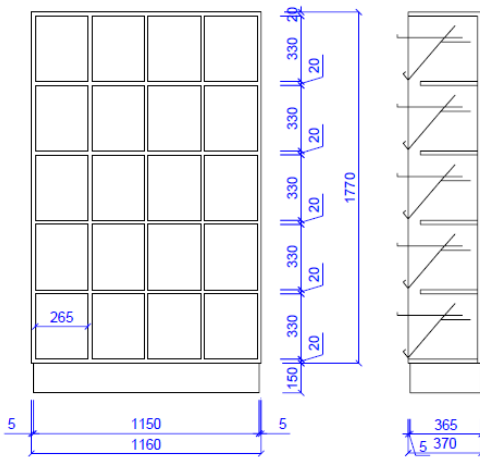
A vertical separation in the middle made of melamin or its equivalent, fixed up and down with screws.

In every vertical sub-division are three drawers, made also of melamin, which will enable the placement of drawers.

16 drawers for about 15.000 kartela that can be easily extracted.

The drawers are made of wood with a place to be attached and removed easily.

Dimensions of drawers: 210 x 210 x 480 mm



**- Book shelves (depth 30 cm)**

Dimensions: about 900 x 320 x 2080 mm

5 mobile divisions for drawers

According to the accompanying plan-scheme

The heads (main components ) shall be realized by taking into account the possible serial connection according to the space.

Construction with frames composed from main parts located on the sides and a drawer base situated above that is linked and fixed at the height of the top base.

The surface is made of a wooden base coated with rimesso.

4 sliding and movable bases made of plastic to regulate the height.

**- Drawer for papers and magazines**

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- According to the accompanying plan-scheme

Dimensions about 1160 x 370 x 1920 mm

The heads shall be realized by taking into account the possible serial connection according to the space. Frame constructions composed of the main components placed on the sides and a drawer base placed in front and attached and fixed at the height of top base.

1 complete plaque placed from the behind

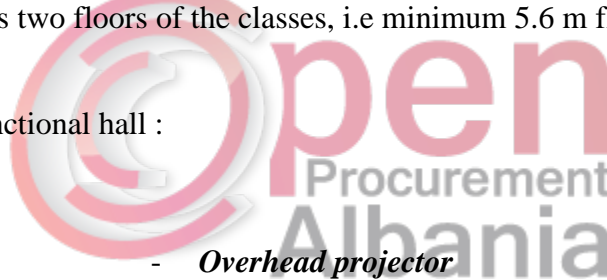
Open part with 20 units

For each unit there is one mobile drawers separation sliding according to a slip with tap that serves as a stopper of the type PVC and attaching slat PVC 35 mm placed in the frontal position.

**i. Multi-purpose space**

The multi-purpose spaces include venues that can be used for several purposes, such as meeting rooms for students and teachers, meeting rooms for teachers and parents, halls for organization of symposiums, display of different film materials, etc. This space shall be designed in the shape of an auditorium and count a seating capacity of at least 100 persons. There shall be a space to serve as a scene or special lectures enabling the school to organize broader activities. The hall shall have an audio system and technics room to control the lights, audio, projector, etc. The hall shall be acoustically functional. This space shall have two entrances, one direct entrance from school corridors and one directly connected to the public space of the school in order to be sufficiently flexible also for beyond school hours. Its minimal height shall be same as two floors of the classes, i.e minimum 5.6 m floor – ceiling.

Equipment for such a multi-functional hall :



- *Overhead projector*

Overhead projector MENTOR 250 basic mode

Technical data

Projektor overhead for daily use

Halogen lamp : 2x 24 V/250 W

Objective with 3 lenses with  $f = 315$  mm

Roboust carcass

Simple use

Rapid inclusive changer of the lamp, scratchless lenses of the make Fresnel, Ventilator, thermal fuse , 5 m network cable.

Weight: 13 kg

Dimensions : L 34 x B 36,5 x H 70 cm

Labor surface 285 x 285 mm

Clearness : about 2.200 ANSI-Lumen

The following picture presents a MENTOR 250 dia film. It is recommended the use of this projectors or a similar make that meets the same criteria

- *dia film projector*

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Following are presented two types of different projectors with dia film, one is new with a remote control and the other connected to cable.

Technical data of the type: **OPLITE 7**

1 x Projector

ARCHITECTURAL/ENGINEERING SERVICES FOR PROCESSING OF SPECIFICATIONS OF CONSTRUCTION MATERIALS AND SPECIFICATION OF EQUIPEMENT AND FURNITURE OF SCHOOLS

MINISTRY OF EDUCATION AND SCIENCE

SPECIFICATIONS OF FURNITURE AND LAB EQUIPMENT Page -66-

2 x Lamps 400W - 36V

1 x Bag for its transport

1 x 3280 store for dia film

1 x enlargement objective 70-120 mm (1:2,8)

1 x cable for remote control

1 x control panel with 6 functions of the type IFR 8

The following picture presents a SIMDA dia film. It is recommended the use of this projectors or a similar make that meets the same criteria

Technical data of the type: **OPLITE 4**

1 x Projector

2 x Lamps 250W - 24V

1 x Transportation bag

1 x 3280 store for dia film

1 x enlargement objective 85-150 mm

1 x cable for remote control

Focus regulation + / -

The following picture presents a SIMDA dia film. It is recommended the use of this projectors or a similar make that meets the same criteria



### - *Working table for conference room*

Dimensions: rreth 1950 x 975 x 720 mm.

Upper surface : Dimensions : about 1950 x 975 x 30 mm. Made of melamin or equivalent material, with plastic coat and plastic stripe for the edges.

Skeleton: Dimensions: about 1950 x 975 x 685 mm. Metallic tube with four legs based on the floor and equipped with height regulating screws made of PVC.

## 4.3 Communication Room (IT Room )

### - *Specification of Network Equipment*

The IT room shall meet the following criteria:



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- Dimensions of the room at minimum of 2 m x 2 m (4 m2).
- Note: *If it is planned that school will have a server there shall be an air conditioning system where the standard temperature must register a standard of 21 degrees.*
  - The server room shall have a rack for minimal cabling of 24 HU.
  - Minimally a UPS 1000VA for network devices such as switch, router wireless etc.
- Patch-panel 24 Port per cabinet (rack) depending on connections necessary for each position
  - Switch-e Layer 2 for network distribution
- Router Wireless for spreading of internet signal in places destined for internet acces.
  - Patch-Cord 1 m ose 2 m, Cat6 (for connections between switches and patch panels)
    - Socket Rack 6 with rack
- Switch with 5 ports

<b>MINIMAL TECHNICAL</b>	
<b>"Type":</b>	Switch Gigabit unmanageable 5 Ports
<b>"Number of Ethernet Ports" :</b>	5 Ports Gigabit
<b>"Forwarding modes":</b>	Store-and-forward
<b>"IEEE Network Protocols":</b>	IEEE 802.3 Ethernet IEEE 802.3ab 1000BASE-T
<b>Certifikimi i produktit,</b>	CE mark
<b>"Accessories included":</b>	Power Supply Power Adapter Quick Install
<b>“Warranty”:</b>	1 year

- Switch with 8 Ports

<b>MINIMAL TECHNICAL</b>	
<b>"Type":</b>	Switch Gigabit unmanageable 8 Ports
<b>"Number of Ethernet Ports" :</b>	8 Ports Gigabit
<b>“Fowarding modes”:</b>	Store-and-forward
<b>"IEEE Network Protocols":</b>	IEEE 802.3 Ethernet IEEE 802.3ab 1000BASE-T

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>"Certification":</b>	CE mark
<b>"Accessories included":</b>	Power Supply Power Adapter Quick Install
	1 year

- Switch with 24 Ports

<b>MINIMAL TECHNICAL CHARACTERISTICS</b>	
<b>Interfaces and HW characteristics</b>	Switch 24 Port L2
<b>Port PoE 10/100/1000Mbps RJ45 (Auto Negotiation /Auto</b>	$\geq 24$
<b>uplink port (copper/fiber)</b>	min. 2 Combo Optional
<b>100/1000Mbps SEP Slots</b>	Optional
<b>Porta Combo</b>	Optional
<b>Port Consol RJ45/RS232</b>	1
<b>Installation in rack</b>	19" rack mountable
<b>"INPUT"</b>	
<b>Nominal voltage</b>	100~240VAC
<b>Frequency</b>	50/60Hz
<b>PERFORMANCE AND FLEXIBILITY</b>	
<b>Bandwidth/Backplan</b>	$\geq 48$ Gbps
<b>Throughput</b>	$\geq 35$ Mpps
<b>Jumbo Frame</b>	Optional
	16k
<b>Fan</b>	Optional
<b>STANDARDS</b>	
<b>IEEE 802.3 - 10BASE-T</b>	Yes
<b>IEEE 802.3u - 100BASE-T</b>	Yes
<b>IEEE 802.3ab -1000BASE-T</b>	Yes
<b>IEEE802.3z -1000BASE-X</b>	Yes
<b>IEEE 802.3ad –aggregation link</b>	Yes
<b>IEEE 802.3x -full duplex on 10BASE-T, 100BASE-TX, and</b>	Yes
<b>IEEE 802.1d -Spanning Tree Protocol</b>	Yes
<b>IEEE 802.1s- multi STP</b>	Yes
<b>IEEE 802.1ë- RSTP</b>	Yes

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>IEEE 802.1q -VLAN</b>	Yes
<b>IEEE 802.1x - Port-based Network Access Control</b>	Yes
<b>IEEE 802.1p -QoS classification</b>	Optional
<b>IEEE 802.3at</b>	Yes
<b>IEEE 802.3af- PoE</b>	Yes
<b>OPERATIVE SYSTEM</b>	
<b>Oriented for LAN operations</b>	Yes
<b>Upgrade possibility</b>	Yes
<b>QUALITY OF SERVICE</b>	
<b>Priority queues</b>	Yes
<b>Queue scheduling</b>	SP, WRR
<b>Characteristics Layer 2 and 3</b>	
<b>IGMP Snooping</b>	V1/V2/V3
<b>Spanning Tree</b>	STP/RSTP/MSTP
<b>LLDP</b>	Yes
<b>BPDU Filtering/Guard</b>	Yes
<b>Loopback Detection</b>	Yes
<b>802.3x Flow Control</b>	Yes
<b>VLAN</b>	4k, (Voice VLAN Optional)
	802.3ad LACP
<b>Adressing IPv6</b>	Yes
<b>DHCP/BOOTP, DHCP Snooping, DHCP Option82 for clients</b>	Yes
<b>Dynamic ARP inspection (DAI)</b>	Yes
	Port/Flow
<b>Policy-based routing (PBR)</b>	No
<b>Routing</b>	No
<b>SECURITY</b>	
<b>Access Control List</b>	min L2
<b>TCP/UDP Ports</b>	Yes
<b>Protocoll DSCP</b>	Yes
<b>Authentication</b>	TACACS+ , RADIUS, IEEE 802.1X, Port/MAC, SSH v1/v2, SSLv2/v3/TLSv1
<b>Storm Control</b>	broadcast, multicast, unicast
<b>MANAGEMENT</b>	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>Web-based GUI dhe CLI.</b>	Yes
<b>RS-232 console/ RJ45 Console</b>	Yes
<b>Telnet, SSH</b>	Yes
<b>CPU monitoring</b>	Yes
<b>SNTP</b>	Yes
<b>Upgrade of Firmware</b>	TFTP or Web interface
<b>Led screen</b>	Optional
<b>SNMP v1/v2c/v3</b>	
<b>SYSLOG</b>	Yes
<b>Warranty</b>	1 year

**Router Wireless**

<b>MINIMAL TECHNICAL</b>	
<b>"Type":</b>	Router Wireless Wi-Fi Gigabit
<b>"Operation Mode":</b>	Wireless router mode Access point mode Media bridge
<b>Rating:</b>	Min AC 1900
<b>"WiFi standards":</b>	IEEE 802.11a/b/g/n/ac
<b>"Network Standart":</b>	IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11ac, IPv4, IPv6
<b>"Ports":</b>	(1) Gigabit WAN Port (4) Gigabit LAN Ports (1) USB
<b>"WAN Connection Type":</b>	Automatic IP, Static IP, PPPoE, MPPE
<b>"Transfer rate" :</b>	up to 1.3 Gbps
<b>"Routing protocols":</b>	IPSec, L2TP or PPTP
<b>"Band":</b>	Dual band: 2.4 GHz & 5 GHz
<b>"Antennas":</b>	Build-in or external
<b>"Security features":</b>	WEP 64/128-bit  WPA2-Personal & Enterprise
<b>"LED indicators":</b>	Yes
<b>"Buttons":</b>	WPS Button Reset Button Power

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>"System requirements":</b>	Windows 7, 8 ose 10
<b>"Power Supply":</b>	AC Input: 110V ~ 240 V (50 ~ 60Hz)
<b>"Accessories included":</b>	Quick start guide ROM with documentation External Antennas (optional) CD-
	Ethernet cable
	2 year

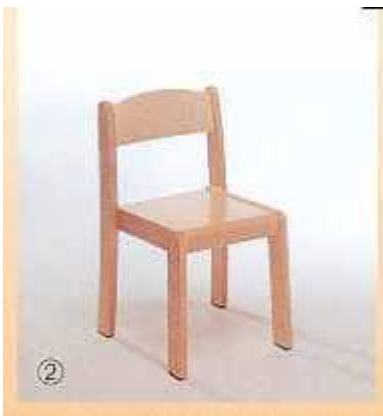
**2.2.2 Pre-school venues**

341. School shall have up to two pre-school spaces sitting room + game space of the kindergartens. These classess shall have accessable and dedicated sanitarries for the group.

- Suitable furniture for these venues are as following :

Material of the skeleton:

Mass oak wood with rounded lips (to avoid possible damage)



Surface painted in lacquer, colorless and water resistant and not harmful for the health.

Material for the seat and back :

Plywood in **ANATOMIC** shaped and rounded lips.

Surface painted in lacquer, colorless and waterproof, not harmful for the health.

**Round table**

Same as chairs, even tables are classified into two groups according to height :

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Round table for a group of children with a diameter of 600 and 1200 mm.

<b>Nr.</b>	<b>Grupi</b>	<b>Lartësia e sipërfaqes së tavolinës</b>	<b>Lartësia trupore e fëmijëve</b>	<b>Lartësia e ndenjësës së karriges</b>
1	2	50	113 – 127	28
2	3	55	128 - 142	30

Material of the skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in

lacquer, waterproof and not harmful for the health.

The upper surface material: MDF or melamine with plastic layer and plastic lateral stripe, with rounded lips. The surface is waterproof and not harmful for the health.

***Square table***

Rectangular table for children with dimensions:

1200 x 800 mm      800 x 800 mm      1200 x 600 mm      600 x 600 mm

Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health).

The upper surface material: MDF or melamine with plastic layer and plastic lateral stripe, with rounded lips. The surface is waterproof and not harmful for the health.

***Trapezoidal Table***

Trapezoidal table for children with dimensions: 1200 x 600 x 600 mm

Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health).

Upper surface material: MDF or melamine with a plastic layer and lateral plastic stripe, rounded lips.

- ***Table for autistic children***

### *Cupboard for toys*

Dimensions t: 900 x 400 x 760 mm 600 x 400 x 760 mm

Material: Veneered melamine with natural wooden slat with rounded lips.

Divisions have been realized taking into account a potential connection in series according to space and a better exploitation.

1 vertical division in the middle with 3 divisions of drawers in each subdivision with a regulatory height, 4 rotating doors with a protection slat against clashes. Top base 100 mm

### *Filter rooms (wardrobe):*

### *Wardrobe for children*

Wardrobes for children are classified as following :

Wardrobe for children with bench to sit on one side. Dimensions: height 1100 mm; depth 390 mm; height of seat 330 mm.

Wardrobe for children with a bench to sit on both sides. Dimensions: Height 1100 mm; Depth 1120 mm; Height of seat 330 mm.

Wardrobe for children with a bench to sit on one side and a place for placing shoes, hats. Dimensions: Height 1100 mm; width 570 mm; height of seat 330 mm.

Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health). Dimensions of wood 40 x 40 mm

Material of the seat: Slat made of oak wood, with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health). Thickness of slats minimum 30 mm.

In the upper part are placed hooks for hanging clothes whereas in the lower part of the seat are placed the shoes on slats.

### 342. 2.2.3 Hall for physical education

#### **High schools**

The high schools must have a special closed premise (gym) for physical education and venues in its extranatal yard.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

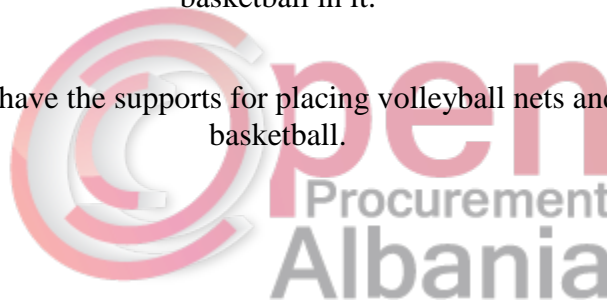
The minimal dimensions of the gym shall enable playing of basketball and volleyball, i.e 18 m x 26 m. Its minimal height shall be equal to two floors, at minimum 5.6 m floor–ceiling.

In this respect, the physical education hall shall include the following additional venues:

- two wardrobes at minimum 20 m<sup>2</sup> each.
- two toilets – showers at minimum 20 m<sup>2</sup>
- a depot for tools at minimum 20 – 30 m<sup>2</sup>
  
- venue for teachers with toilet-shower and wardrobe minimum 16 m<sup>2</sup>

The gym shall envisage the paving with wood parket and lined for organization of volleyball/ basketball in it.

The gym shall also have the supports for placing volleyball nets and baskets and tables for basketball.



***Necessary elements for the gym:***

- Portmanto for teachers room
- Clothes hangers (for the gym)
  - Long benches
- Baskets for internal venues
- Swedish double stairs 2x (1mx220 m)
  - Gymnastics mattress



- Volleyball net

**343.**

### 2.3 Administrative Space

344. For each type of planned school following are made evident the number of academic and administrative staff :

Numri I stafit te nevojshem											
Shkolla sipas numrit te klasave	Nr. Nx	Nr Klasave	Mesues	Drejtor	Nendrejtor	Sekretar	Psikolog	Punjes Social	Roje	Punetore pastrimi	Mjek/Infermier
Shkolle 9-vjecare me 20 klasa, me 30nx/klase	600	20	26	1	1	0	1	1	1	3	1
Shkolle 9-vjecare me 30 klasa, me 30nx/klase	900	30	40	1	2	0	1	1	1	3	1
Shkolle 9-vjecare me 20 klasa, me 24nx/klase	480	20	26	1	1	0	1	1	1	3	1
Shkolle e mesme e larte me 21 klasa, me 30nx/klase	630	21	32	1	1	1	1	1	1	3	1

**345.**

#### **346. 2.3.1 Office of headmaster /Office of deputy headmaster**

The office of headmaster and deputy headmasters shall be distributed in each floor in order to cover the school territory.

The office of headmaster for high schools shall be at minimum 25 m<sup>2</sup>

The office of deputy headmaster for high schools shall be at minimum 16 m<sup>2</sup>

Table: Dimensions about 3700 x 1020 x 720 mm

Surface about 1950 x 975 x 50 mm Melamin made of natural wood slat

Skeleton

Upper surface is based on two legs with a diameter of 500 mm, made of mass wood painted with natural lacquer.

347.

**348. 2.3.2 Secretariat /room for the administration**

These schools need a secretary office. The space for secretary office shall be at minimum 16 m<sup>2</sup>. It is preferable to be located on ground zero.

- Cupboard for registries

Dimensions about 1260 x 450 x 2080 mm

Material of the corpus and sub-divisions : Melamin plaque – with a plastic coat with plastic coating stripe of the edges.

Divisions are realized by taking into account the serial potential connection according to space and its better exploitation.

1 vertical uninterrupted division

2 fixed drawers separations, in half width

2 drawers separations whose height can be regulated, in half width

1 frame in the telescopic slide (guideline) that can be removed by additions (small case) for inventory sheets and accounting – vertical (size of sheet 380 x 260 mm) in half width.

4 framews to be withdrawn in telescope slides (guideline) for the archive of registries with the dimensions A4 – in half width

2 rotating doors with a lock and rotating stick with a cylindric handle and big cylinder suitable for the general closing system.

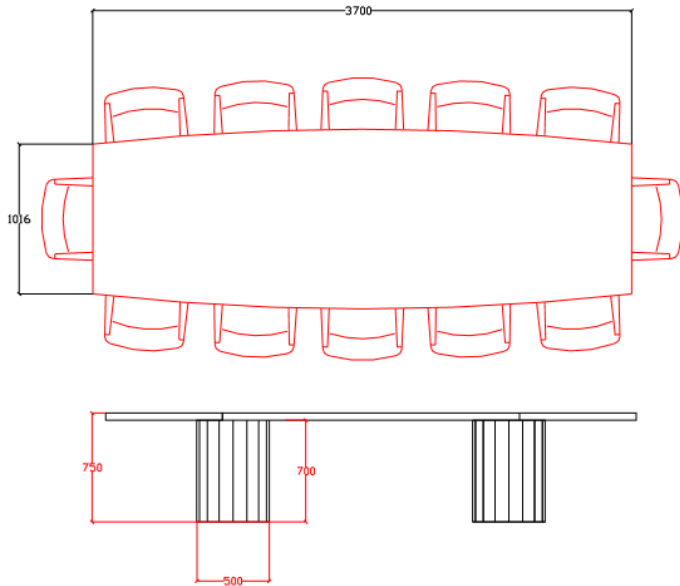
349.

**350. 2.3.3 Teachers room**

The space for teachers room in high schools shall be 2,5 m<sup>2</sup> per each teacher. If there are several teachers rooms, then it is preferable to have them in different floors.

- Meeting table

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**



Dimensions about 3700 x 1020 x 720 mm  
Upper surface about 1950 x 975 x 50 mm.  
Melamin with natural wooden slat

**Skeleton**

The upper surface is based on two legs with a 500 mm diameter, made of mass wood painted in natural lacquer.

**351. 2.3.4 Supporting staff**

For the supporting staff, where is included the maintenance staff, there shall be envisaged a venue of 2 m<sup>2</sup> per each person.

**352.**

**2.4 Additional venues**

**353. 2.4.1 Hygiene-sanitary**

Sanitaries, teachers, students, male/female

Sanitary block including toilets shall be in every floor.

***Location***

Teaching and recreation classes shall not be further than 50 m from the sanitaries.

***Number***

The determination of number of WC, it is based on norms indicated in the following table, which is valid for all school categories.

	No. students / Teachers	WC cabins	Pissoirs	Sinks
Male				
Students (boys)	About 100	2	4	2
Teachers	About 20	2	2	1
Females				
Students (girls)	About 100	4	One WC with bidet	2
Teachers	About 20	2	One WC with	1

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			bidet	
Maintenance room	2 m <sup>2</sup> for each floor			

It is not recommendable to have separated toilets for teachers and students. Thus, it is envisaged that they shall share the same service space, corridor, sink, etc.

A continuous care shall be paid to sanitary equipment to avoid concerning odors.

*Furthermore, it is recommended:*

Walls shall be resistant to scratches, if possible, not able to write on them, i.e. to pave them with majolica tiles up to the minimal height of 1,6 m.

Doors of the toilets shall be about 70 cm and possible to open from outside.

The pissoir shall have plenty of water to avoid concerning odors.

Minimum dimensions of a WC linkage shall be not less than 1,3 m x 0,9 with a minimal height of 2 m

Sanitations shall be hydro-isolated and with a good ventilation

For washing the WC venues, designers shall envisage a tap that can be connected with an elastic pipe and a drain for collection of waters. The pre-rooms of bigger sanitation groups shall be envisaged also a drain for removal of waters on the floor.

***Sanitations for the disabled***

All categories of schools shall have a minimum of a toilet for these persons. For further information refer to CoMD No. 1503, dated 19.11.2008, “For people with disabilities”.

354.

**355. 2.4.2 Office of the physician**

The office of the physician is located in the ground floor of the building and counts a surface of 17-18m<sup>2</sup>, with recommendable dimensions of 6x3m. The 6m length is necessary for a regular performance of examinations for students visibility and hearing.

The office shall have a sink.

Natural illumination shall be provided by a window with a size equal to 1/6 of the office’s surface. The artificial illumination shall be 100 lux.

### **Cupboard for medical instruments**

Dimensions about 1260 x 550 x 2080 mm

Material of the corpus and subdivisions :

Melamine plaque – with a plastic coating layer and a plastic stripe coating the edges.

Divisions shall be realized taking into account the potential serial connection according to the space and best exploitation.

1 drawers division that may be totally removed with a minimal holding force of 600 N (free illuminated space 250 mm)

2 drawers division that may be totally removed with a minimal holding force of 400 N each (free and illuminated space of 250 mm)

3 drawers divisions moving according to the height: one according to depth of cupboard, whereas the other two up to the depth of about 320 mm.

Divisions located in a depth of about 320 mm are movable according to the entire height, therefore an extra row is necessary for the drawers holder. All the divisions that may be fully removed are equipped on all sides with a holder 15 mm high.

Two rotating doors with a clash-protection slat. Cylindric lock and rotating lever with a big handle where it can be kept and a big cylinder.

### **356. 2.4.3 Office of the psychologist**

Office of the psychologist is located in the ground floor of the buildings and counts a surface of 17-18m<sup>2</sup>, with recommendable dimensions of 6x3m. The 6m length is necessary for duly performance of students' examinations.

The office shall envisage a sink

The natural illumination shall be provided by a window with a size equal to 1/6 of the office's surface.

Artificial illumination shall be 100 lux.

The space of psychologist and physician can be integrated together.

357.

**358.**

### **2.5 Communicative venues, entrances, staircase, corridor, halls**

All the categories of schools required communicative venues, entrance, hall, corridors, staircase, ramps, handrails for the stairs.

School entrances shall enable free entries-exits of students. The dimensions of entry-exist doors shall depend on the number of students in the school. For each school entrance, the designer shall envisage a shelter.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

There should be an emergency exit in each floor, in further possible distances from the main entrance. The maximal distance between each door and emergency exit of the floor shall be 30 m. The width of the emergency exit shall be 0,55 m for each 60 persons. The ground floor shall have at least two entrances.

### **359. 2.5.1 Corridors**

*They must meet the following criteria:*

The width of the corridor when it serves for classes only from one side shall be at minimum 2m.

The width of the corridor when it serves for classes from both sides shall be at minimum 3 m.

The height of the corridor shall be at minimum 2,8 m floor - ceiling.

Corridors shall provide a natural illumination

Furniture to be placed in the corridors:

***Metallic drawers that can be closed by key***

Dimensions: Depending on the number of divisions per width of the division 300 mm / 400 mm, we have: Drawers with a width : width per drawer with 1 division = 300 mm / 400 mm width per drawer with two divisions = 600 mm / 800 mm width for drawer with three divisions = 900 mm / 1200 mm width per drawer with 4 divisions = 1200 mm / 1600 mm width per drawer with 5 divisions = 1500 mm

The height of drawers depends on the way of organization and is :

For drawer with upper base: 1750 mm For drawers supported on legs: 1850 mm For drawers with a class A bench: 1950 mm. For drawers with class B bench: 2100 mm

Their priorities are:

Optimal self-ventilation

Long-lasting and robust metallic construction

Lateral holes that enable the simple joining of several drawers

Zinc-coated and painted legs

Elaborated round-edges metallic material

Sustainability and protection against physical damage

Metallic stable hook welded in the internal side of the door

Sustainable anti rust paint

Door with a ventilation gap and locking system with an individual key

In the internal part: 1 drawer in the upper part, 250 mm high

Metallic drawers shall be calculated in order to have a division at the disposal of each student.

**360.**

**361. 2.5.2 Staircase**

*It shall meet the following criteria :*

The width of stairs: minimum 1,2 m /100 students + 0,2 cm for every 100 students.

There shall not be designed or implemented a spiral staircase

The height of the stairs handrail shall be 1,10 m

For stairs with a width up to 1,5 m, handrail is placed only on one side.

For stairs with a width up to 2 m, handrail is placed on both sides

For stairs wider than 2 m, there should be a handrail even in the middle.

Walking space shall be treated with anti slippery material

Staircase shall have a natural illumination

Staircase shall not have more than 18 threads in a ramp

For other elements of staircase design refer to CoMD No. 626, Dt. 15.07.2015 “Normative of dwellings design”.

For the disabled refer to CoMD No.1503, Dt. 19.11.2008 in approval of regulation “Exploitation of facilities by persons with disabilities”.

**362.**

**363. 2.5.3 Lift**

*It shall meet the following criteria:*

The lift shall serve for the vertical movement of the disabled or in other necessary cases, if there is no other technical solution.

Minimal width of the lift door: 85 cm

Holding pipes and control panel of the lift not higher than 90 cm

Dimension of the internal space of the lift not less than 1 m x 1.4 m

### **364. 2.5.4 Hall**

The hall is a very important and necessary element for schools. Halls on the ground floor enable quick movement of students from main entrance to classes and vice versa, as well as consist of the first visual contact of students with internal venues of the school. In other floors, the halls, beside function of distribution of students to classes, play also the role of venues where students stand during the breaks between teaching hours. Halls serve also as venues where are displayed different boards necessary for performance of the teaching process.

Halls as necessary parts of school organization shall enable the completion of the above-mentioned functions. Their size depends on the number of students, floors and organization of classes.

### **365. 2.5.5 Storeroom and additional corners**

The storerooms are venues serving for inventory and other materials. The storeroom surface may vary from 18 m<sup>2</sup> - 40 m<sup>2</sup>.

Technical rooms for installation of the boiler, sanitary water tanks, water pumps and pumps of fire protection system shall have a surface and geometric size that could enable the installation of all equipment and systems according to technical specifications of the producers, by calculating necessary space for repair and maintenance works.

- **2.5.6 External space**

External spaces are divided into three categories:

Spaces determined for recreation zones (fields) and sports premises;

Movement zones include vehicles (streets and parking) and pedestrians (pavement and alleys);

Green spaces and zones planted with trees, bushes, as well as valley.

Entrance to the school shall be clearly noticeable and easily to be found.

Billboard with the name of the school is placed in a noticeable position from far and in the vicinity of the main entrance.



## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

If a bus stop for students is not situated within a reasonable distance, then there should be taken into consideration the projection of a bus stop near the school. This stop should not be in the school territory and should be defined with the understanding of the local power.

Parking for bicycles, if suitable, shall be easily accessible from the students entrance.

The installation of illumination system in school's territory shall be taken into consideration, because it will be used even beyond the school timetable. The designing level shall reflect also the location of the school and take into account the use of building beyond the normal school timetable.

Landscape elements: The background must be simple and easy to be maintained. It is encouraged the use of local plants and calculation of spaces where can be carried out garden activities by students. The designing team shall take into account the inclusion of landscape elements to promote a surface that could help the teaching process, as well as spaces for sowing different plant. Large background spaces with solid materials must be avoided.

The perimetrical space of the school shall be surrounded with low walls and fence, or only iron fence at a minimal height of 2m.

The vicinity of streets and vehicles to the schools shall be at minimum. not be near the school, nevertheless there should be an access to school parking space. Where this can be inevitable, it shall have a clear physical distinction (pavement) between the pedestrian and vehicles streets.

If possible, there shall be projected a parking space for about 20% of the staff and at least a parking space for the disabled.

For sports premises, according to normative of designing and construction, there shall be used materials for layers and surroundings that meet the conditions of physical security. Such as absorbing tartan layer, protection materials in the baskets columns or surrounding of fields and wherever will be held physical activities.

**Two school objects shall have separated yards, pre-school cycle shall also have a separated year and respective recreation spaces.**

In the schools yard shall be envisaged and designed the installation of an art work that could serve as an identifying and orientating element of the school in the community.

In each yard, it is necessary the creation of a volleyball field and basketball field, integrated or in a separated space, as well as the gymnastics corner. In cases, when the territory's surface enables creation of other sports venues, there can be projected mini-football fields, tennis courts, etc.

### **Kindergartens**

Based on standards approved by MoES, it is recommended :

The kindergarten shall have up to 100 children, according to the groups and physical spaces of the kindergarten space. It is recommendable that the kindergarten shall not have more than 125 children.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

First group (3-year old) shall have 15 children.

Second group (4 year old) shall 20 children;

5. The kindergarten shall have the block (group), filter room (wardrobe), staff room, kitchen and laundry.

Block (group) of the kindergarten with food supplement shall have:

Reception-wardrobe or filter room, including children wardrobe;

Sitting and games;

Sleeping space;

Eating space;

Sanitaries for each group.

Regarding functional separation and type of functions, the designer shall refer to:

- Standards and norms, criteria of design for kindergarten/kindergartens/nurseries prepared by Ministry of Education and Science (chapter “Kindergartens of children”);
- Hygiene-Sanitary regulation for construction and functioning of kindergartens for children, rules of Ministry of Health and environmental protection No. 105 dated 17.05.1995;

**Requirements on construction and functional conditions**

- The kindergarten shall be situated in the ground floor of the building, i.e in the first floor. The block of vertical movement ion (staircase) shall be 15 cm high, secure and suitable for the age group.

### **Plastering works.**

Facade of kindergartens shall be easy to be maintained. The design shall avoid huge glass surfaces if possible.

External plastering shall depend on the type of intervention envisaged by the project.

### **Layers of tiles and other layers**

The floor shall be dry, hygienic, warm and easily cleanable. For sitting, filter, eating and sleeping spaces shall be used the wooden laminate.

Corridors, sanitariums and other venues shall be designed with tiles with minimum of dimensions 40cm\*40 cm gres porcelain. Floors of toilets and their walls at a certain height, shall be isolated and the designer shall provide details of their isolation.

### **Doors, windows**

Doors shall have a full wood modular panels made of MDF and equipped with a wooden case, whereas regarding windows, they shall be made of duralumin of high quality with rotating opening made of double glass and fanlight if necessary.

Windows shall include the moveable nets against insects.

### **Electric, telephonic and computer systems**

Consultant shall envisage the lighting of rooms with strong sufficient lighter to guarantee a lighting in line with norms in force and space. Bedrooms shall include artificial lighting according to needs and a sufficient number of sockets for each venue and according to their destination. The distribution of sockets shall take into account the elements of security such as height from floor and type of socket.

Control panels shall be placed according to contemporary standards.

The draft IPR shall include lamps with renewable batteries, in case of power cut.

### **Electrical, lighting, emergency and security systems**

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Transformer’s room shall be isolated from other fireproof walls and shall not be connected to the emergency passages.

The entire electrical system shall be able to go off in one point in the first floor, which can be easily reached and equipped with respective distinguishing signs. The electric scheme of lighting and power shall be displayed on the set off panel.

The emergency lighting shall be automatically set on and last for at least one hour before voltage could go off.

### **Outdoor systematization and green spaces**

Designer shall prepare the necessary materials to include in the project a completed environment of the yard of kindergarten with alley, irrigation system for territory, surrounding wall, including games space with respective equipment.

It shall consist of a transparent surrounding (banisters, etc) and guarantee all the security norms and standards regarding such constructions. There shall be included also an incorporated sound system that shall work in all the other venues of the buildings.

Outdoor venues serve for sitting, recreation, especially as game space which are integrated parts of the general education program for these children. These sites shall also be equipped with tents for sun protection. Special importance has also the creation of a green space.

In the framework of outdoor systematization shall be taken into consideration the following activities:

Corner of water and sand;

Vitality corner;

Theater corner;

Corners for outdoor games,

Green spaces, benches, sun tents, etc

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Designer shall provide details about the respective layers and their implementation technology, as well as combine game space with green venues, taking into account also the realization of game spaces for children of this group age.

To keep the kindergarten’s yard clean and establish bins for wastes in the respective yard and especially near the benches.

### 3.2 Furniture and equipment for kindergarten according to functions

#### 3.2.1 Group venues (sitting + games)

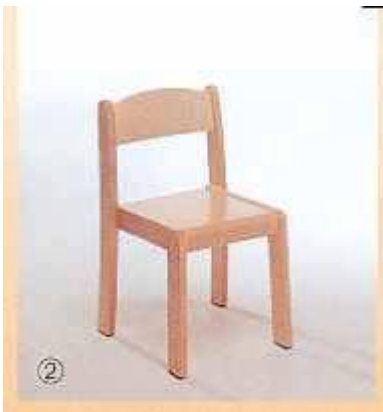
Chairs for children in the kindergartens according to dimensions is classified into two groups as in the following table:

Nr.	Grupi	Lartësia e sipërfaqes së tavolinës	Lartësia trupore e fëmijëve	Lartësia e ndenjësës së karriges
1	2	50	113 – 127	28
2	3	55	128 - 142	32



Material of the skeleton:

Mass oak wood with rounded lips (to avoid possible damage)



Surface painted in lacquer, colorless and water resistant and not harmful for the health.

Material for the seat and back :

Plywood in **ANATOMIC** shaped and rounded lips.

Surface painted in lacquer, colorless and waterproof, not harmful for the health.

#### Round table

Same as chairs, even tables are classified into two groups according to height :

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Round table for a group of children with a diameter of 600 and 1200 mm.

<b>Nr.</b>	<b>Grupi</b>	<b>Lartësia e sipërfaqes së tavolinës</b>	<b>Lartësia trupore e fëmijëve</b>	<b>Lartësia e ndenjësës së karriges</b>
1	2	50	113 – 127	28
2	3	55	128 - 142	30

Material of the skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in

lacquer, waterproof and not harmful for the health.

The upper surface material: MDF or melamine with plastic layer and plastic lateral stripe, with rounded lips. The surface is waterproof and not harmful for the health.

***Square table***

Rectangular table for children with dimensions:

1200 x 800 mm      800 x 800 mm      1200 x 600 mm      600 x 600 mm

Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health).

The upper surface material: MDF or melamine with plastic layer and plastic lateral stripe, with rounded lips. The surface is waterproof and not harmful for the health.

***Trapezoidal Table***

Trapezoidal table for children with dimensions: 1200 x 600 x 600 mm

Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health).

Upper surface material: MDF or melamine with a plastic layer and lateral plastic stripe, rounded lips.

***Six-angle table***

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Six angle table for children with a diameter of 1200 mm. Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health).

The upper surface material: MDF or melamine with plastic layer and plastic lateral stripe, with rounded lips. The surface is waterproof and not harmful for the health.

### *Cupboards*

Cupboards for kindergartens are numerous from the point of view of the shape and use. Following are some types of cupboards :

1. Cupboard for toys 2. Cupboard for books 3. Cupboard with two drawers in the lower part Raft 4. Cupboard for personal drawers

Material for 4 types: Melamine plated with natural wood with rounded .

Dimensions:

Cupboard for toys: 900 x 400 x 760 mm 3 drawers submissions in entire width, regulatory. Top base 100 mm See picture 1 Cupboard for books: 900 x 400 x 760 mm 2 subdivisions for books with an 45 ° inclination and protective to avoid books slippery. Top base 100 mm See picture 2

Cupboard with two drawers in the lower part: 1200 x 400 x 760 mm

1 vertical division in the middle, 2 drawers divisions in each subdivision ,1 drawer in each subdivision. See picture 3

Cupboard for personal drawers: 900 x 400 x 760 mm. Five 5 subdivisions in all the width. 15 drawers that can be easily removed.



*C  
upboard  
for toys*

Dimensions t: 900  
x 400 x  
760 mm  
600 x 400  
x 760 mm  
Material:  
Veneered  
melamine  
with  
natural

wooden slat with rounded lips.

Divisions have been realized taking into account a potential connection in series according to space and a better exploitation.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

1 vertical division in the middle with 3 divisions of drawers in each subdivision with a regulatory height, 4 rotating doors with a protection slat against clashes. Top base 100 mm

### *Filter rooms (wardrobe):*

#### *Wardrobe for children*

Wardrobes for children are classified as following :

Wardrobe for children with bench to sit on one side. Dimensions: height 1100 mm; depth 390 mm; height of seat 330 mm.

Wardrobe for children with a bench to sit on both sides. Dimensions: Height 1100 mm; Depth 1120 mm; Height of seat 330 mm.

Wardrobe for children with a bench to sit on one side and a place for placing shoes, hats. Dimensions: Height 1100 mm; width 570 mm; height of seat 330 mm.

Material of skeleton: Mass oak wood with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health). Dimensions of wood 40 x 40 mm

Material of the seat: Slat made of oak wood, with rounded lips (to avoid potential damage). Surface painted in lacquer, waterproof and not harmful for the health). Thickness of slats minimum 30 mm.

In the upper part are placed hooks for hanging clothes whereas in the lower part of the seat are placed the shoes on slats.

### **3.2.3 Bedrooms**

#### *- Beds for children up to 6 year old*

The children bed shall be single (not sailor bed), and shall be made of wood. It shall be not be high from ground.

### **3.2.4 Kitchen**



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Cooking shall have a special space, well-aspirated and accessible from corridors of the kindergarten and with groups. In this room the natural lighting shall be good and ventilation of space beside natural shall also be equipped with ventilation system (beside aspirator). Windows shall have suitable openings for their location in relation to the kitchen cupboards. Kitchen walls shall all be coated with majolica tiles with large dimensions at a minimal height of 1.5 m from the floor level.

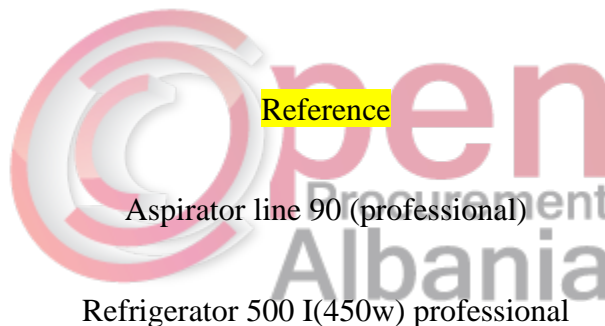
Artificial lighting shall be sufficient and lighter shall be hermetic, suitable for cooking steam resistant.

The kitchen must contain :

Professional sink 1.8x0.7 m stainless with two holes completed with taps + accessories which may be or not be part of kitchen cupboards or stand alone.

Cooking cooker with gas 4 cooking lines 90 (professional)

Kitchen cupboard with MDF buffet. As long as the cooker will use gas then shall be included a good solution according to rules for pressure dishes.



Aspirator line 90 (professional)

Refrigerator 500 I(450w) professional

Stainless kitchen table 1.2x70x85h to enable the cutting of vegetables

Meat cutting machine

Bin for daily wastes

### 3.2.5 Laundry

The laundry shall have a space destined for washing, drying and placement of clothes ready to be used.

This space shall have all the conditions and necessary installations for the equipments:

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Professional washing machine 7 kg

Professional clothes dryer

**3.3 Didactic materials**

Based on a document issued from the Institute for Development of Education, No. 340 prot., dated 29.05.2017, protocoled by Tirana Municipality under no. 16532/1 prot., dated 08.06.2017, didactic materials that will be put at disposal from the winning economic operator shall have the following specifications :

- For Laboratory of Informatics

No.	DESCRIPTION OF DEVICE	UNIT/QUANTITY	TECHNICAL SPECIFICATIONS
18	TABLETS PRESTIGIA	40 pieces	PRESTIGIO MULTIPAD Internal Memory Size 25GB, RAM 2GB
19	COMPUTERS	40 pieces	HDD 160 GB/250 GB Processor Core 2 Duo 30GH <sub>2</sub> Ram (2-4) GB Monitor 19
20	SOFTWARE OF PACKAGES	40 pieces	Office 2013, WINDOWS 7
21	CLIENT FOR ELECTRICAL TEXT	40 pieces	
22	LAPTOP LENARE LENOVO	1 piece	Lenovo - 15.6" Laptop - Intel Core i3 - 6GB Memory - 1TB Hard Drive  PROCESSOR I5, 8GB RAM, GRAPHIC CARD INTEL 4000
23	CUPBOARD FOR TABLETS	1 pieces	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

24	UPS INTERNET	1 piece	650V FOR EACH
25	PROJECTOR	1 piece	EPSON 673595
26	RENTER	1 piece	FG-60 D
27	WEB CHANGE SERVER APLIANSYUS		HP Server G5 or G6
28	CACHEBOX	1 piece	170
29	WIRELESS		HPMSM 430
30	RACK	1 piece	22U DIMENSIONS 600X1000
31	CABLE GRID	1 piece	
32	SWITCH 24 PORT		24 PORT POE GIGABIT
33	HP	1 piece	2530-24G-POEE+SWTCH
34	PRESENTATION WHITEBOARD	2 pieces	

- For Laboratories of Biology

No.	Description	Duration in the course of years	Unit	Quantity	Technical specifications
1	Apparatus for photosynthesis	10	Piece	1	Glass Ballon, scaled test tube with caps, with instructions
2	Retroprojector	20	Piece	1	Current: AC110/220 V 60/50Hz, Power 350W dimensions 285 x 285 mm, distance of projection 1.5-3.5 m, height ~300 mmm, halogen lamp of 24V 300W
3	Stripe Meter	10	Piece	5	1-2 m
4	Compass	15	Piece	10	ø 40-50 mm
5	Entomological net	5	Piece	10	Metallic circle, polyester net, plastic stick
6	Entomological neddle	1	Piece	200	Metallic, enamelled, coloured, 40mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

7	Chemical cup of different sizes	5	Set	5	glass, scalable with mouth, degrees, 50ml up to 500ml
8	Glass Cylinders of different sizes	5	Set	5	glass, scalable with mouth, degrees, 10ml up to 250ml
9	Test tube clip	15	Piece	10	Wood-made
10	Plastic vessel with loupe cap for collection of insects, etc	15	Piece	10	Organic glass cap with loupe ø40mm-60mm, 3x ose 5x
11	Alcohol lamp	10	Piece	10	Standard glass, with plastic cap
12	Hand magnifying glass	10	Piece	10	enlargement 2x ,3x
13	Test tube holder	15	Piece	10	standard, wood or plastic material ø18-20mm
14	Dropper	5	Piece	10	Glass + rubber
15	Scalable pipette	5	set	10	Glass with ø 900mm
16	Petri Dishes	5	Piece	10	Glass, no lips
17	Test tubes 12 x 100mm	5	Piece	100	Glass, no lips
18	Test tubes 16 x 150mm	5	Piece	200	Glass , enamel cap
20	Air Thermometer	10	Piece	5	With alcohol 0-40 °C
21	Laboratory Thermometer 0-50°C dhe -10-110°C	10	Piece	10	With alcohol
22	Glass mixer	5	Piece	10	Glass, length 200mm
23	Clock glass	5	Piece	10	Glass. ø70mm
24	Set of preparation tools (with 7 accessories)	10	set	10	With accessories: scalpel, scissors, preparation needle, tweezers
25	Lama	2	Box	5	Dimensions:: 25,4mm x 76,2mm
26	Lamela	2	Box	5	20mm x 20mm
27	Biological microscope	10	Box	10	Magnifying 600 x, ocular, three objectives
28	Alcohol per djegie	1	bottle	5L	Denaturalized, technical 92-96 Degrees
29	Dropper bottle 60 ml no color	1	Piece	10	Enamel
30	Dropper bottle 60 ml no color	2	Piece	10	Enamel
19	Glass bottle for colorless liquids 60 ml	1	Piece	20	Enamel cap
	Glass bottle for colorless liquids 60 ml	5	Piece	20	Enamel cap
31	Conical bulbs of different sizes	5	Piece	20	glass, with mouth, 50ml deri 500ml
32	Funnels	5	Piece	10	glass, ø75mm
33	Box for lama	5	Piece	5	Plastic box with 25 separated places
34	Holder	2	Piece	10	Metallic with three legs
35	Ceramic net	15	Piece	10	Metallic net with ceramic
36	Filter letter	1	box	3	ø 120 mm, boxes with 100 piece

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

37	Dissection plates	10	Piece	10	Metallic pan with wax or parafin
38	Half analytical scales with weighting stones	10	Piece	2	Maximal Capacity 1000g, Sensitivity 50mg, error margin 1.5, ø120mm
39	Washing Pisetta	10	Piece	10	Plastic with glass gyp
40	Laboratory Stative with Accessories	15	set	5	Basement + rods+metallic circle+pressing+fixing
41	Brush for washing vessels	1	Piece	10	Plastic threads
42	Spatula spoon	10	Piece	10	Porcelain
43	Peza filters	5	Piece	10	glass, low shape, 50mm x 30mm
44	Vessel for aquariums and incubators	5	Piece	2	glass, square
45	Porcelain bowl	10	Piece	3	With supressor ø 90 mm
	<b>Chemical Reagents</b>				<b>For all the list of reagents shall be meet the following specifications :</b>
46	Ascorbic Acid	1	bottle	100g	
47	Etaoic Acid (Acetic Acid)	1	bottle	100ml	Reagent of "p" classification . Packaged according to rules of technical security
48	Soluble Amidon	1	bottle	200g	The label shall contain : Description, chemical formula, expiry date
49	Ethanol 96°	1	bottle	500ml	Molar mass, quantity, signs of risks
50	Formaline	1	bottle	1000 ml	
51	Natrium Hydrogen Carbonate	1	bottle	100g	
52	Amon Hydroxide	1	bottle	250ml	
53	Calcium Hydroxide	1	bottle	100g	
54	Violet Metil	1	bottle	25g	
55	Chlorophorm	1	bottle	250ml	
56	Calcium Chlorur	1	bottle	100g	
57	Calium Chlorur	1	bottle	100g	
58	Parafin	1	plastic	200g	
59	Fehling A Solution	1	bottle	250 ml	
60	Fehling B Solution	1	bottle	250 ml	
61	Biuret reaction	1	bottle	250 ml	
62	Potassium Sodium Tartrate	1	bottle	100g	
63	NatriumTetraborat (Borax)	1	bottle	200g	
64	Iod-iodine of Calium solution	1	bottle	250ml	
65	Fenolftaleine	1	bottle	100ml	
66	Sodium Citrate	1	bottle	100g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

67	Indication letter pH	1	box	2	pH 0-14
	<b>Microscopic Preparations</b>				
68	Kelps – (Chlamydomonasi – one-cell)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
69	Kelps - (Spirogyra with chloroplasts in a cell)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
70	Amphioxus – roundmouther (Matured Individual)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
71	Bacteria - (types of bacteria)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
72	Tiglia. Vertical cut of the stem of two-cotyledons.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
73	Frogs – Larval Development (10mm)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
74	Frogs – Larval Development (3mm)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
75	Epithelium of human mouth	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
76	Euglena	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
77	Ganglion nerve (with nerve fibres and nerve cells)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
78	Human Blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
79	Adipose Tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
80	Epithelial tissue – (simple, with one layer)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
81	Bone Tissue. Vertical Cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
82	Smooth muscle tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
83	Layer muscle tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
84	Nerve tissue – vertical cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
85	Different legs of insects	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
86	Sunflower (Heliantus). Cut of matured root of two-cotyledons.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
87	Maize (Zea mays). Vertical cut typical of one-cotyledon stem	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
88	Human Lungs. General View	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
89	Mosquito – Mouth Apparatus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
90	Medullary Bone	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>91</b>	Paramecium – General Constrution	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>92</b>	Paramecium – Reproduction	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>93</b>	Pines (Pinus) – Leaf cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>94</b>	Planctons (Cyclopus)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>95</b>	Planctons (Daphnia)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>96</b>	Allium. Longitudinal cut, epiderma, cell and nucleus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>97</b>	Allium. Type of roots of different levels of one-cotyledons	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>98</b>	Tapeworm in cattles (head)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>99</b>	Tapeworm in cattles (matured proglottid)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>100</b>	Stitch (Vertical cut )	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>101</b>	Different types of pollen. Middle multi-purpose cut.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>102</b>	Human Kidney - cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>103</b>	Lilium. Vertical cut typical of monocotyledons leaves .	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>104</b>	Small Intestine. Vertical cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>105</b>	Artery, blood vessels	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>106</b>	Nucleus of cell	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>107</b>	Esophagus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>108</b>	Womb of gall	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>109</b>	Frog	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>110</b>	Rabbit blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>111</b>	Pigeon blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>112</b>	Fish blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>113</b>	Hypophysis gland	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>114</b>	Lymphatic gland, section	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>115</b>	Tiroide Gland	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>116</b>	Milk glands	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>117</b>	Chloroplasts	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>118</b>	Chromosomes	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>119</b>	Human skin with sweat glans	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>120</b>	Human Liver	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>121</b>	Mitosis	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>122</b>	Pancreatic islets of Langerhans	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>123</b>	Medullary bone	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>124</b>	Human spermatozoid, sperm stain	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>125</b>	Human Testes	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>126</b>	Trachea, longitudinal cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>127</b>	Rabbit Uterus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>128</b>	Human Uterus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
			piece		
	<b>Liquid preparations</b>		piece		
<b>129</b>	Lizard Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
<b>130</b>	Chicken Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
<b>131</b>	Rabbit Dissection	10	piece	1	Dissection in formalin closed in a glassware , 200 x 70 x40 mm
<b>132</b>	Frog Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
<b>133</b>	Fish Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
	<b>Biological models (Plastic)</b>		piece		
<b>134</b>	Archeopterix (model of fossil)	15	piece	1	Relief PVC, 400 x 300 mm
<b>135</b>	Archeopterix (model of poultry )	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>136</b>	Anatomic bust of man with removable head and other parts 85 cm	15	piece	1	3D model made of PVC and colorant, not toxic, length 850 mm, with removable parts, PVC support
<b>137</b>	Glomerules	15	piece	1	3D model made of PVC and colorant, not toxic,250 x 350 mm
<b>138</b>	Comparison of limbs in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, enlarged, limbs of 5 types of vertebrates
<b>139</b>	Larynx	15	piece	1	3D model made of PVC and colorant, not toxic,magnified
<b>140</b>	ADN Model (helicoidal)	15	piece	1	PVC, not toxical colorant, with removable parts



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>141</b>	Vertical cut of leaf	15	piece	1	3D model made of PVC and colorant, not toxic,, 300x 400 mm
<b>142</b>	Vertical cut of stem	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>143</b>	Model of dicotyledon flower	15	piece	1	3D model made of PVC and colorant, not toxic,180x 300 x 60 mm
<b>144</b>	Model of monocotyledon flower	15	piece	1	3D model made of PVC and colorant, not toxic, 250 x 350 mm
<b>145</b>	Cross-section of the root	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>146</b>	Eye Anatomy	15	piece	1	3D model made of PVC and colorant, not toxic, external, middle ear, magnified 6 x, hearing bones, pipe, canals etc
<b>147</b>	Brain anatomy	15	piece	1	3D model made of PVC and colorant, not toxic, with two separated hemispheres, 2 movable lenses and removable components, magnified 3 x
<b>148</b>	Ear anatomy	15	piece	1	Model in basorelief made of PVC and non toxic colorants,70 x magnified, hair, epiderm, sweat-fat glands, etc.
<b>149</b>	Heart Construction	15	piece	1	3D model made of PVC and colorant, not toxic, with 3 removable parts, magnified 3-4 x
<b>150</b>	Nephrons	15	piece	1	3D model made of PVC and colorant, not toxic, magnified
<b>151</b>	Jaws, teeth	15	piece	1	3D model made of PVC and colorant, not toxic, magnified, lower jaw with mobile teeth
<b>152</b>	Vertical cut of head	15	piece	1	3D model made of PVC and colorant, not toxic, 250 x 350 mm
<b>153</b>	Vertical cut of skin	15	piece	1	Model in basorelief made of PVC and non toxic colorants,70 x magnified, hair, epidermis, sweat-fat glands, etc.
<b>154</b>	Urinary system	15	piece	1	3D model made of PVC and colorant, not toxic magnified,
<b>155</b>	Human Skeleton 85cm	15	piece	1	3D model made of PVC and colorant, not toxic, lenght 850 mm, metal base
<b>156</b>	Model of plant cell	15	piece	1	3D model made of PVC and colorant, not toxic, 180x 300 x 60 mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

157	Kidney	15	piece	1	3D model made of PVC and colorant, not toxic, with removable parts, where are noted: hull, pyramids, cups, waterflow, 3-4 x
158	Model of animal cell	15	piece	1	3D model made of PVC and colorant, not toxic,, 180x 300 x 60 mm
159	Superstructure of cell (with cell organs)	15	piece	1	3D model made of PVC and colorant, not toxic,, 700 x400 x500 mm
160	Digestion apparatus	15	piece	1	3D model made of PVC and colorant, not toxic, with removable parts , 3-4 x
161	Model of protein	15	piece	1	PVC, non-toxic colorant, with removable parts
162	Models of simplified nucleotides for students	15	box	10	PVC, non-toxic colorant, with removable parts
163	Comparison of brain in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, magnified , brain of 5 types of vertebrates
164	Comparison of heart in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, magnified , heart of 5 types of vertebrates
165	Model of liver, with spleen, gall, pancreas and duoden	15	piece	1	3D model made of PVC and colorant, not toxic, magnified,
166	Neuron Model	15	piece	1	3D model made of PVC and colorant, not toxic, magnified
			piece		
	<b>Teaching tables on the wall</b>		piece		Content of tables in line with program requirements. In Albanian Language
167	Hearing Apparatus	10	piece	1	One or two sided material, plasticized or banner
168	Excretory Apparatus	10	piece	1	With plastic slide and movable hanger
169	Respiratory apparatus	10	piece	1	70cm x 100cm
170	Eye Apparatus	10	piece	1	
171	digestion apparatus	10	piece	1	
172	Human Teeth	10	piece	1	
173	ADN structure	10	piece	1	
174	Evolution of animal world	10	piece	1	
175	Birth of conditioned reflexes	10	piece	1	
176	Liver- supporting organ of digestion apparatus	10	piece	1	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

177	Human Muscles	10	piece	1	
178	Anatomic Construction of bone	10	piece	1	
179	Construction of flower in enclosed plants (Angiosperms)	10	piece	1	
180	Female Genital Organs	10	piece	1	
181	Male Genital Organs	10	piece	1	
182	External View of Heart	10	piece	1	
183	Blood Composition	10	piece	1	
184	Ecological Pyramide	10	piece	1	
185	Components parts of skin	10	piece	1	
186	Positions of fetus before birth	10	piece	1	
187	Reproduction of cells - Mytosis	10	piece	1	
188	Reproduction of sexual cells - Meyosa	10	piece	1	
189	Blood Circulatory System	10	piece	1	
190	Nervous System	10	piece	1	
191	Vegetative Nervous System	10	piece	1	
192	Human skeleton	10	piece	1	
193	Plant cell structure	10	piece	1	
194	Animal cell structure	10	piece	1	
195	Mendel Legacy (1 <sup>st</sup> Law of Mendel)	10	piece	1	
196	Mendel Legacy (1 <sup>2nd</sup> Law of Mendel)	10	piece	1	
197	Mendel Legacy (3 <sup>rd</sup> Law of Mendel)	10	piece	1	
198	AIDS Virus	10	piece	1	
199	Drugs	10	piece	1	
200	Risks from alcohol	10	piece	1	
201	Risks from smoking	10	piece	1	
202	Biosynthesis of proteins	10	Piece	1	
203	Earth's Terrestrial Biomes	10	Piece	1	
204	Air pollution : Smog	10	Piece	1	
205	Air pollution : Carbon monoxide and sulphur dioxide	10	Piece	1	
206	Sea pollution	10	Piece	1	
207	Devastration of tropical forests	10	Piece	1	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>208</b>	Food chain in the sea	10	Piece	1	
<b>209</b>	Food Pyramide in the lake (Ecological Pyramide)	10	Piece	1	
<b>210</b>	Forests echosystems	10	Piece	1	
<b>211</b>	Environment Protection from Wastes	10	Piece	1	

- For Chemistry Laboratories

<b>CHEMICAL REAGENTS</b>					<b>Technical Specifications</b>
	<b>Description</b>	<b>Duration</b>	<b>Unit</b>	<b>Quantity</b>	<b>For all reagents, the list must meet these specifications:</b>
1	Salicylic Acid	1	bottle	100g	Clasificated reagent "p" . Packaged as technical safety rules. Label shall have: Description, chemical formula, expiry date, molar mass, quantity,risks signs
2	Benzoic Acid	1	bottle	100g	
3	Oleic Acid	1	bottle	250ml	
4	Ethanoic Anhydrite	1	bottle	250ml	
5	Ethanoic Acid glacial	1	bottle	500ml	
6	Ethanoic Acid	1	bottle	200g	
7	Phosphoric Acid 85%	1	bottle	250ml	
8	Chlorhydric Acid 36%	1	bottle	2000ml	
9	Methanoic Acid	1	bottle	250ml	
10	Nitric Acid 63%	1	bottle	500ml	
11	Silicic Acid	1	bottle	100g	
12	Sulfuric Acid 98%	1	bottle	1000ml	
13	Sulfanilic Acid	1	bottle	50g	
14	Perchloric Acid 65%	1	bottle	100ml	
15	Aluminium (powder)	1	bottle	50g	
16	Soluble starch	1	bottle	100g	
17	Aniline	1	bottle	100ml	
18	Copper (pieces)	1	bottle	100g	
19	Copper – powder	1	bottle	100g	
20	Benzene	1	bottle	250ml	
21	Bromothymol blue	1	bottle	25g	
22	Brom (brom water)	1	bottle	100ml	
23	Potassium bromide	1	bottle	200g	
24	Butanool- 1	1	bottle	100ml	
25	Cyclohexane	1	bottle	100ml	
26	Dextrine	1	bottle	100g	
27	Natrium dihydrogen phosphate	1	bottle	100g	
28	Ammonium Dichromate	1	bottle	200g	
29	Potassium dichromate	1	bottle	100g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

30	Natrium dichromate	1	bottle	100g	
31	Dchloroethane	1	bottle	100ml	
32	Ethanol 96% (ethyl alcohol)	1	bottle	500ml	
33	Denatured ethanol	1	bottle	5 L	
34	Ethanoate ethyl	1	bottle	250ml	
35	Diethyl ether	1	bottle	250ml	
36	Ethanoat sodium	1	bottle	200g	
37	Lead ethanoate	1	bottle	200g	
38	Calcium ethanoate	1	bottle	200g	
39	Calcium phosphate	1	bottle	200g	
40	Calcium fluor	1	bottle	100g	
41	Phenol	1	bottle	100g	
42	Phenolphthalein	1	bottle	250ml	
43	Potassium Ferricyanide	1	bottle	100g	
44	Potassium Ferrocyanide	1	bottle	100g	
45	Formaldehyde (formic aldehyde )40%	1	bottle	250ml	
46	Red phosphorus	1	bottle	50g	
47	Sodium phosphate	1	bottle	100g	
48	Iron powder	1	bottle	200g	
49	n – Hexane	1	bottle	100ml	
50	Hydrogen phosphate sodium	1	bottle	100g	
51	Hydroxide amides (ammonia in water 25%)	1	bottle	500ml	
52	Hydroxide Calcium	1	bottle	200g	
53	Hydroxide Potassium	1	bottle	200g	
54	Hydroxide sodium	1	bottle	500g	
55	Universal indicator pH: 0-14 (Indicator)	1	Kuti	3	
56	Iod (crystals)	1	bottle	50g	
57	Potassium iodines	1	bottle	100g	
58	Potassium iodide	1	bottle	100g	
59	Calcium (metallic)	1	bottle	50g	
60	Potassium (metallic)	1	bottle	25g	
61	Carbamide (urea)	1	bottle	100g	
62	Activ Carbon	1	bottle	25g	
63	Ammonium carbonate	1	bottle	100g	
64	Sodium carbonate	1	bottle	200g	
65	Calcium Carbonate (granuls)	1	bottle	200g	
66	Calcium Carbonate (powder)	1	bottle	200g	
67	Calcium Carbide	1	bottle	200g	
68	Tin- grain (granuls)	1	bottle	100g	
69	Chlorates of potassium	1	bottle	500g	
70	Ammonium chloride	1	bottle	200g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

71	Copper chloride (II)	1	bottle	100g	
72	Barium chloride	1	bottle	200g	
73	Chlorine iron (III)	1	bottle	200g	
74	Hydrate calcium chloride	1	bottle	200g	
75	Potassium chloride	1	bottle	100g	
76	Magnesium chloride	1	bottle	100g	
77	Sodium chloride	1	bottle	200g	
78	Copper chloride	1	bottle	100g	
79	Nickel chloride	1	bottle	100g	
80	Tin chloride (II)	1	bottle	100g	
81	Cadmium chloride	1	bottle	100g	
82	Lithium chloride	1	bottle	100g	
83	Strontium chloride	1	bottle	100g	
84	Aluminium chloride	1	bottle	100g	
85	Zinc chloride	1	bottle	200g	
86	Mohr's salt	1	bottle	100g	
87	Potassium chromium sulfate	1	bottle	100g	
88	Sodium chromate	1	bottle	100g	
89	Xylene	1	bottle	250ml	
90	Blue reagent paper	1	Kuti	3	
91	Red reagent paper	1	Kuti	3	
92	Filter paper 120mm	1	pako	3	
93	Magnesium (powder)	1	bottle	50g	
94	Magnesium (stripe)	1	m	5	
95	Metanol (metilic alcoho)	1	bottle	250ml	
96	Metilorange (indicator)	1	bottle	25g	
97	Red metil (indicator)	1	bottle	25g	
98	Sodium (metallic)	1	bottle	50g	
99	Ammonium nitrate	1	bottle	200g	
100	Aluminium Nitrate	1	bottle	100g	
101	Silver Nitrate (crystals)	1	bottle	25g	
102	Copper Nitrate	1	bottle	100g	
103	Barium Nitrate	1	bottle	100g	
104	Cobalt Nitrate	1	bottle	100g	
105	Potassium Nitrate	1	bottle	200g	
106	Sodium Nitrate	1	bottle	200g	
107	Lead Nitrate	1	bottle	200g	
108	Sodium Nitrite	1	bottle	100g	
109	Nitrobenzene	1	bottle	250ml	
110	Octanol – 1	1	bottle	100ml	
111	Aluminium oxide	1	bottle	200g	
112	Lead oxide (II)	1	bottle	200g	
113	Iron oxide (III)	1	bottle	200g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

114	Calciumi Oxide (granuls)	1	bottle	200g	
115	Chromium Oxide (VI)	1	bottle	100g	
116	Phosforus Oxide (V)	1	bottle	100g	
117	Manganese Oxide IV. (manganese dioxide)	1	bottle	200g	
118	Magnesium Oxide	1	bottle	200g	
119	Lead Oxide (IV)	1	bottle	100g	
120	Zinc Oxide	1	bottle	200g	
121	Paraffin	1	bottle	200g	
122	Potassium permaganate	1	bottle	500g	
123	Propaentriol 1,2,3, (Gliyerine)	1	bottle	250ml	
124	Propanone	1	bottle	250ml	
125	Natriumi Peroxide	1	bottle	100g	
126	Sulfur (powder)	1	bottle	100g	
127	Ammonium sulphate	1	bottle	200g	
128	Aluminium sulphate	1	bottle	200g	
129	Carbon Sulfur	1	bottle	100ml	
130	Ammonium Sulfur	1	bottle	100ml	
131	Natrium Sulfur	1	bottle	100g	
132	Chromium Sulphate	1	bottle	100g	
133	Sodium Sulphite	1	bottle	200g	
134	Hydrated copper Sulphate	1	bottle	500g	
135	Iron Sulphate (II)	1	bottle	100g	
136	Calcium Sulphate	1	bottle	100g	
137	Potassium Sulphate	1	bottle	100g	
138	Nickeli Sulphate	1	bottle	100g	
139	Magnesium Sulphate	1	bottle	100g	
140	Sodium Sulphate	1	bottle	100g	
141	Zinc Sulphate	1	bottle	100g	
142	Sulfocianuro ammonia	1	bottle	100g	
143	Sulfocianuro potassium	1	bottle	100g	
144	Iron Sulfur	1	bottle	100 g	
145	Potassium Sulfur	1	bottle	100g	
146	Aluminium shape	1	bottle	100g	
147	Chrome Shape	1	bottle	100g	
148	Potassium and sodium tartrate	1	bottle	100g	
149	Tetraclorometano (carbon tetrachloride)	1	bottle	100ml	
150	Turpentine	1	bottle	100ml	
151	Sodium thiosulfate	1	bottle	100g	
152	Triclormetan (Chloroform)	1	bottle	100ml	
153	Toluene	1	bottle	100ml	
154	Granular zinc (granuls)	1	bottle	200g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

155	Zinc powder	1	bottle	100g	
	<b>Didactic devices and measuring devices</b>				
	<b>Description</b>		<b>Unit</b>	<b>Quantity</b>	
156	Kipp’s apparatus	10	piece	2	classic type with security tubing 125ml
157	Simple Kipp’s apparatus	5	piece	5	with buckle insurance
158	Electrolytic electrical conductivity devices	5	piece	5	with carbon electrodes
159	Vacuum filtering equipment	5	piece	2	erlenmayer bunsen, porcelain funnels, glass pumps
160	Liquid distillation apparatus	5	piece	3	Insurance funnel
161	Apparatus for electrolysis of water (Hoffman’s Voltmeter)	10	piece	3	With two electrods , continued current 6-12V
162	Device for water synthesis (Eudiometer)	10	piece	1	With escalation, glass
163	Simple device for studying the properties of gases	5	piece	10	refractory glass
164	Simple apparatus for gases that are not dissolved in water	5	piece	10	refractory glass
165	Simple apparatus for gas preparation heavier than air	5	piece	10	refractory glass
166	Simple apparatus for gas preparation lighter than air	5	piece	10	refractory glass
167	Pajisje te thjeshta per djegjen e gazeve	5	piece	10	refractory glass
168	Pajisje me spekter te gjere perdorimi	5	piece	10	refractory glass
169	Apparatus for electrolysis of salt	5	piece	5	Glass funnel U, carbon elektrodos
170	Apparatus for the preparation of chlorine, hydrogen chloride	5	piece	1	Glass ballon 500 ml, glass funnel, funnel Z
171	Apparatus for the preparation of hydrocarbons	5	piece	1	Erlenmayer 800 ml, glass funnels separator,
172	Apparatus for demonstrating the galvanic element (with Galvanometer)	5	piece	3	Glasses 100 ml, elektrodas zinc and copper
173	Metallic Barometer	15	piece	1	standart type
174	Higrometer or Psikrometer (with termometer)	15	piece	1	standart type
175	Calorimeter	15	piece	10	400mm , ø20mm,aluminium
176	Areometer (density measure for liquids with d<1	15	piece	5	With alcohol
177	Areometer (density measure for liquids with d>1	15	piece	5	With alcohol
178	Laborator thermometer -10-100°C	5	piece	10	With alcohol
179	Laborator thermometer 0-200°C	5	piece	5	With alcohol
180	PH-meter	15	piece	1	pH 0-14.0pH with resolution pH:0.1ph
	<b>Glasses</b>				
181	Adaptors (Alunge)	5	piece	2	refractory glass
182	Burets for acides 25 ml or 50 ml	5	piece	10	Glass water tap



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

183	Burets for bases 25 ml or 50 ml	5	piece	10	With glass and rubber pipe
184	Measuring cylinder 10 ml	5	piece	10	Scalable with mouth
185	Measuring cylinder 25 ml	5	piece	10	Scalable with mouth
186	Measuring cylinder 50 ml	5	piece	10	Scalable with mouth
187	Measuring cylinder 100 ml	5	piece	10	Scalable with mouth
188	Measuring cylinder 250 ml	5	piece	2	Scalable with mouth
189	Measuring cylinder 500 ml	5	piece	2	Scalable with mouth
190	Measuring cylinder 1000 ml	5	piece	2	Scalable with mouth
191	Eksikator	5	piece	2	glass, sanded
192	Vertical Cooling	5	piece	2	type Liebih
193	Chemical glasses (Bekera) 50 ml	5	piece	10	High form, scalable, with mouth
194	Chemical glasses (Bekera) 100 ml	5	piece	10	High form, scalable, with mouth
195	Chemical glasses (Bekera) 250 ml	5	piece	10	High form, scalable, with mouth
196	Chemical glasses (Bekera) 500 ml	5	piece	5	High form, scalable, with mouth
197	Chemical glasses (Bekera) 800 ml	5	piece	2	High form, scalable, with mouth
198	Chemical glasses (Bekera) 1000 ml	5	piece	2	High form, scalable, with mouth
199	Glasses pipes with different diameter	5	kg	1	glass, with different diameter
200	Glasses pipes with T form	5	piece	10	glass, with different diameter
201	Glasses pipes with Y form	5	piece	10	glass, with different diameter
202	Drying pipes	5	piece	5	glass, with different diameter
203	Safety pipes with bule	5	piece	5	with 1 bule
204	Glasses funnel Ø 75 mm	5	piece	10	Short tail
205	Glasses funnel Ø 90 mm	5	piece	5	Short tail
206	Dividing funnels (separatore) 125 ml	5	piece	10	Sanded cup
207	Dividing funnels (separatore) 250 ml	5	piece	5	Sanded cup
208	Dividing funnels (separatore) 500 ml	5	piece	2	Sanded cup
209	Glass bell with cap	5	piece	2	Sanded cup
210	Crystallisator Ø=180mm, h=90 mm	5	piece	10	With mouth
211	Crystallisator Ø=90mm, h=40 mm	5	piece	10	With mouth
212	Drying column	5	piece	2	Sanded neck
213	Alcohol lumps	5	piece	15	Plastic cup
214	Microburette	5	piece	2	With tap
215	Pjata Petri# plates (sett)	5	piece	10	ø 90mm
216	Escalating Pipets (cannuls) 1ml or 2 ml	5	piece	10	glass, standard type
217	Escalating Pipets (cannuls) 5ml	5	piece	10	glass, standard type

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

218	Escalating Pipets (cannuls) 10ml	5	piece	5	glass, standard type
219	Escalating Pipets (cannuls) 25ml	5	piece	5	glass, standard type
220	Regulated Pipets 1ml or 2ml	5	piece	10	glass, standard type
221	Regulated Pipets 5ml	5	piece	10	glass, standard type
222	Regulated Pipets 15ml ose 20ml	5	piece	5	glass, standard type
223	Bulb (sphere ballonns ) 100 ml	5	piece	10	Tight neck
224	Bulb (sphere ballonns ) 250 ml	5	piece	10	Tight neck
225	Bulb (sphere ballonns ) 500 ml	5	piece	2	Tight neck
226	Bulb (sphere ballonns) 1000 ml	5	piece	2	Tight neck
227	Distillation bulbs with side pipes	5	piece	2	Tight neck
228	Bulbs with flat bottom (Balloons with flat bottom) 100ml	5	piece	10	Tight neck
229	Bulbs with flat bottom (Balloons with flat bottom)250ml	5	piece	10	Tight neck
230	Bulbs with flat bottom (Balloons with flat bottom) 500ml	5	piece	2	Tight neck
231	Bulbs with flat bottom (Balloons with flat bottom) 1000ml	5	piece	2	Tight neck
232	Conic bulbs (Erlenmajer) 50 ml	5	piece	10	Scalable, Tight neck
233	Conic bulbs (Erlenmajer) 100 ml	5	piece	10	Scalable,, Tight neck
234	Conic bulbs (Erlenmajer) 250 ml	5	piece	10	Scalable,, Tight neck
235	Conic bulbs (Erlenmajer) 500 ml	5	piece	5	Scalable,, Tight neck
236	Conic bulbs (Erlenmajer) 1000 ml	5	piece	2	Scalable,, Tight neck
237	Conic bulbs (Erlenmajer) with sanded cup	5	piece	10	Scalable, Tight neck
238	Poça konike me gyp anesor (Erlenmajer Bunsen)	5	piece	2	Scalable,, Tight neck
239	Test tube 12 x 120 mm	5	piece	100	refractory glass, with borders
240	Test tube 16 x 150 mm	5	piece	200	refractory glass, with borders
241	Test tube 18 x 100 mm	5	piece	200	refractory glass, with borders
242	Test tube 24 x 200 mm	5	piece	50	refractory glass, with borders
243	Signed bulbs (tarated) 100 ml	5	piece	10	Glass, standart type
244	Signed bulbs (tarated) 250 ml	5	piece	10	Sanded neck
245	Signed bulbs (tarated)500 ml	5	piece	5	Sanded neck
246	Signed bulbs (tarated)1000 ml	5	piece	2	Sanded neck
247	Pesafilters	5	piece	10	Sanded cup

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

248	Glass taps	5	piece	2	sanded
249	Agitable glass (agitator)	5	piece	10	200 mm
250	Glass Bottle with sand dropper without colour 60 ml	5	piece	20	Specifications as nominations
251	Glass Bottle with sand dropper with colour 60 ml	5	piece	20	Specifications as nominations
252	Glass Bottle, for liquid reagents with sand without colour 60 ml	5	piece	20	Specifications as nominations
253	Glass Bottle, for liquid reagents with sand with colour 60 ml	5	piece	20	Specifications as nominations
254	Glass Bottle, with neck with sand without colour 60 ml	5	piece	20	Specifications as nominations
255	Glass Bottle, with wide neck with sand with colour 60 ml	5	piece	20	Specifications as nominations
256	Bottle Mariot (for distilled water) 2,5 l	5	piece	2	Specifications as nominations
257	Clock glasses	5	piece	10	Specifications as nominations
	<b>Moleculares models or crytalline</b>				
258	Set of moleculares models	20	piece	1	suitcase, rubber models and metallic bars
259	Micromolekulare models	20	piece	10	box, rubber models and metallic bars
260	Orbital atomic model px	20	piece	1	Plastic model with metallic elements
261	Orbital atomic model py	20	piece	1	Plastic model with metallic elements
262	Orbital atomic model pz	20	piece	1	Plastic model with metallic elements
263	Orbital hybridization model sp <sup>2</sup>	20	piece	1	Plastic model with metallic elements
264	Orbital hybridization model sp <sup>3</sup>	20	piece	1	Plastic model with metallic elements
	<b>Wood, rubber plastic instruments</b>				
265	Rubber pipes (laborator) with diameter 6 ÷ 8 mm	20	m	10	Specifications as nominations
266	Test tube holder	20	piece	20	Wood material
267	Pipes holder	20	piece	10	Plastic material
268	Test tube holder	20	piece	10	Wood material
269	Washable plastic Bottle (pisets)	20	piece	10	plastic with glass pipe
270	Rubber cups with different diameter with hole	20	piece	50	nr 00,01,1,2,3
271	Rubber cups with different diameter without hole	20	piece	50	nr 00,01,1,2,3
	<b>Metallic instruments</b>				h=150 mm, ø16 mm
272	Bek Bunsen	20	piece	1	standart
273	Cames (pirostri)	20	piece	10	metallic
274	Laboratory Jack screw	20	piece	2	standard
275	Spoon incineration	20	piece	10	standard
276	Spoon for substances	20	piece	10	standard
277	Magnet in horseshoe form	20	piece	1	standard

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

278	Tongs per pots	20	piece	10	
279	Laboratory tenter	20	piece	10	bar,antimorsete, metallic circles,Metallic fixing
280	Weighter, teknich-chimical with stone weight box	20	piece	10	Maximal capacity 200g, sensitivity 0.1g, tolerance mistake 1.5, pan diameter ø90mm
281	Weighter, half analytic with stone weight box	20	piece	1	Maximal capacity 1000g, sensitivity 50mg,tolerance mistake 1.5, pan diameter ø120mm
282	Ceramic mesh	20	piece	10	Ceramic and metallic mesh
283	Puncture cups	20	piece	2	With 3 dimensions
284	Constriction for burets with fixing	20	piece	10	metallic
285	Constriction for pipes with screw (Hoffman staple)	20	piece	5	metallic
286	Elastic Constriction for rubber pipes (Mohr staples)	20	piece	5	metallic
	<b>Porcelain instruments</b>				
287	Porcelani bowl		piece	5	porcelain
288	Funnel for filtration in space (Buhner funnel)	10	piece	2	porcelain
289	Spoon - spatula	10	piece	10	porcelain
290	Kapsuls (cupshore) porcelain	10	piece	10	porcelain
291	Kroogiola (pote) porcelain	10	piece	10	porcelain
292	triangular for pos post	10	piece	10	porcelain and metallic
	<b>Instruments and different materials</b>				
293	Laboratory distiller for distilated water	10	piece	1	2-3 liter in hour, monofase
294	Instrument for cutting glass pipes	10	piece	2	Metallic with screw
295	Brush for washing instruments	1	piece	10	metallic with plastic cord
296	gloves - protection	1	piece	10	anti acid, anti alcal, anti corrosive
297	Protection masks	5	piece	10	anti acid, anti alcal, anti corrosive
298	Protection glass	5	piece	10	anti acid, anti alcal, anti corrosive
299	Universal Current feeding universal or current leader	10	piece	1	0-24V / 6A
300	Keeper for infiltration instruments	15	piece	2	Metallic with me rubber pins
301	Fast help box	2	set	1	With 7 accessory, as technical safety instructions
302	Fire extinguishing (exintore)	20	piece	1	With powder
303	Dynamic model for demonstration of atomic orbital	15	piece	1	500 x 350 mm current 24V
304	Chemical-physical caracterisics and methods for using chemical reagents in school	20	piece	1	In albanian language
305	Instructions for technical safety	20	piece	1	In albanian language
	<b>Instructional signs</b>				
306	Danger signs of chemical	15	piece	1	70cm x 100cm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

	substances				
307	Safety rules in laboratory	15	piece	1	70cm x 100cm
308	Method of separation of substances	15	piece	1	500 x 350 mm 24V
309	Ambience of acid -base of solution	15	piece	1	70cm x 100cm
310	Electrolitic dissolution	15	piece	1	70cm x 100cm
311	Alcanes	15	piece	1	70cm x 100cm
312	Isomery	15	piece	1	70cm x 100cm
313	Chemical Substances dissolubility in water	15	piece	1	140cm x 100cm
314	Chemical elements table (long version)	15	piece	1	140cm x 100cm
315	Base unit of SI	15	piece	1	70cm x 100cm
316	Ionisation energy of elements as group A of periodic system	15	piece	1	70cm x 100cm
317	Electronegativity	15	piece	1	70cm x 100cm
318	Molecules geometry	15	piece	1	70cm x 100cm
319	Elementary reactions and velocity equation	15	piece	1	70cm x 100cm
320	Thermodynamic information for some substances	15	piece	1	70cm x 100cm
321	Constans of jonic equilibrium	15	piece	1	70cm x 100cm
322	Solubility product	15	piece	1	70cm x 100cm
323	Potenciale te reduktimit	15	piece	1	70cm x 100cm
324	Value relation of quantice numbers for n=4	15	piece	1	70cm x 100cm
325	Moles relation	15	piece	1	70cm x 100cm
326	Table of chemical elements (long variants) for personal use	15	piece	300	150mm x 300mm folding

- For Laboratory of Physics

No.	Definition of the device	Unit/quantity	Technical specifications
1	<b>MECHANICS</b>		
2	Simple apparatus for demonstration of free fall	1 piece	Metallic or plastic spheres with $\varnothing$ (20-30)mm
3	Tube of Newton	1 piece	Used for demonstrating independence of free fall from mass and shape of a body. Composed of a vacuum tube, with a feather and a metallic piece inside. Dimensions 5x105 cm, pesha 0,7 kg
4	Apparatus for inertia	1 piece	
5	Apparatus for rotating motion in vertical plane	1 piece	Demonstrates transformation of Ek in Ep. Composed of a metallic rut, mounted on a wood basement and a metallic sphere with a $\varnothing$ (12-15)mm
6	Tribometer	1 piece	Axis with dimensions ( 81.5 x 10 x 2)

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			cm, coach with dimensions 10 x 8 x 4cm, 200g, a roll with a small friction fixed on one edge. The axis is supported on different angles ( 0-45) degrees on a metallic protractor metalik, fixing sticks
7	Dinamometer , force measuring , (0-5) N	3 pieces	Measuring scale (0-5) (500g) ,
8	Dinamometer , force measuring (0-10) N	3pieces	Measuring scale (0-10) (1000g)
9	Disc for moment equilibrium	1 piece	Diameter not smaller than 245mm, scale 4x10-80
10	Communication vessels	1 set	4 glass pipe with different dimensions and shapes mounted on a plastic or wood support
11	Halfospheres of Magdeburg	1 set	Composed of two halp-spheres with me diameter Ø (100 – 110)mm, made of metal or plastic, with vacuum pipe
12	Scales stone with hooks	1 set	Box with 10 metallic stone with weight from 10g up to 500 g
13	Caliber	2 pieces	Metallic equipment for measuring lengths in mm
14	Lab coach	4 pieces	Dimensions 290x140x90mm; 0.87kg. Coach line (1.5x0.3m), 10 springs (50x15)mm 10 springs holder, 10 elastic cords with rings in the end 150mm long, wheels with bearings with spheres, with small friction
15	Set of capillary pipes	1 set	Series of glass pipe of different diameters
16	Set of rolls	1 set	Maximal allowed weight 2kg
17	Chronometer	3 pieces	Chronometer for determination of time per second (Classical type – mechanic or digital)
18	Micrometer	1 piece	Metal made for measuring lengths in mm
19	Equipement for demonstration of parallel forces (Lever)	1 piece	Composed of a metallic linear (40-50)cm long, with a hole and diameter (3,5-4,5)mm, scalable. Used to study relations between force and its direction and moment and serves to hang weight stones with hooks
20	Equipment for demonstration of Archimedes force (Double cylinder of Archimedes)	1 piece	Diameter ø 28mm, height 55mm, dimensions of cylinder 35 g, plastic material
21	Equipment for demonstration of principle of preservation of mechanical energy	1 piece	Height ~ 250 mm, dimensions of the set ~380x130x150mm, rroll ø 110mm.
22	Equipment for demonstration of distribution of pressure in fluids (Law of Pascal)	1 piece	Steel spheres, size ~350 mm, weight ~300 gram
23	Hand vacuum pump	1 piece	Vacuum pressure shall be less than 6700 Pa
24	Equipment for measuring pressure in fluids	1 piece	General scale, not less than 24 cm, with center of scale 0
25	Thread-Level Indicator	1 piece	Hanging string
26	Physical scales-technical with weight stones	1 piece	Maximal capacity (200 – 300)g, sensitivity 0.1g, error tolerance not more than 1.5, diameter of pan ø(90-110) mm
27	Spheres of different sizes	1 set	Diameter (10-20)mm, steel metal

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

28	Sensor of gas pressure	1 piece	Requires a signal in proportion with gas pressure
29	Motion Sensor	1 piece	Serves to calculate distances crossed by a body when time and signal output and input is given. Frequency is 50 measures per second and measurement scale from (0.15 -6) m. Connected to smartboard E46. Touchscreen control
30	Force Sensor	1 piece	Force sensor measures withdrawing and submersive forces of about -50N +50N. Connected smartboard. Touchscreen control
31	Tribometer	1 piece	Wooden
32	Hydraulic pressure	1 piece	
33	Stripe-meter	1 piece	Plastic, metallic, 1,5m, 2m,
34	Metallic tripod with accessories	1 piece	Diameter of rod $\phi$ 10-13 mm, basement of triangle iron, height 700-900mm, 1 rod with isolation head, 1 rod with hooks, 2 morsette
35	Unscalable Springs	10 pieces	Maximal allowed weight of 500gram
36	Bodies with same density and different volumes	6 pieces	Bodies with the same shape and dimensions and different materials, such as: wood, plastic, bronze, aluminum, iron, lead etc.
<b>TERMODINAMICS</b>			
37	Apparatus for change of thermal conductivity	1 piece	Composed of three metallic rods, different metals, equipped with a metallic ring, movable, with dimensions (300 x 150) mm
38	Pyrometer	1 piece	
39	Apparatus for demonstration of bulge of fluids and gases	1 piece	Indicates changes during fluids bulge. Composed of 5 glass pipes with a spherical ending, height 400 mm, mounted on a plastic basement and scaled in mm.
40	Apparatus for demonstration of bulge of rigid bodies	1 piece	Diameter of sphere s $\phi$ 20 mm, weight 0.2kg, length 300 mm
41	Apparatus for transformation of thermal energy B29	1 piece	Composed of :copper pipe, holed clips, plastic corks and friction strings. Height about 470 mm, weight about 600 gram,
42	Apparatus for demonstration of Boil-Mariot Law	1 piece	Dimensions 300 x 200 mm, rubber cover, cylindric pipe, volume measurement, measurer of pressure, scale 0.5,1,1.5,2.
43	Apparatus for demonstration of adiabatic process	1 piece	Cylindric vessel with glass valve, with dimensions (64x65x200)mm, diameter (25x130)mm
44	Teaching Barometer	1 piece	Analogue metallic body diameter 10cm
45	Aneroid Barometer	1 piece	Measures air pressure, values (690-790) mm Hg, and scale 1mm Hg
46	Communication vessels	1 set	4 glass pipes with plastic support
47	Equipment for demonstration of convection B51		Diameter of the pipe $\phi$ 12mm, dimensions: 300mm x 200 mm. Numeric values of technical specifications are flexible up to 15%.
48	Calorimeter	1 piece	Copper made, nicke-plated, with dimensions 54x34 m

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			For the determination of specific heat in fluids with electrical method. It is composed of a calorimeter, copper plated with dimensions (54 x 34) mm, placed inside an external vessel with dimensions 70x45 mm. Voltage of electrical feeder $U = 6V$ , Resistance of the heater $R=2-6 \Omega$ , Current : $I=0.5-2 A$ .
49	Bimetallic sheet	1 piece	Material: copper, iron, length about 200 mm.
50	Temperature Sensor	1 piece	Shkalla: $-30/+1350C$ Resolution: $0.10C$ Frequency: over 10 matje/s Connected to smartboard. Touchscreen Control. E109 .
51	Gas Pressure Sensor	1 piece	Requires proportional signal in proportion with gas pressure. The required values is 156.050 kPa. Measuring unit may be Bar, kPa, atm. Frequency is 100 measures per second and scale 0-200 kPa. Connected to smartboard. Touchscreen control. Collection and preservation of data on USB. Permanent connection with cord.
52	Combustible Engine	1 piece	
53	Thermometer (0-50) Celsius degrees	10 pieces	Scale (0-50) degrees with mercury
54	Thermometers (0-200) Celsius degrees	10 pieces	Scale (0-200) degrees with mercury
55	Thermometers (-10-110) Celsius	10 pieces	Scale (-10-110) degrees with mercury
<b>ELECTRICITY AND MAGNETISM</b>			
56	Laboratory Ampermeter	4 pieces	Measure scale $-0,2-0-0,6A / -1-0-3A$ , sensitivity 75 mV, Dimensions about (133 x 97 x 100) mm
57	Ampermeter-voltmeter for demonstrations	1 set	DC direct current, 1mA, 100mA, 1A, 10A, DC voltage (0-10)V, (0-30)V AC/alternative 10mA, 100ma, 1A, 5A AC voltage 10V, 30V, 250V
58	Apparatus for distribution of current	1 piece	Metallic sphere mounted on an isolating handle
59	Apparatus for action of magnetic force on current conductor	1 piece	Dimensions: about (500x250x270) mm $I=2A$
60	Apparatus for demonstration of Kulon Law	1 piece	Metallic basement, thread made of medullary wood
61	Apparatus for demonstration of line in a magnetic field	1 piece	Box with dimensions (98x55x55)mm, with a tunnel, internal diameter 10mm and length 70mm and magnetic rod with dimensions (50x7)mm long.
62	Light source (battery)	5 pieces	3 V, 4,5V
63	School teaching compass	1 piece	Diameter not less than (50) mm
64	Rumkorff coil	1 piece	220V/50Hz, dalja (20-100)Kv, distance 100mm
65	Couple of induction coils	3 sets	Primary coil $\phi 35$ mm, length 120mm and 380 wire secondary coil $\phi 65$ mm, 481 wire, as well as iron nucleus
66	Switch with cassette	1 piece	Voltage 36V and direct current 6A
67	Switch for electrical circuit	5 pieces	$U= 36V$ with direct current 0-3A
68	Conductive thread	10 pieces	50cm length with terminal two-sided



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			pin
69	Electroscope with sheets	1 piece	Diameter not less than 200mm, with a support of plastic or glass material
70	Horseshoe-shaped electromagnet	1 piece	Composed of two rolls, one with a nucleus with iron rod in U shape, and a closing metallic armour with a hook and voltage 6V and current 1A.
71	Magnetic needles with support	3 pieces	Length of needle not less than 40mm
72	Small magnetic needles	3 pieces	Length not less than 30 mm
73	Plastic pipes	6 pieces	Plastic material
74	Faraday Cage	1 piece	Dimensions (600x300x150)mm
75	Conducting cables with terminal plug	10 pieces	With a length 50cm and two-sided terminal plug
76	Condensator with discs	10 pieces	Plastic discs with a diameter (200-300)mm
77	Resistance box mounted in the cassette	1 set	10x0,1Ω; 10 x 1 Ω; 10x10 Ω; 10x100 Ω; 10x1000 Ω
78	Small lamps	25 pieces	Standard type, 6V
79	Lamp holder	1 set	Plastic basement with lamp holder U= (0-30)V, I=(0-3) A
80	Model of three-phase generator	1 piece	Output > use = 8V when rotating velocity is about 1600 rot/minute
81	Model of an electromotor	1 piece	Dimensions 50cmx50cm
82	Pendolini elektrizues	1 piece	Plastic support with silk threads
83	Horseshoe-shaped magnet	2 pieces	80mmx200mm, 0,05T80mm x 200mm <sup>2</sup> , 0,05T.
84	Simple magnet	4 pieces	5x25cm
85	Equipment for density of loads	1 piece	Dimensions (600x300x150)mm
86	Voltaic pile	3 pieces	Carbon rod, copper plaque, lead plaque, zinc plaque
87	Rectangular conductor with plastic plaque	1 piece	Composed of three different conduction, plastic basements
88	Record for Winston bridge	1 piece	(1000x100x50)mm, tel Ni-Cr
89	Rheostat 50U with cursor (sliding)	1 piece	Resistenca (0-50) om, current 5A
90	Electrostatic Net	1 piece	
91	Catode Rays	1 piece	(640x440x590)mmm with plastic support
92	Alternative sources systems B46	1 piece	Used in different experiments for study of renewable energy, such as solar, hydric, wind. It is composed of a solar panel, wind turbine, hydraulic turbine, cell with hydrogen, ventilator, rotor. Dimensions 50x45x15 cm. Weight 5.5 kg
93	Series of metallic threads mounted on a plaque	1 set	Material of threads : iron, copper, nickel-chrome
94	Sphere with an isolating handle	1 piece	Plastic handles or metallic spheres with a diameter not less than ø50mm
95	Glass rod	2 pieces	Length not shorter than 300 mm
96	Ebonite rod	1 piece	Length not shorter than 300 mm
97	Discharging rod	10 pieces	Plastic end – Metallic rod (500-700)mm
98	Magnetic rod	2 pieces	With colored poles 160mm, 0,06 T (160 x 200) mm, 0.06T.
99	Magnetic spectres	1 piece	(500x330x250 )mm
100	Power security incentive		Simulates technical problems of the

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			electrical system: short circuit, current leak, over load and fuse. Places in aluminum case filled with foam. Dimensions about: 30x35x10 cm.
101	Sensor for voltage and current	1 piece	Combined Sensor. Measure Frequency 50000 measuring /s. Connected to smartboard. Touchscreen Control.
102	Transformer	1 piece	
103	Geisler pipes (light source with different gases)	1 set	Pipes with hydrogen, oxygen, helium, carbon dioxide, neon, argon.
104	Universal feeder (0-24)V, 6A	1 piece	Outputs of alternative and direct current (2-24)V with 12 scales. Maximal current of work up to 6A. Dimensions about (270 x 120 x 210) mm, 6,5 kg
105	Laboratory Voltmeter	3 pieces	Measuring scale -5~15V, sensitivity 1mA. Dimensions (133 x 97 x 100)mm
<b>ACUSTICS, VIBRATIONS, WAVES</b>			
106	Apparatus for demonstration of wave-spreading phenomenon	1 piece	Voltage (0-6)V; number of vibrations 13; $\phi$ of vibrator 15,6mm, dimensions (450mmx200mmx300mm)
107	Diapason 440Hz	1 piece	Composed of : two forks with the same frequency 440 Hz, with vertical session (6,5 x 16)mm, length of wings 109 mm, distance between 17mm,
108	Mathematic pendulum	1 piece	Sphere hanged in an unextendable thread, fixed on a basement
109	Pendulum for resonance	5 pieces	5 pendulums of different lengths, metallic frames (400 x 300) mm.
110	Resonance Box	1 box	Suitable for diapason 440 Hz; about 145x88x53 mm
111	Springs set	1 set	Used for demonstration of horizontal and vertical waves . Springs with a diameter of 8 cm, unextendable length 13 cm, it may reach up to 5 m, weight 0.6 kg. Spring 2 with a 2 cm diameter, not extended 1 m long, weight 0.5 kg.
112	Sonometer with cords		Used for study of sound dependence from length, pressure and thickness of vibrating cord. It is composed of a resonance box made of wood 60 cm long, scalable. Completed with a dynamometer, two steel cords, diameter, $\Phi$ 0,4 mm, one steel cord with a diameter, $\Phi$ 0,8 mm and three immovable bridges for fitting the length of cords.
113	Kundt Pipe	1 piece	Glass pipe with a length of 1,5 m and diameter 35mm, wooden rod 390mm long, basement of wood 1,5 m long and diameter 13mm.
114	Equipment for study of electromagnetic waves		Waves transmitter: diode Gunn 10.7GHz ( $\lambda=2.8$ cm), power 30W voltage (10-12)V në (2 - 3.5)V. Cylindric case with a diameter 83mm and length 70mm. The general length 25 mm. Waves receiver : Similar to transmitter. Sond Detector: silicon microwave diode , same with the

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			receiver but mounted in a shorter rod, Vertical, not metallic. 4 sockets with external circulation, dimensions (75x50x135)m.
115	Stroboscope		Used to observe phenomena than happen very soon. Dimensions (20x12x14) cm, weight 1.8 kg. Frequency (1-300) Hz.
	<b>OPTICS</b>		
116	He-Ne Lazer		Used for experiments of defraction and interference. Dimensions 35x10x14 cm, pesha 1.5 kg, coherent red light, wave length 633 nm
117	Accesories for analogue optical experiments		Reflecting surface (200x300)mm, (60x300)mm, glass plaque with parallel sides (200x300)mm, polarization net (200x200)mm, convec-plane lenses with a hole that during work is filled with paraffin oil; prism with gap filled with paraffin oil (45x90x45) degrees ;
118	Photocamera	1 piece	Digital, cyber shot, mbi 10 Mega pixel.
119	Optical disc	1 piece	Disc with colors and rotating rope. Used for fragmentation of white light. It is composed of the disc with a diameter of 200 mm, two sets of spectres of colors, a rotor with handle. Axis of the hande coincides with the axis of the disc. It is placed on a plastic base with dimensions about (120x120) mm, with rubber legs, general height about 32 cm.
120	Concave mirror	2 pieces	Glass F' = 65mm, $\phi$ =100mm
121	Convex mirror	2 pieces	Glass F' = 65mm, $\phi$ =100mm
122	Flat mirror	1 piece	Distance f=65mm, $\phi$ = 100 mm
123	Filters with different colors	1 set	Plastic, 40x20 mm <sup>7</sup> with basic colors of spectrum, with dimensions about 535x310 mm each filter
124	Eye Model		Physical view of eye functioning, including sight impair and their correction. Mounted on a wooden or plastic basement. Dimensions not less than (320 x 180)mm
125	Caleidoscope		Diameter (180 x 35 )mm
126	Summarizing lenses	2 pieces	Made of glass
127	Distribution lenses	2 pieces	Made of glass
128	Convex lenses	2 pieces	Made of glass
129	Glass prism	1 pieces	Point of view 85 <sup>0</sup> , 25mm-75mm / 50mm-15mm
130	Glass plaque with parallel sides	1 pieces	Dimensions (50x20)mm
131	Ceramic net	1 piece	1235x125 mm dhe 150x150mm
132	Magnifying glass	2 pieces	Magnifying not less than 4 x
133	Light sensor		Scale: (0 -2 000 )lux / (0 -30 000) lux Resolution: 0.5 lux/10 lux Frequency : over 1000 measures/s Connection to smartboard. Touchscreen control.
	<b>MODERN PHYSICS</b>		
134	Radiation Monitor ( $\alpha$ , $\beta$ , $\gamma$ )		Composed of Geiger-Myler pipe and

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			measurer of frequency mounted in a small plastic box, made of rubber and with an analogue meter. The unit works with battery and can be used without a PC for measuring radiation $\alpha$ , $\beta$ , $\gamma$ . It can be used for measuring radiation statistics, to measure frequency of nucleus fragmentation and to monitor radon transformations
135	<b>GENERAL</b>		
136	Alcohol	1 bottle	1kg alcohol in glass bottle
137	Sulphur Acid	1 bottle	250 gram in glass bottle
138	Glass Beaker	10 pieces	100ml, 250ml,500ml, glass
139	Scalable cylinders	10 pieces	25ml, 100ml,500ml, glass
140	Colors disc	1 piece	Colorful Disc with a rotating rope, diameter 200mm
141	Wind measurer	1 piece	Plastic ose inox
142	Glass vessels with different shapes but same volume	5 pieces	100ml, 250ml,500ml, glass
143	Glass vessels with different shapes and volume	5 pieces	100ml, 250ml,500ml, glass
144	Weighting stones with hooks	1 set	Box with 10 metallic stones, 50gr.each
145	Chemical cup	5 pieces	Chemical cup 50 ml 100 ml 250 ml
146	Plastic pipe with different diameters	5 pieces	Transparent, $\phi = 6-8$ mm
147	Small glass pipe U-shape	5 pieces	$\phi = 16$ mm, h= 150mm
148	Scissors	1 pieces	Iron-made, plastic handle, 10cm long
149	Glass funnel	3 pieces	Glass
150	Test tupe clip	1 piece	Wood
151	Alcohol Lamps	4 pieces	Made of glass with alcohol, with a cover and wick
152	Color pencils	2 packages	Box with color pencils wood and water
153	Color marker	5 pieces	Color markers
154	Rubber	10 m	Thin rubber
155	Spoon for substances	2 pieces	Glass, inox, plastic
156	Test tubes holder	2 set	Wooden
157	Microscope	1 piece	Simple microscope
158	Nafthalene	200 gr.	Pure chemical reagent
159	Level indicator	1 piece	Wood or plastic material with an air bubble
160	Adhesive	2 piece	Small and big adhesives
161	Paraffin	250 gr.	Pure chemical Reagent
162	Dropper	3 piece	Made of glass with rubber clips, about 10cm
163	Plasteline	1 package	In colors 70x150mm
164	Iron powder	200 gr.	Pure chemical Reagent
165	Technical scales with weighting stones	1 piece	Simple scales with dishes
166	Test tubes	6 pieces	Glass, 12x100mm
167	Bulbs of different volumes	3 pieces	Volume100 ml 250 ml 500ml
168	Lead-thread	1 piece	Lead hanged in a thread
169	Petri dishes	4 pieces	Material prej petri
170	Spheral bulbs of different volumes	4 pieces	Volume100 ml 250 ml 500ml
171	Plastic Protactor	1 pieces	Standard type, basement 50cm
172	String	10 m	Non-extendable thread
173	Different size spheres	10 pieces	Dimensions with diameter (50-100) mm
174	Plastic Support of silk threads	1 piece	Dimensions (500x300x250)mm
175	Spring	1 set	Diameter 8 cm, length 13 cm, weight

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			0,6 kg
176	Glass mixer	2 pieces	Glass-made, 30-50 cm
177	Ballons	10 pieces	In different colors
178	Balls for ping-pong, tennis, football	3 pieces	Balls for ping-pong, tennis, football
179	Ceramic Net	1 piece	125x125mm ose 150x150mm
180	Copper sulphat	1 bottle	250gram
181	Glass bottle for liquids	5 pieces	Volume 60ml, 100ml
182	Plastic syringe	3 pieces	big, plastic
183	Rainmeter	1 piece	Plastic or inox , classic PVC
184	Sulphuric Acid	1 bottle	250gram
185	Long plastic linear	1 piece	Dimensions 100 cm
186	Triangle linear	1 piece	Dimensions (30x40x50) cm
187	Clock glasses	2 pieces	Glass made
188	<b>TEACHING TABLE</b>		
189	International System of SI units	1 piece	Dimensions (70x100)cm
190	Fundamental Physics Dimensions	1 piece	Dimensions (70x100)cm
191	Thermodynamic processes	1 piece	Dimensions (70x100)cm
192	Karnoy Cycle	1 piece	Dimensions (70x100)cm
193	Fundamental Constants in nature	1 piece	Dimensions (70x100)cm
194	Lorence Transformations	1 piece	Dimensions (70x100)cm
195	Mendeleev Table	1 piece	Dimensions (70x100)cm
196	Work Principle of Refridgerator	1 piece	Dimensions (70x100)cm
197	Gravity center and equilibrium conditions	1 piece	Dimensions (70x100)cm
198	Shell movement	1 piece	Dimensions (70x100)cm
199	Thermodynamic processes	1 piece	Dimensions (70x100)cm
200	Transformations of substance states	1 piece	Dimensions (70x100)cm
201	Magnetic field	1 piece	Dimensions (70x100)cm
202	Earth as a magnet	1 piece	Dimensions (70x100)cm
203	Phase Transformations of liquids	1 piece	Dimensions (70x100)cm
204	Bulge of rigid bodies	1 piece	Dimensions (70x100)cm
205	Electromotor	1 piece	Dimensions (70x100)cm
206	Transformer	1 piece	Dimensions (70x100)cm
207	Model of three-phase generator	1 piece	Dimensions (70x100)cm
208	Model of electrical bell	1 piece	Dimensions (70x100)cm
209	Principle of Generators	1 piece	Dimensions (70x100)cm
210	Electromagnetic Induction	1 piece	Dimensions (70x100)cm
211	Electrical voltage	1 piece	Dimensions (70x100)cm
212	Ohm Law	1 piece	Dimensions (70x100)cm
213	Electromagnet	1 piece	Dimensions (70x100)cm
214	Magnetic field of solenoid with current	1 piece	Dimensions (70x100)cm
215	Connection of conductors in parallel	1 piece	Dimensions (70x100)cm
216	Left hand rule	1 piece	Dimensions (70x100)cm
217	Moon eclipse	1 piece	Dimensions (70x100)cm
218	Globe (physical and political)	1 piece	With a basement on the table or ground
219	Dark room	1 piece	Dimensions (70x100)cm
220	Electroscope	1 piece	Dimensions (70x100)cm
221	Serial connection circuit	1 piece	Dimensions (70x100)cm
222	Parallel connection circuit	1 piece	Dimensions (70x100)cm
223	Integrated circuit with mixed connection	1 piece	Dimensions (70x100)cm
224	Short circuit connection	1 piece	Dimensions (70x100)cm
225	Amper Force	1 piece	Dimensions (70x100)cm
226	Crystal Diode	1 piece	Dimensions (70x100)cm
227	Transistor	1 piece	Dimensions (70x100)cm
228	Magnetic Spectres of gases	1 piece	Dimensions (70x100)cm
229	Atom's Construction	1 piece	Dimensions (70x100)cm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

230	Galvanometer	1 piece	Dimensions (70x100)cm
231	Experiment of Thomson on cathode rays	1 piece	Dimensions (70x100)cm
232	Scheme of energy generation from HPP to houses	1 piece	Dimensions (70x100)cm
233	Hydraulic system of breaks	1 piece	Dimensions (70x100)cm
234	Solar systems and planets	1 piece	Dimensions (70x100)cm
235	Refraction of light rays from glass prism	1 piece	Dimensions (70x100)cm
236	Law of reflection and refraction	1 piece	Dimensions (70x100)cm
237	Full internal reflection	1 piece	Dimensions (70x100)cm
238	Interface Experiment of Jungs’ splits	1 piece	Dimensions (70x100)cm
239	Light Polarization	1 piece	Dimensions (70x100)cm
240	Light Dispersion	1 piece	Dimensions (70x100)cm
241	Spectres (with stripes, continuos, absorbaton)	1 piece	Dimensions (70x100)cm
242	Fragmentation of white light and unification of colors	1 piece	Dimensions (70x100)cm
243	Hydraulic and electrical circuit	1 piece	Dimensions (70x100)cm
244	Electronic Microscope	1 piece	Dimensions (70x100)cm
245	Electronic Microscope	1 piece	Dimensions (70x100)cm
246	Diagram of energy levels of atom and hydrogen	1 piece	Dimensions (70x100)cm
247	Lazer Diagrama	1 piece	Dimensions (70x100)cm
248	Series of nucleuses fragmentation	1 piece	Dimensions (70x100)cm
249	Nuclear reaction	1 piece	Dimensions (70x100)cm
250	Chain reaction	1 piece	Dimensions (70x100)cm
251	Magnetic Resonance	1 piece	Dimensions (70x100)cm
252	Diagram of cyclotron	1 piece	Dimensions (70x100)cm
253	Work principle of steam engine	1 piece	Dimensions (70x100)cm
	<b>SECURITY TOOLS</b>	1 piece	
254	Plastic protection glasses	1 piece	Children syze
<b>255</b>	First aid box (security means during work in laboratory)	1 set	Classical first aid box

**366.**

**4.1 Design for persons with special needs**

The design of school buildings shall provide a free approach for movement, stay and learning process of students with special needs, referred to special respective legislation for this category. Therefore, designers shall take into account these legislation, as well in this guideline where are presented the most specific technical conditions for school buildings. Types of special needs that can be addressed in a standard school will be limited, due to practical reasons, into those with special needs for the movement, loss of hearing that can be regulated with hearing devices, partial or total loss of sight. The latest category of persons cannot participate in all school activities.

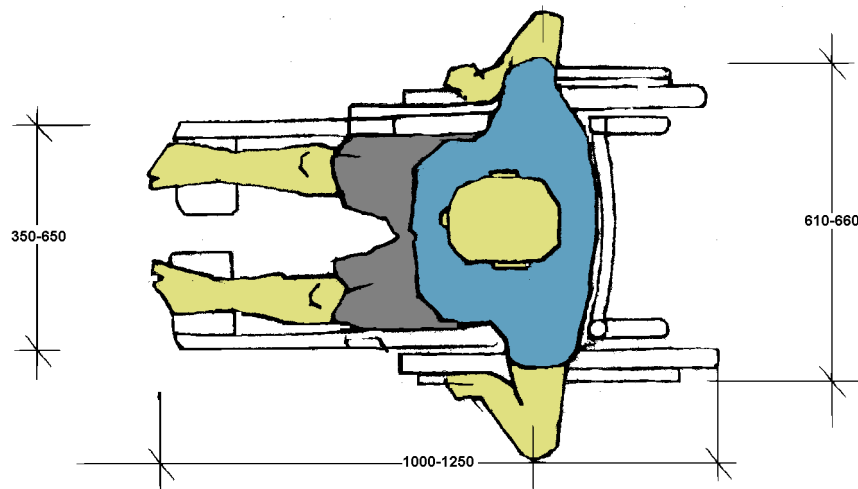
Persons with special needs may be students, teachers, guests or staff. Their main problem is the mobility due to the use of wheelchairs, canes and crutches. This problem requires special determination of movement areas, door space, sanitary equipment, evacuation passages and spaces of classes to accommodate the persons with special needs.

Dimensions of wheelchairs shall be taken into account by the designers in determination of school space and movement. The wheelchairs have different dimensions according to the age of students and type of

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

item. Nevertheless, following dimensions coincide with the average dimensions of adults and shall be taken into consideration. (see picture 1.3.13 and 3.14) :

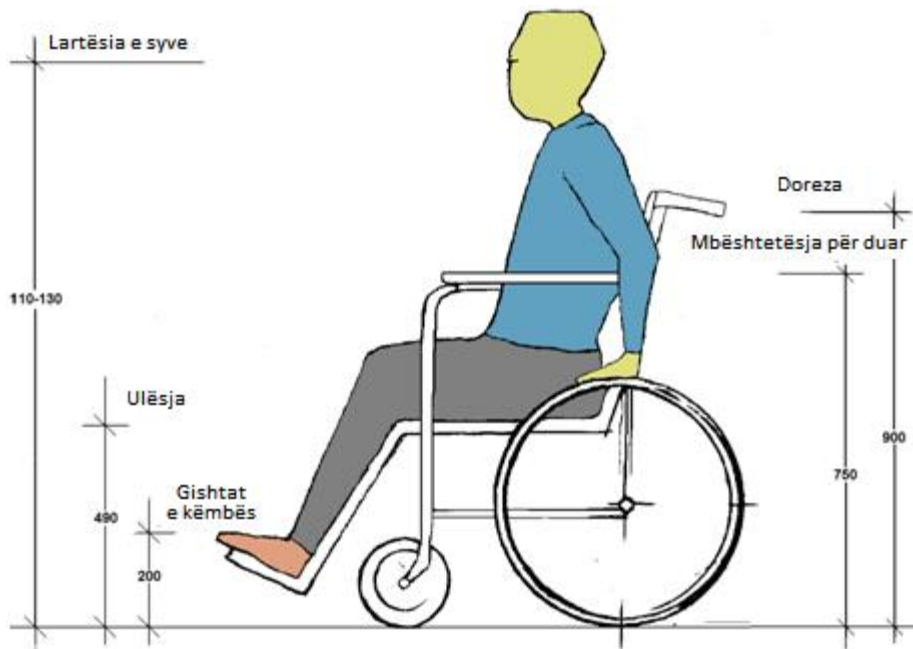
- Width of chair in general is between 600 and 700 mm
- Length is between 1000 and 1250 mm
- The external range is between 1300 and 1500 mm



Picture 1.3.13

Space where persons with special needs in wheelchairs arrive shall be defined :

- Between 230 and 300 mm above the floor level;
- Between 1100 and 1300 in height;
- Between 300 and 400 mm from lateral sides of the chair ;



Picture. 3.14



**Approach in external spaces and buildings**

### **External movement**

Special parking for vehicles shall consist of a big space on one side (3.80 m instead of 2.5 m wide);

Borders of pedestrian alleys shall always have interrupted edges and pedestrian space shall be separated from vehicles traffic with pavement stones (blocks) ;

Alleys shall respect the minimum required width of about 1.5 m for a wheelchair, return surface and floor layer shall be composed of anti-slippery material and free of any obstacles;



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Inclination of the walking path shall not be more inclined than 1:12 or 5% and long inclinations shall be divided into phases;

Pavements shall have a minimal widths of about 0.90 m if they have been projected on one side and 1.80 m on both sides;

Alarming shall be visible and rationally continuous;

The approach to entire building shall be accessible from persons with special needs, if possible with platforms, whose inclination be over 1:12 (5%) with flat rests every 9 m along the entire length of the platform;

All other passages to sports premises shall be designed with platforms, if necessary. The final part of these platforms shall be composed a anti-slippery materials such as concrete blocks, stones or asphalt;

Platforms shall be equipped with a lateral handrail and/or pavement block along the length of the platform;

**Internal space**

Main entrances of the buildings shall be clearly noticeable, easy to open and simple to pass through them;

Thresholds of the doors shall be avoid or not higher than 20 mm;

In the teaching rooms, working space with a diameter of about 1.5 m shall be kept free and with no obstacles, so that the wheelchair can return and positioned before the table;

Blackboard shall be reachable also from the sitting position. A changeable blackboard can be an option;

Small changes of the level shall be avoided. If inevitable, small platforms are more preferable than stairs;

In order to help students with eye problems, the design shall avoid fully glazed doors, different colors shall be used in the staircase for the rests and stairs, windows at the end of the corridor shall be avoided (exaggerated contrast in illumination);

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Lift (s) shall be placed near the building entrance, lift space shall be big enough for wheelchairs, whereas the control signs shall be accessible for persons with special needs. Lift cabin shall contain also signs, such as Braille alphabet, acoustic and visual call and voice explanations for each floor.

**367.**

### **4.2 Schools as a Community Center**

The initiative “Schools as a Community Center” means that the school is put at the disposal of the community, without hampering the teaching process, completing it beyond the official working hours.

In this respect, it is necessary that the designer shall think about the school functions program and access by the community beyond the official working hours of the school. The architectural solutions shall offer flexibility and at the same time guaranteeing school security and easily accessible venue after school hours.

Schools, including their territory shall be divided into three privacy categories. A. Totally school, students and staff function. B. Spaces for school, but also the community. C. Total space for community.

A. Functions totally dedicated to school are those function that will be used only by students and staff of the schools, such as classes, laboratories, staff venues, etc. There shall be enabled such entrance that could provide necessary security of the venues, limitation of entries and exits, easy to be monitored.

B. Spaces for the school and community are those that serve the teaching timetable for students and staff and after the official timetable it is dedicated to the community. These functions can be related to the gym, multi-purpose spaces (auditory, concert hall, exhibition, parents meeting, etc), library. In such cases, they shall be accessible. The designer shall design these spaces by offering easy access for the community, if possible directly from outside, without using spaces such as corridors or classes. These venues shall have separated toilets to be used by the community. The designer shall think also about these specific spaces of how they can be function integrated with the schools, but also separately.

Likewise, the school yard shall be flexible taking into account the school security, but at the same time, it shall be easily transformable into public space with a potential use from the entire community after teaching timetable. In this respect, the access shall be easy, transparent surrounding, big entrance gate. It shall have green spaces and trees to make enough shadow, benches, as well as urban illumination also during the night.

C. Spaces dedicated totally to the community are those places that during school hours are always accessible by the community. The designer shall take into consideration that one part of the school yard, coinciding also with the entrance to this yard, could consist of a public space, serving as a public space for the community, used by students after the teaching timetable, where parents bring and wait for

children, etc. It shall have green spaces and trees to make enough shadow, benches, as well as urban illumination also during the night.

**368.**

**369.**

**4.3 Thermal Amenity (Temperature)**

**370. 4.3.1 Definitions and terminology**

*Thermal amenity* is usually attributed to two key parameters : (1) feeling of thermal amenity as a result of the balance between calories accumulated and lost in the body, and (2) control of thermal conditions, including sun position and radiation, temperature, humidity and odors. Designers of the school buildings shall take into account thermal conditions of the school location. In these instructions are presented also the thermal conditions in Albania, but detailed and additional data shall be collected for exact conditions of respective zones, such as: (1) minimum and maximal average monthly temperature, (2) local hygrometry, and (3) dominating winds for each climate season and frequency of strong winds and storms.

**371.**

**372. 4.3.2 Improvement of thermal amenity**

To improve the thermal amenity of the school spaces, the potential measures for monitoring the temperature are classified into two categories:

**Natural** or passive measures, including orientation of building, position and opening dimensions, quality of materials, thermal isolation, planting of trees in the vicinity of buildings, etc.

**Artificial** or active measures, including mechanical means, such as heating, ventilation.

Regarding heating system, it shall be envisaged a boiler using wood pellets.

Regarding cooling system, school shall be designed to guarantee an air temperature of 26°C which is the limit for a normal activity in schools, where with the proper movement of air, natural air stream from the open windows and air circulation means, such levels can be achieved in all class all year long.

Ventilation of the object is designed to guarantee the air quality through natural ventilation. In venues where natural ventilation is not possible, then it is considered a solution through artificial ventilation systems.

For the control of thermal effects in school spaces, the designer shall undertake some simple measures at the beginning of the designing process. These measures consist of :

**Orientation of buildings:** It recommended that orientation of classes spaces shall be toward the east and west, because this orientation offers protection from direct sun rays. This preferable orientation

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

may be changed for about minus or plus 30° (due to location requirements or due to orientation of dominating odors) without any great impact on convenience of teaching classes (see the picture below):

**Establishment of buildings:** distance between buildings shall be in proportion with the height of the buildings to allow circulation of fresh air and natural light also in the lowest levels. For the same reason, a minimal distance of about 4m shall be kept between the main sides and surrounding wall. Likewise, the southern facade of the school shall not be closer than 10m from the nearest building.

**Shape and design** of buildings, such as possibility of indirect air circulation for regeneration of fresh air with natural ventilation during the hot season or option of the culmination with four inclination levels in zones with heavy snowfalls;

**Planted surface** : planting of herbs may play a fundamental role in creation of micro-climate, whenever necessary. The plating of herbs efficiently contributes in protection of dust, winds and sun rays. Nevertheless, planting of bushes enables protection of sun rays reflection from the ground;

**Proper elements of the building:** this includes draining from the roof and draining around the buildings, creation of shadows with regulated window shutters, sun tents, sun curtains, umbrellas and/or gallery that could provide additional protection from sun rays, especially when building orientation is not favorable.

- **Proper construction materials**, including materials of facades with potential sun reflection, isolating materials for increase of thermal action of the walls and culmination, with anti-allergic materials or not harmful for students health.

### 373. 4.3.3 Active Control of Temperature

**Low temperatures:** amenity level of low temperatures may considered the one between 19°C, for countries where are exercised activities of work that do not include movement and 15°C for movement zones. Efforts to provide heating in order to achieve such levels of temperature in internal venues shall not be very high. Nevertheless, a much lower minimum can happen in each of the months of heating season, where the heating system may have a capacity of reaction against these low temperatures.

**High temperatures:** Albania climate is mainly dry and hot from May to September, where majority of this period is sunny. The hottest months are July and August with regional variations due to high level. Nevertheless, air temperature of 26°C is the limit for normal activity in schools, where with the right movement of air from natural air stream, from open windows and air circulators, these levels can be normally achieved in classes all year long.

### **374. 4.3.5 Isolation Standard**

The better the thermo-isolation of an external constructive element against external air, the smaller the possibility of warm air to go outside.

The badly isolated constructive elements have a low temperature of internal surfaces; the worse the isolation, the greater the risk that on surfaces under the influence of a relatively healthy humidity of air of about 40-60%, the minimal critical temperature reaches below 12,6 °C.

Special attention shall be paid to the co-called thermal bridges zones, such as ceilings of external walls, because the temperature of the surface here may be lower than the one of constructive elements in regular zones.

### **375. 4.3.6 Thermal bridges**

#### **376.**

Thermal bridges are weak thermal points localized in the thermal transmittance cover of the building. In comparison to untroubled constructive elements, in these points there occurs a huge thermal loss from in out. The higher the energetic standard of a building the more important is the elimination of thermal waters.

#### **Types of thermal bridges**

Conditioned geometrical thermal bridges are created if size of thermal absorbing and emitting surfaces change, e.g. external angles of the building, different thickness of constructive element or columns.

Thermal bridges conditioned from the type of material are created during use of materials with different thermal conductivity and with such different isolating characteristics, which may be placed on the side or one over the other. Therefore, in the place of the construction material with the highest thermal conductivity is created a higher thermal stream. A typical example is the concrete constructive elements inside an external brick wall.

Thermal convective bridges are created when thermal energy of an air stream is transported through the thermal transmission cover of the building. They are caused from the failure to isolate the surface. Open connections of the isolation layer in the roof area or non-isolation of the window spaces are examples for creation of these thermal waters.

A big number of thermal waters may be avoided with the help of a good designing work, careful supervision and through selection of the right materials.

### Advices during designing

- To avoid structures with many branches;
- To establish thermal divisions of constructive consol elements (concrete slabs of the balcony, columns, holding consols) with structures in the edge;
- Undivided layers of the isolation material, e.g. thermo-isolation systems of external walls and passages of special isolation levels without affecting the insulation values.

#### **377. 4.3.7 Requirements of U-values $U(W/m^2K)$ (thermal transmittance coefficient)**

According to legislation in force (Law No. 8937 dt. 12.09.2002 “On preservation of heat in buildings” and respective by-legal acts, CoMD No. 38 dt. 16.01.2003 “On approval of norms, rules and terms of design, construction, generation and preservation of heat in buildings”) for climate zone A where Tirana is situated (not less than 1500 heating degree days per year) The loss coefficient  $G_v$  for buildings is between  $0.54 - 1.03 W/m^3C$ . The lowest value for buildings with a S/V ratio (external surface/warmed volume) lower than 0.3 and highest value for buildings with a S/V ratio higher than 0.9. For buildings with S/V between these values, the  $G_v$  coefficient is calculated in proportion. In order to have a loss coefficient that meets the law requirements by respecting at the same time even the economic criterion cost-gain, it is calculated that buildings in Tirana shall have an external insulation layer (cavity wall) of polysterol EPS 5 cm ( $U = 0.35 W/m^2K$ ) or with mineral fiber with the same transmittance parameters of heat and double-glass windows (6 x 12 x 6 mm) with a plastic or aluminum insulation profile. **Thermo-isolation (insulation) layer shall be installed from outside** and rigorously respect the requirements of producers about the way of fixing (beside glueing material also installation system with plastic screws) as well as the obstacle layer of water steam. Every other installation method may cause condensation in the internal walls, mold and damage of insulation layers.

#### **378. 4.3.8 Windows and Doors**

Penetration of natural light in internal venues from inside and outside the window and free bird-view within the entire building are very important elements for students premises.

Windows shall be places in the walls separating the classes from external venues, classes from classes and classes with internal corridors.

To meet these requirements, design shall take into account the students and teachers. Attention shall be paid. to elements such as height and window frames, type of glass, clearness of the view (not to be blocked horizontally neither from adults nor students) light control and risk assessment impact, as well as security factors. The evaluation of security may recommend that guard place shall be positioned within the center in order to monitor entries and exits can be monitored from the guards of the buildings. Or may be recommended any alternative way in this respect. The designer shall try to plan at least one window per class. If this cannot be realized and the internal space must be occupied by students, the designer shall

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

envisage the best penetration of light and view from the windows, lateral windows, glass windows and doors (secure). Students’ spaces in new constructions shall have a total surface with windows of at least:

8 % of the floor surface if windows are from south and directly connected to external venues.  
(Note: glass surface viewing south is smaller because quality of light coming from south is better);

10% of room surface if windows are oriented from east of west;

15% of room floor surface if windows view north;

20% of room surface if windows are on an external wall

Surfaces that do not need windows are toilets, conference rooms, halls and storeroom.

The placement of metallic bars is not allowed.

External doors and windows shall have a case made of PVC material with thermal divisions or aluminum case with thermal divisions. Technical specification of windows shall be detailed and take into consideration at least the following points:

Coefficient U - 1.2 (W/m<sup>2</sup>K)

Thermal division –

Resistance against the atmospheric factors –

Isolation ability – (class 4)

The glass coating can demonstrate a higher value of sun rays isolation (g). This value does not specify the sun radiation. In today’s glasses of thermo-isolated windows, this value is recommended to be about g = 60%.

To avoid thermal bridges, the window shall be placed under the thermo-isolation level or at least installed in the external corner of the wall. Thus, the isolation is placed on the window frame. It is essential to realize a continuous hermetical unification of the window during the installation. Foam fixing is not enough, because during the drying phase it shrinks, and therefore does not guaranty a hermetical isolation.

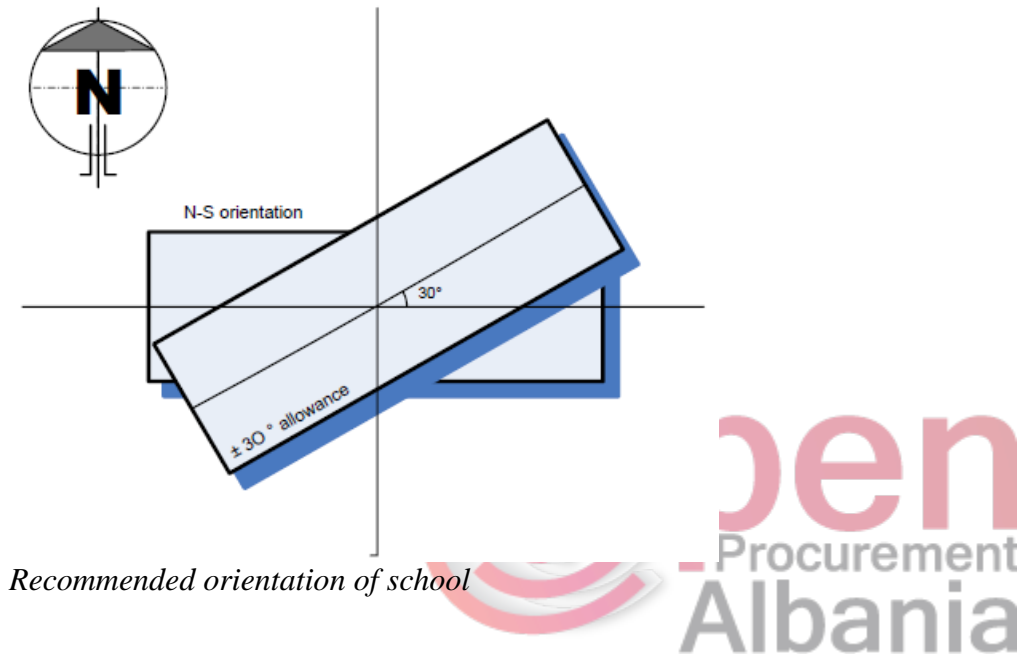
### 379.

#### 380. 4.3.9 Passive control of temperature

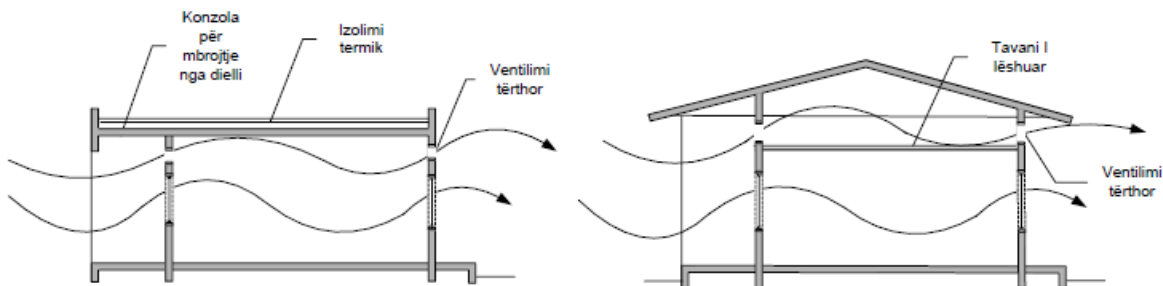
Monitoring of penetration and creation of heat may be naturally minimized by a duly design of walls and plastering of the building. The main source of heat is sun, therefore elimination of the direct sun light from the internal side of the building is essential. As mentioned above, the external walls can be excluded from the important sources for creation of heating during the day in schools. This means that windows are elements that require attention. This is achieved with the help of two methods: orientation and sun reflection. Means for creation of shadows from the sun inside the glass are not efficient because the material gets hot and creates reflections inside. It is essential to prevent the sun hit on the glass, heating is not reflected outside through the glass, because the wave length changes and the venue gets warm. Use of double glazing is inefficient for prevention of sun penetration, this is efficient in prevention of the external heating loss.

**Sun orientation:** orientation or the best orientation to have natural light during the day on the window is north-south (see picture below):

Orientation from North in Albania does not directly reflect the sunlight on the window, whereas orientation from south reflects minimal rays, on the window under the smallest and narrowest corner during the day: in the hottest part of the day, the sun will be on zenith and radiation corner of windows from South will be the narrowest.



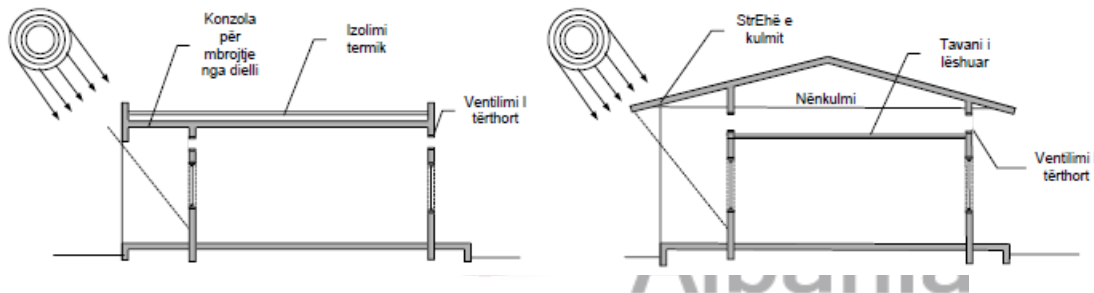
- **Ventilation (indirect ventilation)** will be a natural factor of comfort for the hottest periods of the year (see picture below) but also in the highest is more necessary to bring out the warm air passing through warm and dry land. Nevertheless, the buildings with spaces and option of openness on both sides are not economic, even though this method is recommended as the most optimal. School, as any other construction group shall have an inclination of suppression in different wind conditions and directions, in order to enable the air movement within the building from the positive and negative suppression, as much as it is allowed by divisions and internal spaces. Hence, potential fresh air during the night is enabled, which will be helped from the external lights entering from external windows of upper level.





*Thermal amenity / Indirect ventilation*

**Sun reflection:** efficient equipment for sun reflection may be designed to function for every orientation, as long as the sun angle is fully predictable. Nevertheless, due to seasonal change in height, exclusion of sun rays during the year will require movable elements. In practice, reflection is normally a compromise, and if an optimal reflection has been designed, then reflection after realization would be effective. Taking as an example the south orientation, the window shall be reflected from an external horizontal axis in the level of window peak, with a design that depends on the desired duration of time for prevention of sun rays coming into the hall or falling on the window. During winter, there shall be benefits from sun reflection, therefore the angle of sun reflection to be excluded is the one from May to October. It is essential to avoid sun rays falling on the window, because heat is very efficient when the environment and glass itself gets warm, by increasing the heat effect. The use of double glass is inefficient for prevention of the sun and it is efficient only in prevention of loss of sun from outside. Construction of a major peak coming out or windows with shutters are part of the normal solutions of sun protection (see picture below), but the project can not envisage other measures than enable reduction of radiation on the window, such as bri-slab, external tents, etc. The proposed solution shall not obstacle the entrance of light but only direct radiation on the glass, (not shutters).



*Thermal Amenity /Sun protection*

**381.**

**4.4 Visual Amenity**

*Defintions and terminology*

Need for high standards and a well-designed lighting for school buildings is based on :

- **natural lighting** resulting from the direct or reflected sun light from earth and other external or internal surfaces:
  - **artificial lighting** from sources of electrical current (lamps, fluorescent pipes);
- **shine** or intensity of light either from natural or artificial source or from another surface or inpenetrating object which is not transparent;

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- **contrast** of shine or color.

*Average factors of light reflection*

<b>Materials</b>	<b>%</b>
Plaster	85
White letter	84
White paint	75
Cement	55
Gray stones	50
Natural wood material (light color)	33
Red bricks	20

Lightening is very important for each zone of activities because is a key element to create a warm possible venue.

The quality of light shall create a positive feeling to students.

Powerful lightening is suitable for spaces where is carried out moving activity; whereas lighting with focus on a specific task is needed for manipulative activity; weaker lighting is necessary for calm areas. Quantity and orientation of natural light shall be taken into account in the design and variety of light level.

In the rooms with poor natural lighting, it is allowed a maximum of about 500 lx. Rooms that do not have windows on the ceiling or external windows shall be equipped with conveying tubes of natural light. Spaces of lights that transfer the light deeper inside can be used in the entire sides from south. The designer can refer to the table about minimal values of light for different functions.

In this respect, designers shall take into consideration that: with the reflective light children cannot directly see the light source, a fact causing blinding shine and eye fatigue. Lights with focus, such as the hanging types for residences shall be used only when reading, painting or carrying out a delicate work. Design of variety in lighting with means as light level control, special switches, cables with regulating orientation and hanging cables shall be placed in working areas. There shall be tried the use of specific lighting to display works of art, several lamps to create a joyful atmosphere and high levels of lights to encourage physical activity.

The external light shall be controlled through curtains or other types of windows shades. The external light shall be sufficient to enable movement and security. All the lamps shall have lenses or covers to be resistant to refraction

*Recommended Lux in school spaces*

<b>SPACE</b>	<b>LIGHTING</b>	<b>LIGHTING LUX</b>
Classes	Natural light	300
Classes (near the black board)	Natural light	500
Laboratories	Natural light	400 - 500
Labor room	Natural light	400 - 500
Music/drawing room	Natural light	400 - 500
Storehouse		300 - 500

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Library		300 - 500
Multi-purpose space		300 – 400
Physical education hall	Natural light	300 – 400
Office of headmaster/deputy headmaster	Natural light	500
Secretariat	Natural light	250 - 350
Teachers room	Natural light	500
Space for additional staff	Natural light	250 - 350
Toilet		150 – 250
Office of the physician	Natural light	500
Office of the psychologist	Natural light	500
Depot		250 – 350
Hall	Natural light	300 – 400
Stairs	Natural light	329– 400

**382.**

**383.**

**384.**

**4.5 Acoustic Amenity**

In school buildings, a special attention shall be paid to acoustic isolation. In urban level, the school position, as mentioned above, shall be situated in quiet areas far from important road axis. It is preferred a location inside the residential areas.

If this is not possible then there exist different solutions, either physical barriers, such as walls, or green physical barriers, such as high plants.

Inside the school, structures shall guarantee a specified acoustic isolation according to the following table:

<b>Construction elements</b>	<b>Requirements in Rw in dB</b>
Walls between the classes venues and similar spaces	47
Walls between classes venues and corridors	47
Walls between classes venues or similar spaces and staircase of the building	52
Walls between the classes venues or similar venues “particularly noisy” (e.g. administration space)	55

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

During the design of systems and other structures shall be taken into consideration the following recommendations:

all pipelines (air conditioning, hydric supply) crossing the walls that transfer noises shall be covered with material for acoustic protection;

in venues where will be created high acoustic levels, there shall be placed furniture elements that would reduce the acoustic noise, such as linoleums, carpets, etc;

to reduce acoustic levels, during design shall be used materials that could decrease the level of noise inside the kindergarten;

glass of doors and windows shall be acoustically laminated glass with an acoustic isolation ability 35dB, with an air space from 50mm to 100 mm;

doors opened from noisy zones shall secure a high acoustic isolation

it is advisable to use textile materials to reduce the acoustic level;

for a better isolation of the rooms zone from the external space or administration space shall be used double doors or tamboura system. The same is recommended also for the selection of double windows. This solution helps also in achievement of a better thermal isolation taking into account that doors and windows are the most delicate zones in relation to acoustic and thermal meaning;

boxes of electrical sockets shall not be installed on the back

Noises protection inside an object does not depend only on amount of voice transmission into the division construction elements but also from the amount of longitudinal voice-isolation of the related construction elements. Even though, this practice is often subject of lack of attention. The voice-isolation of an object achieved only with the special value of division construction elements is not sufficient because long voice-isolation of construction elements defines the limit of performance in voice-isolation. Only one weak point in the isolation of elements (e.g. uninterrupted plaques of the floor layer, light elements of the facade, walls with hollow bricks) reduces the voice-isolation amount, turning irrelevant the changes in the amount of voice-isolation of construction elements.

Responsible planning is first of all related to achievement of clearness of voice-isolation mass of construction elements and in this field are met the necessary conditions for positive results of longitudinal voice-isolation in the building. Later on, there shall be selected the division walls in harmony with circumstances.

385.

## 4.6 Colors and their usage

### 386. 4.6.1 Meaning of colors

Colors influence students in different ways by making them feel happy, sad, calm or meditative. Colors influence in the perception of the size, amenity of the venue, etc.

Colors may change our perception for dimensions and distances. A wall painted in a darker or warmer color may make it look nearer than it is. This is helpful when walls at the end of narrow corridors are painted with dark colors.

In case when the venues are small there shall be used light colors with cold tonality .

In this respect, their use in schools is necessary, but there shall be taken into consideration also their influence to children.

**Red** is related to the sun and increases the heart beats. It is a very stimulating color and symbolizes activity and desire to live life, as well as transmits warmth.

**Orange** is a less strong version than red. It is compared to joy that encourages yellow. Offers joy and helps get through traumas. It represents the sunny and beautiful nature.

**Blue** in therapy of colors is known as the color of transition. Blue offers support and protection and is the color of peace, calmness and wisdom

**Pink** same as blue has relaxation effects and suggest warmth and calmness.

**Green** is the color of youth, growth, hope, joy, life and freshness. It is also the color of harmony and equilibrium.

**Yellow** is the color of optimism and is efficient, a solar stimulating color. It provides clearness.

In particular, students need a dynamic and stimulating environment to improve and shape their intellect. Rooms painted in orange, green or blue go along with a didactic dimensions, stimulate their sensorial activities and make them feel calm.

In the general theory of colors, their division is made between warm and cold tonalities.

Warm tonalities are characterized by yellow, red, orange and all the intermediate tonalities. These colors are active, positive and are related to action, high sounds and continuous movement. An experiment shows that heart beats faster in a red painted room than in a light blue room.

Cold tonalities are light blue, blue, purple, which are calm colors, passive that stimulate meditation and calm.

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

In spaces used for games and active work is recommended the use of warm colors, between light yellow, orange yellow or light orange because they stimulate production of adrenaline and as a result affect the creativity and capacity

- In calm zones are preferred cold colors and tonalities because in the philosophical point of view, an environment with green-blue-light blue tonalities affects the reduction of heart beats offering a feeling of calmness.

### **387.**

#### **388. 4.6.2 Use of colors**

Before thinking of specific colors, it is important to determine the natural light of the venue and identify the small and difficult areas. To define the function of the rooms and classes and later on define the atmosphere that is needed, i.e. if it is necessary a cold, harmonic or warm, welcoming or cosy.

Colors shall be chosen attentively to create an emotional equilibrium. If the activities performed in these zones would require different color schemes by keeping the main scheme soft, there shall be used strong and brighter colors in some zones, such as windows, doors, corners and frames. As a solution to maintain the equilibrium, one of the simplest and most successful ways is the use of two, three or more colors that suit each other in the point of view of colors, such as peach, apricot and orange, or green, blue green, aquamarine and light blue.

Use of these schemes is called mixture or harmony, because all the colors are combines, balanced without clash of two colors.

If it is required a calm and fresh atmosphere, then there shall be chosen green colors, such as green blue or blue green. If the atmosphere shall be warm then this is achieved with red, pink, orange or yellow colors.

## **5. PLANTS AND INSTALLATION SYSTEMS**

### **General**

The plants and installation system projects shall refer to the technical terms of design and standards in the Republic of Albania (K.T.P - STASH) and for special elements not envisaged in these norms, the designers shall before the Euronorms (EN) and Eurostandards (EN,HD) as well as recommendations of CEI, CENELC, DIN, VDI/VDE, or local norms and European Community standards.

Installation projects shall include :

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Full project of heating and ventilation accompanied with respective details, list of materials and technical specifications of materials.

Full project of electrical system (including telephony and computer system) accompanied with respective details and table of materials and technical specifications of materials.

Full project of water supply system accompanied with respective details and table of materials and technical specifications of materials.

Full project of sewerage network accompanied with respective details and table of materials and technical specifications of materials.

Full project of fire protection accompanied with respective details and table of materials and technical specifications of materials.

Final specifications of materials and equipment.

Full schedule of works.

Methodology of works implementation specifying the manner of preservation of environment from pollution (environmental project)

Detailed IPR of construction costs in the budget agreed by parties for each object conditioned by the geographical zone where is built. For the key categories shall be presented the respective construction analyses.

**389.**

**390.**

**Full project of heating and ventilation**

**391. Meteorological data and external conditions of the environment**

During the initial phase of design of mechanical plants, shall be taken into consideration the geographical position of the object which conditions the way of design due to external meteorological conditions of the areas, as well as the internal factors affecting the venue’s temperature, such as lighting, equipment transmitting heat, etc. Among many factors influencing the thermal amenity can be listed the following:

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Temperature

Air Humidity

Solar radiation

Winds

The following table shows the external designing temperatures for winter period and geographical data according to cities in the Republic of Albania.

**Table No.2. Table of external designing temperatures**

No.	City	Height above sea level (m)	Geographical width (grad,min)	tlog
35	Tirana	110	41 20	-1.0

\* In these cities, the climatology series is less than 30 years

**392. Designing norms and recommended values of temperatures in venues**

Thermal conditions within the education buildings shall be in harmony for the activity performed in them. It is necessary for the designer to take into consideration the function of activities and the activity to be performed. The following table offers the recommended values of internal temperature, relative humidity, quantity of fresh air, level of noise and speed of air movement that shall be taken into consideration during design phase of school venues.

**Table No.2. Table with recommended values of internal climate parameters**

Destination of the venue	Winter	Summer	Humidity	Quantity of fresh air	Volumes of air per hour	Noise level	Air speed m/s
Classes	22	26	35-60%	8 (L/s*person)	6	35-40 dB(A)	0.15
Auditors	22	26	35-60%	8-10 (L/s*person)	12	30-35 dB(A)	0.15
Laboratories	22	26	-	10 (L/s*person)	10	40	0.13-0.15



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

						dB(A)	
Reading room	20	25	55% +/-5%	8 (L/s*person)	-	45 dB(A)	0.07-0.15
Offices	22	26	55% +/-10%	8 (L/s*person)	6	45 dB(A)	0.07-0.15
Library	22	26	45-50%	8 (L/s*person)	-	40 dB(A)	0.13
Dressing rooms	24	-	-	2.5 (L/s*m2)	10	55 dB(A)	0.15
Corridor, staircase	20	27	-	0.5 (L/s*m2)	4	50 dB(A)	0.15
Storehouse	18	-	-	-	4	55 dB(A)	0.15
Technical venues	16	-	-	-	-	55 dB(A)	0.15
Bars, refectory	21-23	23-26	20-30% / 55-60%	10 (L/s*person)	12	50 dB(A)	0.13-0.15
Gym	20-22	25-26	30-70%	8 (L/s*person)	6	45 dB(A)	0.12-0.15
Swimming pool	26	30	50-60%	-	4-6	45 dB(A)	0.13
Hostels	20	25	50%	15 l/s/ dhome	4	30 dB(A)	0.15
Sanitary system	24	-	-	2.5 (L/s*m2)	6-10	55 dB(A)	0.15
Services, shops	22	26	50%	1-1.5 (L/s*m2)	-	47-56 dB(A)	0.015-0.2
Museum	20	25	55% +/-5%	10 (L/s*person)	-	40-50 dB(A)	0.13
Cooking facilities	20-23	28-30	-	508-762 l/s/m2	12	55 dB(A)	0.15-0.25

Mechanical plants are very important for functioning of a building and normal development of activity destined to be used by users.

Irrespective of the function and use of buildings, mechanical system shall meet the basic necessary criteria toward design, implementation of works in the object and exploitation from users that are :

Harmonization and comfort in use,

Function reliability,

Full technical control,

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To guarantee hygienic conditions and technical security,

To enable a partial dedicated use,

To guarantee saving of used energy,

To respect environmental conditions,

To guarantee low maintenance costs,

To construct with standard components.

Projects, implementation works and exploitation from uses are based on legal framework and Decision of Council of Ministers of the Republic of Albania, and in cases when this framework does not envisage special terms or arguments, they are based on Italian standards, norms and instructions (UNI, UNIEN) and European (ISO, EN).

**Heating system shall be boiler operating with pellet,** with panel radiators equipped with thermostatic valves, The sending-return network of water shall be:

For pipes with a diameter smaller or equal to 28 mm, with Pex-Al-Pex material or copper with a insulation coat according to the standards

For pipes with a diameter bigger than 28 mm shall be with black steel pipes without dart or with any other material, thermo-isolated according to necessary standards for pipe dimensions

For gyms may be applied heating systems on the floor or heating systems with hot air (aero-therms type).

Inverter circulation pumps

The designer together with the project shall present also the calculation of thermal losses

**The design of heating system with pellet shall meet the following criteria :**

**To have a pellet tank with a considerable autonomy (up to two months based on thermal calculations of the object)**

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The pellet tank of deposit shall guarantee the filling without the need of extra labor forces, but directly from the standard self-emptying machineries

The pellet tank of deposit shall guarantee protection of pellet from atmospheric factors

The system shall be automatic, equipped with respective mechanisms of pellet transport from the pellet depot in the intermediate deposit (if necessary even at the boiler) without the need for extra labor force.

The pellet deposit, tank of intermediate silos, as all as the boiler shall be placed in venues by respecting all the necessary norms of fire protection, ventilation, necessary spaces for maintenance and repair works, etc.

The boiler shall be monoblock or several pellet boilers with pellet placed in the position to generate the required thermal power. In any case, the efficiency of each boiler shall at least be 89% calculated according to BS 845-2:1987 norm or any equivalent norm.

It should be taken into consideration the light discharge of ashes from burning and removal of wastes in determined places as suitable waste deposit place.



## **Ventilation**

As long as school venues are high density zones and considering also the immunity system of students to attend these premises is relatively low, the ventilation system of venues is of great importance and requires a special care in calculation and selection of typology that will be used according the each case. The ventilation system in school venues shall enable to meet the main purposes of its application, such as :

*To meet the requirement for ventilation and fresh air supply for breathing needs of persons to use these venues.*

*To enable the elimination of pollutants and bad odors from the venues and enable improvement of air quality.*

*Possibly to regulate the air humidity in these venues*

*Improvement of thermal amenity by preserving thermal regime of heating/cooling systems.*

Value of air exchange in school venues and schools depends on the destination of use of the venue.

**Table no 2** presents the recommend quantity of air change according to the venue’s destination of use.

All the classes, gym, library, laboratories and other venues of mass use shall have mechanical ventilation systems with recovery of heat (at least 60%) and shall be equipped with a filter of minimum F7 class. Air pipes and grills shall be positioned in order to guarantee a good distribution of air and level of noises shall be within then allowed norms for each venues. The air pipe values shall be insulated. Ventilation system shall take into consideration that in case of fire it shall go off automatically and in case of a design as central units (serving to more than one venue), shall include also the fire dampers.

### **Ventilation of sanitary system**

During ventilation of sanitary system, it shall be considered that:

Air speed shall not pass 6m/s.

Flexible piles shall not pass the length of 3000 mm.

Points of air absorption shall be placed in every closed venue.

### **393. Thermal Power Station**

During the design phase, special attention shall be paid to the right concept of thermal power station. In order to have a well-functioning thermo power station, it is necessary to avoid at maximum problems during operation time, the designers shall take into account:

There should be space of at least about 10% of gross surface of the building for mechanical systems.

Technical venue shall be completed with stairs and in some cases even some elevating means for necessary maintenance and to enable the replacement of equipments.

The doors of technical venues shall at minimum have the dimensions of 230x180. External doors shall be possible to open and removable in case of replacement of large equipment which do not come in pieces.

The underground technical room shall be equipped with special spaces and dimensions that allow replacement of large equipment in the technical venue.

Ventilation points of technical premise shall be positioned at least 50 cm above land level

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

All the outputs of lines or channels shall be accompanied with collars for fire protection.

Technical venues shall not be used as an area for output and input of air from machineries.

A condensation pipe shall be placed in every part of equipment using steam. Condensation pipe shall discharge with self-flow which will later on end up in the drain or drainage pumps.

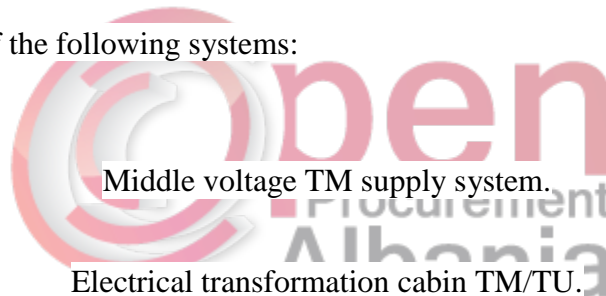
There should have suitable spaces for passages around the equipments in the technical venue in order to allow the maintenance, to bring the repaired equipment, temporary equipments, replacement of old equipments and security of high voltage.

There should be sufficient lighting inside the technical venue to facilitate the work of maintenance workers.

**394.**

**Complete project of electrical network:**

The electrical project shall consist of the following systems:



Middle voltage TM supply system.

Electrical transformation cabin TM/TU.

Structure of venues

Typology of devices

Schemes and calculation of loads according to requirements

System of emergency energy supply - Generators

Structure of venues

Typology of equipment

UPS security system of energy supply

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Main energy supply lines of electrical panels from electrical substation

Functional characteristics of main distribution network

Secondary Distribution network

Electrical box

Electrical box of the floor, zone ....

Secondary Distribution network

Special venues box

General Power Grid

Supply of general consumers from normal network

Supply of preferential consumers from generator

Supply of important consumers from UPS

Lighting network

Network of general normal lighting

Night lighting system

External lighting system

Security lighting network

Emergency lighting network

Evacuation lighting network etc.

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Earthing grid, atmospheric discharges and equipotential schemes

**Project of special installations shall contain the following systems:**

Security system

Fire and gas detection and alert system

Sound alert system

System for blocking unwanted entries

Doors control system

CCTV monitoring system.

Communication system installation

System of structured cables, optical fiber

Active devices of data transmission network

TV-SAT signal system .

Video-doorbell system

The above-mentioned system shall be accompanied with all the calculations and selected technical specifications.

**Power supply system.**

This system will be designed to enable the uninterrupted power supply in all the venues. In this case, there shall be 3 sources of power supply.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

### From the network of electricity system - normal voltage

The distribution of power supply lines depends on the organization of venues. E.g. security systems shall have uninterrupted supply from UPS, same for high sensitivity zones for children, the UPS lines will supply also the informatics systems and those of preservation of uninterrupted information, if any.

With critical voltage (from generator after 15-20 sec) will be supplied those consumers who for 15-20 sec period will not lose the work parameters and do not influence in the normal development of the garden's activity.

With this voltage will be supplied consumers of general lighting, emergency lighting, security systems, etc.

With normal voltage will be supplied all the venues of the garden considering it as basic supply, but for security and continuity reasons shall be doubled with voltages from the generator and UPS automatically, which shall be envisaged in the designing schemes.

For the power supply of the object in cases when the required power passes the value of 150 kW and when there is no possibility of power connection of low voltage in that area, it shall be envisaged the construction of a substation, which will included the following technical rooms:



middle voltage room

This room will be equipped with middle voltage boxes according to the following listing:

20kv middle voltage input box

20kv middle voltage output box

20kv middle voltage measurement box

Control and protection box of TR1

In the second room, it is envisaged the establishment of middle voltage transformers TM 20/0.4 kv with resin.

Transformers are divided from the venue with an iron grill 40x40x4 (mm) with secured doors and protection elements in case of doors opening.

The third room envisages establishment of generators and after necessary calculations shall be determined even their power.



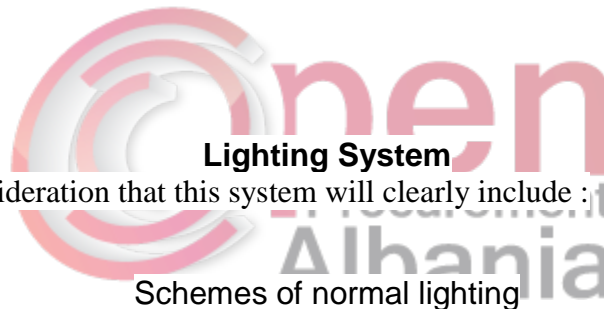
## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

In the fourth room will be established the panel of automatic passing into generator network, and regulation panel of  $\cos \Phi$  which will be calculated based on the installed power and calculations shall be presented, etc.

It is better to place the low voltage box nearer to the venues that they supply for saving energy and having a stable voltage. Middle voltage panels and generators shall be placed outside the object. Establishment of low voltage boxes within the kindergarten building makes them more controllable, manageable and economic. During the design of electrical installation, we recommend that the low voltage lines shall be carried out by respecting TNS system for three phase voltage and by respecting TS system for mono phase system. The realization of TU panels design is carried out in conformity with CEI norms, programmed by implementation of powers, dimensions, temperature, lines length and type of consumers. During the design of the project, there shall be considered that lines shall be straight, no joints, labelled according to destination, different from one another, i.e. Grid, Generator, UPS as well as derivation boxes shall be labelled and easily readable. The electrical boxes must contain the protection controlling and measuring elements, protection from atmospheric discharges, etc. Voltage boxes shall provide sustainability REI -120.

The designer shall provide the Approval of Electrical Projects in ISHTI and CEZ, as well as determined the point of power connection from power grid (sub-station or zone transformer).

The electrical project shall be accompanied with the certified license of the electrical engineer, which will serve for further procedures for approval of connection point with CEZ.



The design shall take into consideration that this system will clearly include :

Schemes of emergency lighting

Schemes of evacuation lighting (indication)

Lighting flow shall be respected according to the venues where will be installed by respecting Lux per m<sup>2</sup> in relaxing venues, eating, teaching, corridors, kitchen, toilets, etc.

The control mode of lighting shall be used with efficiency in order to save as much energy as possible.

The lighting shall be with LED lamps with high energy efficiency and minimal consumption. LED lamps shall be specified so that the lighting body (lamp) shall be changeable without needing to change the entire lighting set in case of a defect and capable to operate for 50.000 working hours and meet the DIN EN 60598-1 requirements (VDE 0711-1): 2005-03

Technical specifications of lights shall take into consideration all the necessary standards in order to avoid installation of uncertified products.

**Power System in venues**

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

In all venues shall be envisaged monophasic sockets working with normal voltage and generator in harmony with furniture as well as lighting output in the toilets and aspirator if necessary. Në të In corridors in 15 -20 m distance shall be envisaged installation of mono phase sockets with normal voltage for cleaning equipment.

### **Equipotential scheme**

In special venues, such as technical, mechanical, electrical, kitchen spaces, etc, during the realization of the project shall be equipped with a equipotential busbar placed after each door where all the metallic parts will be connected on the floor, walls or ceiling with the equipotential scheme.

VO!

Realization of equipotential scheme during the design shall be absolutely separated from the earthing scheme and lightening rod system.

Inside the equipotential box is envisaged a copper busbar with holes for realization of all connections in equipotential points. The equipotential scheme begins in every venue and ends in the electrodes places on the ground outside the object.

### **Earthing scheme**

During the design of earth scheme shall be taken into consideration all the elements, such as sigma of the earth, type of earth, humidity, so that during the calculation the final resistance shall be less or equal to  $4 \Omega$ . The quantity of electrodes depends on RT realization. During the measuring with controlled currents differential from 2mA-30mA, the differential relay shall act within this diapason.



### **Lightening rod system**

The scheme shall be realized by the designer taking into consideration that  $R_r$  shall be smaller or equal to  $10 \Omega$ . The counture on earth surface and terrace shall be realized with a zinc stripe  $30 \times 3$  and zinc rods  $L=1.5m$ , whereas surrounding counture and connector of electrodes on the ground with bare copper conductor  $S= 50mm^2$ . For every discharge shall be placed the disjoint for measuring. Number of discharges shall address the report  $n=P/15 +2$  and resistance of the lightening rod will be calculated with a smaller value than 10 om.

### **Schemes of supply and control of mechanical and hydronic devices**

During realization of the project shall be taken into consideration the realization of schemes of supply and control of heating system, ventilation and water supply. Therefore, in the framework of the prepared schemes by the mechanical and hydrotechnic designer, the electrical project shall contain the following:

panel and cables of ventilation units

panel and cables of pumps (heating, cooling, twins)

panel and cables of boiler

panel and cables of fire pump

panel and cable of water supply pumps I

panel and cables of submersible pumps (if any)

### **Security systems**

Cameras, alarms and control access shall be placed in order to provide uninterrupted information through venues, as well as monitoring of the entire situation in all the venues of the garden - inside and outside. For realization of the electrical installation project shall be carried out a coordination of work with all the designing groups in order to serve at best all the specialties and realize a qualitative service of the staff and apparatus.



During realization of the project of fire detection shall be taken into consideration the selection of detectors according to their function and location.

During completion of the project shall be taken into consideration the distance of establishment of detectors, sirens, alerts, so that the entire zone could be covered. The project shall envisage multifunctional detectors, optical, CO<sub>2</sub>, NO<sub>2</sub>, and temperature detectors. The alerts shall be placed on the corridors in the quotes 1 m and 40 cm from quote 00 of the floor. Internal and external sirens shall be placed in the most positions with the best acoustics. The station to be used shall offer all the informations to the system, location of all elements of the scheme and be equipped with GSM. The station shall have a voltage 24 and 48 V for controlling electromagnetic dampers, etc.

The magnifying glass of this station shall not pass 80-125 elements including detectors, sirens, etc. The station shall be connected with the public system of the zone without causing panic in other zones. The fire system software shall be accessible in more than two points and display in a clear situation of the entire system.

### **Satellite and terrestrial TV system**

During the design, this system shall take into consideration the equipped of all entertaining and relaxing rooms of children with territorial and satellite system.

### Sound alert system

Sound alert system shall be used to offer information to the staff in cases of emergencies and special occasions. All the components, such as voice center, central, distribution and connection components shall be envisaged and adjusted for every venue. They can be connected with the central CD player device to play music in suitable hours.

Following zones/rooms will be equipped with sound alert

- Corridors
- common venues

During the designing phase, planned exits shall be coordination with those of the client.

### CCTV System

In line with requirements and standards of the installation, the project shall envisage a CCTV system for common school venues. It shall cover the necessary fields required by the benefiter, which are divided into categories. Based on these special requests in every field, the selection of equipment shall meet these requirements. For the outside areas, there will be the main entries and other requirements that will be coordinated with the benefiter, mobile cameras, suitable for the installation, anti-intervention protection, with IP-66 case and motion detection, etc.

For the internal area will be used high-resolution cameras placed in key monitoring points. All the data will be registered with NVR registration equipment, which shall be placed in the server room with a calculated capacity with the time required by the benefiter. The monitoring room shall display the images of the cameras of the monitor covering the entire divided space in the screen with all the envisaged cameras.



**395.**

### Complete project of water supply system

The supply with cold sanitary water is necessary for normal performance of teaching activity.

Water supply in education venues can be carried out from the urban network or wells in cases when the urban network does not guarantee the needs for water supply of these venues.

Likewise, beside the need for water reserves that will serve for fire protection system, there shall be provided also the quantity and necessary reserve quantity for consumption needs on the users bases.

The referring values for necessary flow in all the hydrosanitary equipments used in the teaching venues is indicated in the following table expressed in “l/s”.

<b>NOMINAL FLOW TO BE PROVIDED IN EACH TAP</b>			
Hydrosanitary equipment	Cold water (l/s)	Hot water (l/s)	minimal pressure mk H2O
Sink	0.10	0.10	10

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Bide	0.10	0.10	10
WC	0.10		10
Shower plaque	0.15	0.10	10
Basin	0.20	0.20	10

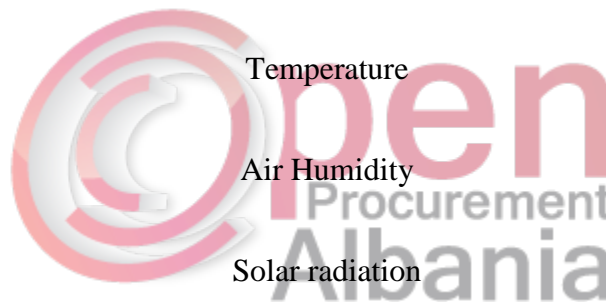
396.

397.

Full project of heating and ventilation

**398. Meteorological data and external conditions of the environment**

During the initial phase of design of mechanical plants, shall be taken into consideration the geographical position of the object which conditions the way of design due to external meteorological conditions of the areas, as well as the internal factors affecting the venue’s temperature, such as lighting, equipment transmitting heat, etc. Among many factors influencing the thermal amenity can be listed the following:



Winds

The following table shows the external designing temperatures for winter period and geographical data according to cities in the Republic of Albania.

**399. Designing norms and recommended values of temperatures in venues**

Thermal conditions within the education buildings shall be in harmony for the activity performed in them. It is necessary for the designer to take into consideration the function of activities and the activity to be performed. The following table offers the recommended values of internal temperature, relative humidity, quantity of fresh air, level of noise and speed of air movement that shall be taken into consideration during design phase of school venues.

Minimal daily consumption necessary to support the European Standards shall be provided to meet the requirements for sanitary water is 25 liters/user.

Sanitary cold water supply is done through the external network from the controlling manhole.

**Connection point shall be coordinated with the water supply enterprise.** Water supply system from external network shall guarantee sufficient water for sanitary use. Through the flow and pressure of

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

external network is enabled the supply of general water reserves. A water supply group shall consist of: water measuring, pressure reduction tool, non-return valve and “Y” filter. The pumping group shall be placed in the technical venue.

Water reserve basins shall be calculated in order to provide water quantity for the required amount (maybe 1 day). Specifications (quantity, capacity, etc) shall be defined from the designer based on the diagram of daily use by consumers. Beside sanitary cold water reserves placed in the technical premise, the project shall contain also a water tank in free flow as well as its connection with toilets and pissoirs in cases of power cut. The tank volume shall be calculated by the designer and cover the needs for at least 1 day.

The taps in sanitary connections shall be equipped with water flow timer time press to enable water saving, as well as the hot water mixers shall have thermostatic valve.

The pumping station is the most important part of the system. The pumps parameters shall be calculated in line with daily needs diagrams for water and network configuration.

In this respect, there shall be calculated the pressure, flow, pump power and other technical specification. The project design shall include a pumping station, which is installed in line with the project requirements.

The distribution network comes from the pumping station to the technical building and sanitary connections. Every joint from the main magistral serving as a supplying branch or a columns for shall be equipped with a stopper valve for interruption of water when is necessary to intervene in the system without interrupting the supply for other consumers. The pipeline system of sanitary water needs all the requirements of defined norms and standards. The entire distribution network will be insulated to eliminate the condensation phenomenon and will be equipped with stopping valves wherever necessary, in case of necessary interventions for potential repairs. The system of sanitary water pipes will meet the requirements of norms and standards defined and selected since the designing phase by the engineering staff, as well as preliminary requests of the investor. The pipes shall be sustainable against mechanical blows and resistant to atmospheric agents. The pipes of this system are divided according to the function of their material as following:

Zinc-plated steel tubes without dart for columns;

Tubes PE-Xa – (Reticulated Polyetilen) for distribution into floors;

Tubes PPR;

Tuba PEHD (polyetilen with high density).

Before use, the sanitary water shall be treated (filtered) based on its physical-chemical characteristics. Filtration may be:

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Mechanic filter;

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Cartridge filter;

Sand filter;

Carbon filter;

Ultraviolet filter.

**Plant for supply with hot sanitary water**

The hot sanitary water shall be prepared in solar panel systems for hot water, where shall be taken into consideration at least 1 m<sup>2</sup> solar panel over every 100 liters of hot water per day. Panels may be either with a thermosiphon system, without electrical resistance, but designed in order to supply the boiler directly or with central system with pumping circulation.

Hot water accumulation shall have a temperature not less than 60 °C. Nevertheless, for the children security, for reduction of risk from very high water temperatures, regulations of kindergarten venues require that the temperature for use (in the output of hydro-sanitary equipments) shall not be higher than 43 °C for all the hot water equipment. Such thing is achieved through thermostatic mixture completed by the mixer.

The dimensions of sanitary hot water network shall be carried out based on the designing norms and standards.

The sanitary water system shall serve for providing cold and hot water from the pumping station to collectors and after this shall provide the water distribution in equipment of sanitary venues. the distribution of sanitary water is realized through:

Hot water distribution lines;

Re-circulation of hot water (if it is chosen the version with hot water central boiler)

Water supply collectors (if it is chosen the collector version from the designer)

400.

**Full project of sewerage system**

The sewerage system consists of the network of collection of atmospheric waters, sewers, gray waters and waters containing fats.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Atmospheric waters are waters falling on the earth surface in the form of liquid falls (rain) and solid form (hail and snow)

Sewers are all the waters collected by the sewerage system of WC of all schools.

Gray waters are waters collected by the draining network of sinks, bidets, showers, washing-machines, etc.

Waters containing fats are collected from the draining network of all kitchens in different building.

In the water draining system in which we have presence of waters containing fats, it is installed the plant of collection of fats before outflow in the main collector of sewerage system.

### **401. Dimensions of draining plants, normative values of draining**

Dimension of draining network of waters is made based on calculations of flows for draining units of different equipment, velocity of flow of liquids in pipes and inclination of pipes. The water flow in the draining system shall not create pressure that could create hydraulic blows in the pipes. Pipes shall have a sufficient diameter to enable free circulation of air ventilation that provides the stability of network pressure.

### **402. Values of drain units accompanied with respective details and table of materials and technical specifications of materials.**

Every sanitary equipment is characterized by a defined norm of water flow, which depends on its size and functioning. Norms of dimensions addressed for the draining network are proposed by **UNI 9183** standards.

**Table 1 – Amount per draining unit for equipments (UNI 9183)**

<b>Equipments</b>	<b>Draining unit</b>
Tube (no shower)	2
Shower (per one siphon)	2
Shower (per every siphon installed together)	3
Sink	1
Bidet	2
WC with cassette	4
WC with cassette incorporated in the walls	8
Kitchen sink	2
Sink	3



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Dish washer	2
Washing machine	2
Floor drain	1
Combination Sink-Bidet-Tube-WC with cassette	7
Combination Sink-Bidet-Tube-WC with cassette incorporated in the wall	10
Combination Sink-WC with cassette	4
Combination Sink -WC with cassette incorporated in the wall	8

**Dimensions of joints**

The internal system of collection of sewage waters is composed of the joints of all sanitary equipment. From the internal network, water is send to the vertical draining column. The flow in one joint is the unit flow of the apparatus that will drain to the joint. Diameter is defined based on the following table:

**Table 2 – Diameter of draining joints ratio to maximal number of unit joints of drains in them (UNI 9183).**

<b>Diameter of branches (mm)</b>	<b>Total load</b>
40	3
50	6
65	12
80	20
100	160
125	360
150	620
200	1400

403.

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**409. Dimensions of draining columns**

A draining column normally counts different joints in different floors.  
The maximal flow in a draining columns increases with the height of the floors where there exist joints.  
The dimensions of the vertical draining column pipes depend on the maximal flow of the column.

**Table 3 – Diameters of the draining columns ratio to maximal number of units per drain, number of floors and loads in the draining units in the busiest floor (UNI 9183)**

<b>Columns Diameter (mm)</b>	<b>Built up to 3 floors</b>	<b>Maximal load per one floor</b>
50	10	6
65	20	9
80	30	16
100	240	90
125	540	200
150	960	350
200	2200	600
250	3800	1000
300	6000	1500

**410.**

**411.**

**412. Ventilation of sewerage network**

The main purpose of ventilation of sewerage system aims to bringing out the gases collected from sewers, as well as encourages the normal function of the installed siphon in each equipment and to keep them under the atmospheric pressure. An efficient ventilation system is also useful in fight against creation of mould.

Ventilation columns are divided into four categories:

Primary ventilation

Direct parallel ventilation

Indirect parallel ventilation

Secondary ventilation

**413.**

**414. Processing of drain waters**

Processing of sewerage waters consists of removal of pollutants in these waters

Processing of sewerages is done through the construction of water treatment plants

These plants are built outside the inhabited centers

After the cleansing these waters are used for communal purposes

#### **415. Materials of pipes and main components of sewerage system**

Pipes of internal network feeder and sewerage columns are made of different materials, pressure pipes: geberit piping system with welding.

Pipes without pressure: Politelien and PVC

Collectors pipelines are divided into pipes with loads and pipes without pipes.

When pipes pass through pavements or green spaces, there shall be used junction pipes without loads SN4, PVC SN4.

When pipes pass through a road soil where there are dynamic loads and it is used by high tonnage vehicles, there shall be used junction pipes with loads SN8, PVC SN8. Materials shall be accompanied with manufacturing certificates. Based on **UNI 9183** and **UNI EN 1091** norms.

#### **Rain water draining system**

Dimensions of roofs and terraces draining network

Dimensions of ruts.

Dimensions of descending columns.

Dimensions of pipelines collectors

Dimension of superficial drainage

White water draining plants

- Condense waters
- Accidental waters from fire protection plant
- Waters in underground floors, from infiltrations, etc.

Water rain draining networks and main elements

Materials of pipes and main elements of plants

Preservation and use of rain waters

**416.**

**Complete project of fire protection system  
(MKZSH)**

This system includes the total of architectonic, constructive, mechanic and electrical measures for “Prevention, protection and construction of Fire Protection System”.

These measures according to their function and way of application are divided into measures for “Passive Protection” and measures for “Active Protection”.

Passive protection that deals with architectonic and constructive arguments of fire prevention and protection, such as compartmentalization of structures; realization of roads and secure escape exists; reduction of fire load its spreading. Passive protection is subject of architectonic and constructive projects.

Active Protection that deals with manual fire detection and extinguishing system, fire and heat control system. Detection plants will be treated by electrical systems.

Fire protection system shall consist of hydrants. Hydrants shall be designed for the necessary flow and standards and shall be completed with all elements (cassettes, valves, rubber pipe, etc.). They need to be positioned in such a way that every point of the object could be covered by at least two hydrants and shall be placed nearest possible to passages of escape and evacuation (object shall have at least two escape and evacuation passages). If the building is more than story high, in the hydrants of each floor shall be a valve for connection of the fire-fighting teams.

Internal hydrants shall meet the following criteria:

To be installed separately for each compartmentalization;

To be positioned in the vicinity of exits of escape passages without being an obstacle;

To be positioned on both sides of the gate is there exists a REI gate;

To cover every space of the activity;

Every hydrant shall protect a zone up to 1000 m<sup>2</sup>;

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Every point of the protected zone shall be in a maximal distance of 20 m per mural hydrants and 30 m per naspot;

External fire hydrants that consist of the type of columns on the ground with a flow of 350 l/m and output pressure not less than 2.5 bar are composed of a columns coming from underground in which are positioned the connections that enable the water supply. The hydrant consist of columns with two exits respectively DN 70 and DN 100 with me stoppers linked with a chains and maneuver key (optional). The columns hydrants on the ground and underground hydrants shall be installed in order to:

To be not more than 60 m far from each other ;

Outside the building is recommend the use of column hydrants above the ground;

Where possible shall be installed in relation to exits from then building in order to be in a secure position in case of fire;

Distance between them from the external walls of the building is recommend between 5 m and 10 m .

The connection with auto-pump is a mean that helps fire extinguishing linked to the hydric network which can supply water in case of fire emergency. Every connection with the auto-pump shall provide:

- 1 or 2 linkages with a diameter not less than DN 70;

- To be well-fixes in the lateral walls outside the building, easily identified and accessible by fire-fighting vehicle;

- Output pressure not less than 1.2 Mpa.

Water supply system shall be able to provide at any time the necessary flow and pressure required by the plant in case of fire. As a water source shall serve:

- Fixed connection from the water supplying system of the city, uninterrupted;

- Fixed abundant basins with the with the necessary quantity of water anytime.

Wells, fountains or other insecure connections cannot be used as a source or water reserve. Measures shall be taken in order that the water shall contain no :

- Kelps or other blocking materials

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- Corrosive Materials

The pumping group shall be positioned in a protected venue, in the same level of the water reserve and shall be composed of :

- 1 or 2 pumps in line with EN733 norm together with the pilot pump (jockey) and diesel.

- Control Panel equipped with buttons in the frontal part and LCD screen.

There shall be taken measures for providing power supply from the normal grid and moro-generator.

The distribution network includes the underground network, visual external network and internal network of the building. It is preferred a ring system equipped with controlling interrupting valves.

The distribution network shall take into consideration:

- To consist of materials according to the norms;
  - To be painted with anti-mould paint;
  - To be protected from fire, damage and freezing;
  - To ensure the mechanical resistance;
- To take measures for seismic zones, passages in the walls or anti-fire division.

The MNZSH project shall also define the positions and necessary equipments for evacuation of fire (space with an automatic opening, ventilators for removal of fire, etc.).

The MNZSH Project shall also include the evacuation signaling system. Signals system enables persons to find the escape ways, emergency exits, fire extinguishing equipments or emergency phone numbers.

The fire alert, dimensions (depending on the sight distance) colors and their dimensions are determined in line with EN ISO 7010 norm. Signals system shall also be realized with other means :

through a sound communication system;

through a different consistency surface;

through chromatic contract on the floor visible in all illumination conditions

**417. 6.CONSTRUCTION**

**418.**

**6.1 Standards for the construction project**

STANDARDS OF REFERENCE

Eurocodes

- EC0 Basis of structure design
- EC1 Load in structures
- EC2 r/c structures design
- EC7 Geotechnic design
- EC8 Seismic structures design

Albanian Designing Terms and in concrete

- Technical Designing Terms KTP -1978
- Technical Terms for designing of anti-seismic constructions KTP-N.2-89

Schools design shall be based on structural design standards and also long as in our country there are still in force 1978 -1979 Technical Conditions of Design, which do not reflect the developments and recent norms drafted in this respect, we recommend that the school design could be done based on Eurocodes norms.

The eurocodes determine in details the types of loads (permanent, temporary, snow and wind, as well as their combination), which shall be taken into analysis during the structural analysis.

In this respect, we also underline that:

Before completing the design there should be carried out a geological and seismic study about the soil where the object will be built.

The school design shall be made with r/c structures and concrete make shall not be smaller than C25/30, whereas the steel to be used shall be from the make S500 (sideror) or its equivalent (e.g. FeB44k).





BASHKIA  
TIRANË

Likewise, we recommend that  
hydroisolated from outside.

foundations of the schools shall consist of r/c slabs,

Slabs of inter-floors of schools shall consist of monolite slabs with deep beams.

**419.**



**Tirana Municipality**

**GENERAL DIRECTORATE OF PUBLIC WORKS**

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420.

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424.

425. **DESIGNING TASKS**

**FOR REALIZATION OF STUDY AND DESIGN**

**“New construction of Type 4 school in Administrative Unit no. 8  
(Site 8/1)**



• TABLE OF Contents

<u>426.</u> .....	<u>DESIGNING TASK</u> .....	<u>45</u>
<u>427.1.</u> .....	<u>GENERAL DATA AND EXISTING SITUATION OF THE OBJECT</u>	<u>47</u>
<u>428.</u>	<u>2. ....GENERAL DESIGNING REQUIREMENTS FOR SCHOOL CONSTRUCTION</u>	<u>71</u>
<u>429.</u> .....	<u>Main space</u> .....	<u>2.1</u> <u>72</u>
<u>430.</u> .....	<u>Teaching classes</u> .....	<u>2.1.1</u> <u>72</u>
<u>431.</u> .....	<u>Laboratories</u> .....	<u>2.1.2</u> Error! Bookmark not defined.
<u>432.</u> .....	<u>Furniture</u> .....	<u>2.1.3</u> Error! Bookmark not defined.
<u>433.</u> .....	<u>Laboratories</u> .....	<u>2.1.4</u> Error! Bookmark not defined.
<u>434.</u> .....	<u>Working space</u> .....	<u>2.1.5</u> <u>83</u>
<u>435.</u> .....	<u>Music and dancing halls</u> .....	<u>2.1.6</u> Error! Bookmark not defined.
<u>436.</u> .....	<u>Social space</u> .....	<u>2.2</u> <u>89</u>
<u>437.</u> .....	<u>Libraries</u> .....	<u>2.2.1</u> <u>89</u>
<u>438.</u> .....	<u>Multi-purpose space</u> .....	<u>2.2.2</u> Error! Bookmark not defined.

<u>439.</u>	<u>2.2.3</u>
<u>Space for physical education</u>	<u>97</u>
<u>440.</u>	<u>2.3</u>
<u>Administrative space</u>	<u>98</u>
<u>441.</u>	<u>2.3.1</u>
<u>Headmaster’s Office / Deputy Headmaster’s Office</u>	<u>79</u>
<u>442.</u>	<u>2.3.2</u>
<u>Secretariat / administration rooms</u>	<u>98</u>
<u>443.</u>	<u>2.3.3</u>
<u>Teachers’ room</u>	<u>99</u>
<u>444.</u>	<u>2.3.4</u>
<u>Assisting Staff</u>	<u>100</u>
<u>445.</u>	<u>2.4</u>
<u>Other facilities</u>	<u>100</u>
<u>446.</u>	<u>2.4.1</u>
<u>Hygiene-sanitary venues</u>	<u>100</u>
<u>447.</u>	<u>2.4.2</u>
<u>Office of the physician</u>	<u>Error! Bookmark not defined.</u>
<u>448.</u>	<u>2.4.3</u>
<u>Office of the psychologist</u>	<u>Error! Bookmark not defined.</u>
<u>449.</u>	<u>2.5</u>
<u>Communication spaces, entrances, staircase, corridors, halls</u>	<u>Error! Bookmark not defined.</u>
<u>450.</u>	<u>2.5.1</u>
<u>Corridors</u>	<u>Error! Bookmark not defined.</u>
<u>451.</u>	<u>2.5.2</u>
<u>Staircase</u>	<u>Error! Bookmark not defined.</u>

<u>452.</u>	<u>2.5.3</u>
<u>Elevator</u>	<u>Error! Bookmark not defined.</u>
<u>453.</u>	<u>2.5.4</u>
<u>Hall</u>	<u>Error! Bookmark not defined.</u>
<u>454.</u>	<u>2.5.5</u>
<u>Storeroom, additional corners</u>	<u>Error! Bookmark not defined.</u>
<u>455.</u>	<u>2.5.6</u>
<u>Wardrobe</u>	<u>Error! Bookmark not defined.</u>
<u>456.3.</u>	<u>FURNITURE AND EQUIPMENT</u> <u>Error!</u>
	<u>Bookmark not defined.</u>
<u>457.</u>	<u>3.1</u>
<u>Antropometry and furniture dimensions</u>	<u>Error! Bookmark not defined.</u>
<u>458.4.</u>	<u>SPECIAL REQUIREMENTS</u> <u>Error!</u>
	<u>Bookmark not defined.</u>
<u>459.</u>	<u>4.1</u>
<u>Design for people with disabilities</u>	<u>Error! Bookmark not defined.</u>
<u>460.</u>	<u>4.2</u>
<u>School as a Community Center</u>	<u>Error! Bookmark not defined.</u>
<u>461.</u>	<u>4.3</u>
<u>Thermal Amenity (Temperature)</u>	<u>Error! Bookmark not defined.</u>
<u>462.</u>	<u>4.3.1</u>
<u>Definitions and Terminology</u>	<u>Error! Bookmark not defined.</u>
<u>463.</u>	<u>4.3.2</u>
<u>Improvement of thermal amenity</u>	<u>Error! Bookmark not defined.</u>
<u>464.</u>	<u>4.3.3</u>
<u>Active control of temperature</u>	<u>Error! Bookmark not defined.</u>

<u>465.</u>	<u>4.3.4</u>
<u>Temperature and humidity levels</u>	<u>Error! Bookmark not defined.</u>
<u>466.</u>	<u>4.3.5</u>
<u>Isolation standard</u>	<u>Error! Bookmark not defined.</u>
<u>467.</u>	<u>4.3.6</u>
<u>Thermal bridges</u>	<u>Error! Bookmark not defined.</u>
<u>468.</u>	<u>4.3.7</u>
<u>Requirements of U values (W/m<sup>2</sup>K)(thermal transmittance coefficient)</u>	<u>Error! Bookmark not defined.</u>
<u>469.</u>	<u>4.3.8</u>
<u>Windows and Doors</u>	<u>Error! Bookmark not defined.</u>
<u>470.</u>	<u>4.3.9</u>
<u>Passive control of temperature</u>	<u>Error! Bookmark not defined.</u>
<u>471.</u>	<u>4.4</u>
<u>Visual Amenity</u>	<u>152</u>
<u>472.</u>	<u>4.5</u>
<u>Sound Amenity</u>	<u>154</u>
<u>473.</u>	<u>4.6</u>
<u>Colors and their usage</u>	<u>Error! Bookmark not defined.</u>
<u>474.</u>	<u>4.6.1</u>
<u>Meaning of colors</u>	<u>Error! Bookmark not defined.</u>
<u>475.</u>	<u>4.6.2</u>
<u>Use of colors</u>	<u>Error! Bookmark not defined.</u>
<u>476.5.</u>	<u>PLANT DESIGN AND INSTALLATIONS</u>
	<u>Error! Bookmark not defined.</u>
<u>477.</u>	<u>5.1</u>
<u>Standards for electrical projects</u>	<u>Error! Bookmark not defined.</u>

“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

<u>478.</u> .....	<u>5.2</u>
<u>Mechanical plant</u> .....	<u>Error! Bookmark not defined.</u>
<u>479.</u> .....	<u>5.3 Fire</u>
<u>protection installation</u> .....	<u>Error! Bookmark not defined.</u>
<u>480.</u> .....	<u>5.4</u>
<u>Sanitary cold water supply system</u> .....	<u>Error! Bookmark not defined.</u>
<u>481.</u> .....	<u>5.5</u>
<u>Sanitary hot water system</u> .....	<u>Error! Bookmark not defined.</u>
<u>482.</u> .....	<u>5.6</u>
<u>Sewerage system</u> .....	<u>Error! Bookmark not defined.</u>
<u>483.</u> .....	<u>5.7</u>
<u>Plant for draining of rain and waste waters</u> .....	<u>Error! Bookmark not defined.</u>
<u>484.</u> .....	<u>5.8</u>
<u>Heating, Ventilation and air-conditioning (H.V.A.C)</u> .....	<u>Error! Bookmark not defined.</u>
<u>485.</u> .....	<u>5.9 Fire</u>
<u>protection plant</u> .....	<u>Error! Bookmark not defined.</u>
<u>486.</u> .....	<u>5.9.1</u>
<u>Passive Protection</u> .....	<u>Error! Bookmark not defined.</u>
<u>487.</u> .....	<u>5.9.2</u>
<u>Active Protection</u> .....	<u>Error! Bookmark not defined.</u>
<u>488.</u> .....	<u>5.9.3</u>
<u>Terms and graphic definitions of signal charts technical symbols</u> Error! Bookmark not defined.	
<u>489.</u> .....	<u>5.9.4</u>
<u>Terms and terminology of construction elements, distances, rescue ways, evacuation of smokes and active tools of fire alert-detection and extinguishing</u> .....	<u>Error! Bookmark not defined.</u>
<u>490.</u> .....	<u>5.9.5</u>
<u>Classification of fire dangel level</u> .....	<u>Error! Bookmark not defined.</u>

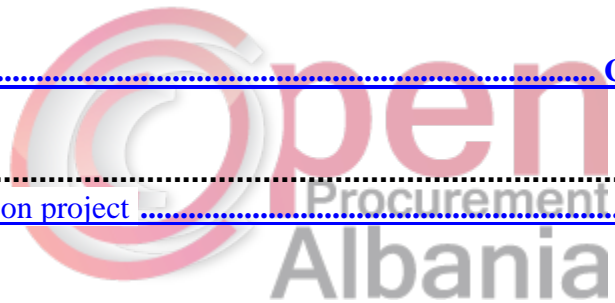
<u>491.</u> .....	<u>5.9.6</u>
<u>Hand-held (vessels) fire extinguisher .....</u>	<u>Error! Bookmark not defined.</u>
<u>492.</u> .....	<u>5.9.7</u>
<u>Half-portable system (hydrants, naspot) of fire extinguishing .....</u>	<u>61</u>
<u>493.</u> .....	<u>5.9.8</u>
<u>Fire Sprinkler System .....</u>	<u>Error! Bookmark not defined.</u>
<u>494.</u> .....	<u>5.9.9</u>
<u>Pressured Plants and water reserve for fire extinguishing .....</u>	<u>Error! Bookmark not defined.</u>
<u>495.</u> .....	<u>5.9.10</u>
<u>Distribution network, main installation and design components .....</u>	<u>Error! Bookmark not defined.</u>
<u>496.</u> .....	<u>5.9.11</u>
<u>Smoke and evacuation control system .....</u>	<u>Error! Bookmark not defined.</u>
<u>497.</u> .....	<u>5.9.12</u>
<u>Graphic presentation of additional necessary documents in drafting Mechanical Project of Fire Protection .....</u>	<u>Error! Bookmark not defined.</u>
<u>498.</u> .....	<u>5.9.13</u>
<u>Role and duties of staff in recognizing, maintaining and using fire extinguisher tools and action in case of a fire .....</u>	<u>Error! Bookmark not defined.</u>
<u>499.</u> .....	<u>5.9.14</u>
<u>Standards, norms and international and national normatives .....</u>	<u>Error! Bookmark not defined.</u>
<u>500.</u> .....	<u>5.10</u>
<u>Cold hydro/sanitary (H/S) water supply plant .....</u>	<u>Error! Bookmark not defined.</u>
<u>501.</u> .....	<u>5.10.1</u>
<u>Use of cold sanitary water .....</u>	<u>Error! Bookmark not defined.</u>
<u>502.</u> .....	<u>5.10.2</u>
<u>Need for cold hydro/sanitary water.....</u>	<u>Error! Bookmark not defined.</u>



<b>503.</b> .....	<b>5.10.3</b>
<b><u>Methods of primary water supply and provision of reserve water</u></b> Error! Bookmark not defined.	
<b>504.</b> .....	<b>5.10.4</b>
<b><u>Pumping station</u></b> ..... Error! Bookmark not defined.	
<b>505.</b> .....	<b>5.10.5</b>
<b><u>Distribution network and components of design and installation</u></b> Error! Bookmark not defined.	
<b>506.</b> .....	<b>5.10.6</b>
<b><u>Pipes materials and installation and design components of internal network</u></b> Error! Bookmark not defined.	
<b>507.</b> .....	<b>5.10.7</b>
<b><u>Filtration of sanitary water</u></b> ..... Error! Bookmark not defined.	
<b>508.</b> .....	<b>5.10.8</b>
<b><u>Design and installation of hot sanitary water</u></b> ..... Error! Bookmark not defined.	
<b>509.</b> .....	<b>5.10.9</b>
<b><u>Parameters of hot sanitary water</u></b> ..... Error! Bookmark not defined.	
<b>510.</b> .....	<b>5.10.10</b>
<b><u>Needs for hot sanitary water accordign to standards</u></b> ..... Error! Bookmark not defined.	
<b>511.</b> .....	<b>5.10.11</b>
<b><u>Preparation of hot sanitary water</u></b> ..... Error! Bookmark not defined.	
<b>512.</b> .....	<b>5.10.12</b>
<b><u>Dimensioning of hot sanitary water</u></b> ..... Error! Bookmark not defined.	
<b>513.</b> .....	<b>5.10.13</b>
<b><u>Network Distribution, installation components</u></b> ..... Error! Bookmark not defined.	
<b>514.</b> .....	<b>5. 11</b>
<b><u>Sewerage and wastewater plant</u></b> ..... Error! Bookmark not defined.	
<b>515.</b> .....	<b>5.11.1</b>
<b><u>Classification of drained waters</u></b> ..... Error! Bookmark not defined.	

<b>516.</b>	<b><u><a href="#">Dimensioning of draining system, normative values of draining</a></u></b>	<b><u><a href="#">5.11.2</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	
<b>517.</b>	<b><u><a href="#">Values of draining units according to devices</a></u></b>	<b><u><a href="#">5.11.3</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	
<b>518.</b>	<b><u><a href="#">Dimensions of draining columns</a></u></b>	<b><u><a href="#">5.11.4</a></u></b>
	<b><u><a href="#">173</a></u></b>	
<b>519.</b>	<b><u><a href="#">Ventilation of draining networks</a></u></b>	<b><u><a href="#">5.11.5</a></u></b>
	<b><u><a href="#">174</a></u></b>	
<b>520.</b>	<b><u><a href="#">Treatment of drained waters</a></u></b>	<b><u><a href="#">5.11.6</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	
<b>521.</b>	<b><u><a href="#">Materials of pipes and main components of draining</a></u></b>	<b><u><a href="#">5.11.7</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	
<b>522.</b>	<b><u><a href="#">Heating, ventilation and air-conditioning system (H.V.A.C)</a></u></b>	<b><u><a href="#">5.12</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	
<b>523.</b>	<b><u><a href="#">Meteorological data and external conditions of the environment</a></u></b>	<b><u><a href="#">5.12.1</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	
<b>524.</b>	<b><u><a href="#">Designing Conditions</a></u></b>	<b><u><a href="#">5.13</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	
<b>525.</b>	<b><u><a href="#">Designing Norms and recommended values of temperatures of premises</a></u></b>	<b><u><a href="#">5.13.1</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	
<b>526.</b>	<b><u><a href="#">Air-conditioning plant</a></u></b>	<b><u><a href="#">5.14 Air-</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	
<b>527.</b>	<b><u><a href="#">Heating</a></u></b>	<b><u><a href="#">5.14.1</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	
<b>528.</b>	<b><u><a href="#">Typology of heating plants</a></u></b>	<b><u><a href="#">5.14.2</a></u></b>
	<b><u><a href="#">Error! Bookmark not defined.</a></u></b>	

<u>529.</u> .....	<u>5.14.3</u>
<u>Heating system</u> .....	<u>Error! Bookmark not defined.</u>
<u>530.</u> .....	<u>5.14.4</u>
<u>Cooling</u> .....	<u>Error! Bookmark not defined.</u>
<u>531.</u> .....	<u>5.14.5</u>
<u>Ventilation – Fresh air</u> .....	<u>Error! Bookmark not defined.</u>
<u>532.</u> .....	<u>5.15</u>
<u>Thermal power station and mechanical equipments</u> .....	<u>Error! Bookmark not defined.</u>
<u>533.</u> .....	<u>5.15.1</u>
<u>Thermal power stations</u> .....	<u>Error! Bookmark not defined.</u>
<u>534.</u> .....	<u>5.15.2</u>
<u>Mechanical equipments</u> .....	<u>Error! Bookmark not defined.</u>
<u>535. 6.</u> .....	<u>CONSTRUCTION 177</u>
<u>536.</u> .....	<u>6.1</u>
<u>Standard for the construction project</u> .....	<u>177</u>
<u>537.</u> .....	<u>7.</u>
<u>ACCESSIBILITY FOR THE DISABLED/ARCHITECTURAL BARRIERS</u> Error! Bookmark not defined.	



## **MATERIALS TO BE PRESENTED BY PROCUREMENT ENTITY**

1. The Designing tasks for each educational object
2. Feasibility Study for pre-university educational infrastructure

## **METHOD OF PROVIDING COMPLETE PROJECT**

*e. Schematic and conceptual phase of design, which will be completed by companies participating in the competition:*

- Concept of the object
- Genplan of the object and external organization, staircase 1-500
- Distributive scheme, organization of school spaces
- Plan of all proposed floors with furniture, scale 1-200
- At least a A-A elevation scale 1-200
- Facades of the object, scale 1-200
- At least 4 render images of the external venues, 2 render images of internal space
- At least 1 axinometric drawing
- Report on the project
- Complete IPR of construction-installation and furniture of the object

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Methodology of works implementation

***f. Project implementation phase which will be completed by winning companies:***

Project of “New construction of Type 4 school in Administrative Unit no.8 (Site 8/1)” shall consist of :

- Plan of the structure establishment, which will be compiled in cooperation with General Directorate Territory Planning and Development in Tirana Municipality.
  - Technical Architectonic and Constructive Report.
- Architectonic project: Facades, object plan, furniture plan, terrace plan, etc.
- Object construction project: Plan of structures and details, plan for foundations, etc.
  - The movement plan for the disabled
- Project Implementation of hydrosanitary and sewerage systems
- Project implementation of electrical installation, telephone and internet network accompanied with the certified license of the designer
- Project Implementation of heating system, fire protection approved by Fire and Rescue Directorate of Tirana Region Prefecture
  - Project for arrangement and green spaces of the yard, project of sports venues
  - Technical Specifications for categories of works and furniture of the project
    - Detailed schedule of works according to categories.
    - Architectural details, layers, dorr/windows, furniture etc
      - Construction Materials to be used

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

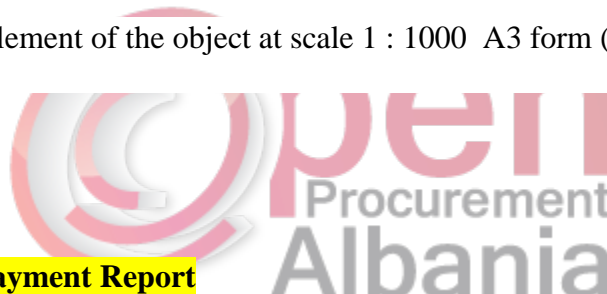
- Geological Report
- Seismicity Report
  
- Report of Assessment of Impact on Environment (VNM)

The entire material prepared for the project implementation phase will be submitted in six printed copies and electronically in CD.

Likewise, the designer shall present :

- Licence of the designing company + extract of Trade Registry
  
- Licences of designing engineers, licence of environmental expert + notarial declaration of the designing engineers
  
- Plan of settlement of the object at scale 1 : 1000 A3 form (original copy);

*VERSION 1*



**Preparation of the Interim Payment Report**

Total cost of the intervention will be defined in the final IPR of the object that will be prepared based on the implementation project, technical specification, taking into consideration special requirements of the Municipality regarding accepted standards and prices per unit according to the Technical **Manual of Prices in force or Technical Analysis of prices for categories not included in the manual.**

**538.**

*VERSION 2*

**Preparation of the Interim Payment Report**

*IPR of the object*

The final IPR of the object that will be prepared based on the implementation project, technical specification, taking into consideration special requirements of the Municipality regarding accepted standards and prices per unit according to the Technical Manual of Prices in force or Technical Analysis of prices for categories not included in the manual.

*Cost of construction and installations*

The total cost of the construction-installation and furniture will be based on the final IPR of the object providing the implementation company with the prices of every category envisaged in this IPR. This IPR shall be within the limit fund envisaged by the Contracting Authority. This cost will be exactly part of the general bid, thus, the project quality will be compared to the implementation quality within the same limit fund.

**539.**

**Standards**

***Design Standards***

The Project will be drafted in line with all norms and standards of designing envisaged by the legislation in force. The design shall take into consideration the respect of standards, even during the implementation. The Designer is responsible for the accuracy and respect of all the respective norms and standards. The Designer may recommend also the introduction of new standards of harmonization with EU norms, as well as the best international practices of design and implementation. Recommendations shall contain feasibility and profitability elements of the Albanian practice and financial limits for the project. During the drafting of the project, there shall be considered all the norms approved for the disabled, eye problem person, etc. The project shall envisage the necessary infrastructure for this category.

Technical infrastructure details for this category will be presented by the Designer in special sheets of the project.

**Recommendations for the designer**

- The Project will be drafted in close cooperation with the task force in Tirana Municipality for consultations and supervision of designing process.
- The designer shall use and review all the existing information in relation with the zone where the school will be built. Necessary data for the design, such as situation of the existing water supply and sewerage systems, illumination, high voltage cabins, regulatory plan of the zone, etc, shall be provided by the designer through request for information in the respective institutions.
  - The designer shall use preliminary studies and data of Tirana Municipality.
  - Quality of study shall meet the required standard

**Calculation, technical specifications and IPR**

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

The technical report accompanying the project shall contain :

- Technical report of the architectonic design
- Technical report of the constructive design including report on calculation of all structures (foundations, staircase, slabs, beams, etc), as well as engineering measures, security in the object during construction works. Attached to the report will be also the respective annexes with all the calculation including computer method of calculations for potential controls by the investor
  - Seismic report of the soil (general description in case of no study)
  - Technical Specification for each category of works
    - Full IPR of implementation works
- Geological report and physical-mechanical characteristics of the earth including physical-mechanical characteristics of soil and layers in the foundations of the new and existing object
  - Recommendations and proposals for special cases

**Presentation of drawings**

Drawings of the project implementation phase will be presented in a A3 version, readable and at the minimum consisting of the following sheets:

49. Topography of the existing situation updated with current constructions (formal and informal) and respective report
50. General plan of the object at Sc. 1:200; 1:500
51. Plan of floors in the object at Sc. 1:100, 1:50
52. New Facades in 2 D and 3D Sc.1:100
53. Elevation of the building (on both sides) Sc.1:100
54. Plan of foundations Scale1:100



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

55. Elevation of the foundations and details Sc.1:20; 1:10

56. Detailed Plan of Structures Sck.1:100; Shk.1:50

57. Plan of school furniture Sc.1:100

58. Plan of sewerage system Sc. 1: 100

59. Manholes and other details of sewerage system Sc.1:10, 1:20

60. Plan of water supply system Sc. 1: 200, 1:100

61. Axonometric schmes of water supply, details of hydrosanitary equipments Sc.1:100

62. Manholes and other detailes of water supply system Sc.1:20, 1:10

63. Plan, axinometry and heating system details Sc.1:100

64. Plan and detailes of fire protection system Sc.1:100

65. Plan of boiler room, construction, details Sc.1:100;1:50

66. Plan and details on lighting, installation of lights in the ceiling, installation of main box sc.1:100;1:50

67. Plan of power distribution scheme in the entire object, Sc. 1:100

68. Plan of telephony, internet network Sc.1:100; 1:50

69. Plan of external lighting and its details Sc.1:100; 1:50

70. Plan of sports venues, green spaces and details Sc.1:100; 1:50.

71. Plan of surrounding wall, type and details of placement of benches Sc.1:100; 1:50.

72. Plan of superficial waters draining and respective details sc. 1:100; 1:50.

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Each sheet of the object construction drawing shall be provided even the tables of specification for each material, steel, concrete, bricks, etc.

### **REFERENCES**

#### **General References**

- Existing Guidelines for Albanian schools that are now used as reference by planners, designers and supervisors of work areas;
  
- Law on Education of MoES;
  
- ISO Norms of Construction;
  
- Other Albanian Laws, including Law on Protection of Environment, Law on Territory Planning, Regulations on Fire Protection, Law on Construction, Guideline on Technical Conditions of construction objects for movement of the disabled, technical regulation for saving of thermal energy and thermal protection in buildings;
  
- New curriculum on general education
  
- Different standard projects for construction of schools in Albania
  
- Other guidelines prepared in advance from the consultant .

#### **Specific References**

- CoMD no.319, dt 12.04.2017, “On approval of designing standards in schools design”
- CoMD no.98, Dt. 06.02.2013, “On approval of List of Harmonized Albanian Standards of referring character for presumption of conformity for construction product
  - ISO Norms for Constructions
- CoMD No. 68, datë 15.2.2001, ”On approval of Standards and Technical COndiitons of design and implementation of construction works”.
- CoMD, No. 1503, Dt. 19.11.2008, “On approval of regulation “For exploitation of spaces by the disabled”.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Order of Ministry of Interior No. 425, Dt. 24.07.2015 “On acceptance, administration of technical and graphic documents of the fire protection and rescue project and issuance of technical acts”
- Order of Ministry of Interior No. 424, Dt. 24.07.2015 “On approval of technical rules for fire protection and rescue in residential buildings”
  - Law No. 152/2015 “On fire protection and rescue service”.
  - Law No.107/2014, Dt. 31.07.2014 “On Territory Planning”
- Law No. 69/2012, Dt.21.06.2012 “On pre-university education system in the Republic of Albania”.
- CoMD No. 408, Dt. 13.05.2015 “On approval of territory development regulation”.
  - CoMD. No. 626, Dt. 15.07.2015 “Normative of designing of residences”.
- CoMD No 628, Dt. 15.07.2015 “Technical rules of designing and construction of roads”.
- CoMD No, 691, Dt. 29.07.2015 “Inter-sectorial strategy for decentralization and local government”.
- CoMD. No.38, Dt. 16.01.2003 “On approval of norms, rules and terms of design, construction, production and preservation of heat in buildings”.
  - Normative provisions on Pre-University Education System, MoES, Tirana, 2013.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Zevi, B. Architectura-Zevi, Il Nuovissimo Manuale Dell Architetto.
  - Neufert, E. & P. Architectural Standard

### *Electrical*

- CEI 0-2 Guideline for definition of documents
- CEI 11-35 Guideline of execution of substations
- CEI 11-1 Electrical systems for alternative voltages higher than 1 kV.
- CEI 11-17 Plants of Production, Transport and Electrical Power Distribution
- CEI 11-20 Plants for Production of Alternative Energy, groups of electrogenerators connected in networks of I and II category.
- CEI 11-25 Short circuit currents in three-phase alternative systems. Their calculations.
- CEI 11-26 Short circuit currents, calculation of effects. Definitions and calculation methods
  - CEI 17-13/1 Security of equipment of low voltage use (low voltage boxes)
- CEI 31-30, 31/33, 31/35 Electric constructions of equipment installed in zones risking explosion due to gas presence. Classification of dangerous zones .
- CEI 64-8/1 Use of electrical plants in nominal voltages not higher than 1000 V alternative and 15000 V directt.
  - CEI 81-10/1-4 Protection from atmospheric discharges (lightning).
  - CEI 103-1/1 a 103.1/16 Plant of internal telephony
- CEI in CT 210 (electromagnetic compatibility) and CT 211 (exposure of man toward

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

electromagnetic fields).

- UNI EN 12464-I Internal lighting system of labor posts
- UNI Standard 9795 – Fixed systems of detection and automatic signal and fire alarm.
- UNI EN 1838 Lighting equipments. Emergency lighting .
- CEI EN 50173-1 Information Technology – General cabling system - Planning and criteria of installations within internal venues .
  - IEC 60076-11 Use of dry three-phase transformers .
    - IEC 103-1 / N PABX central.
  - 60617/1-2 CEI EN Symbols– Graphics used for diagrams, etc.
  - CEI 3-8 Abbreviations and symbols for sketches in plans
    - CEI electrical users 64-8/1-2-3-etc.
- CEI / UNI Products applied for design, construction, testing in plants and installation of materials, components and electrical equipments.

### *Mechanics*

- UNI/EN 12845 General Norms of Fire Protection;
- UNI 10779 Hydrants network. Designing, installation and use;
- EN 671 Fixed Systems of Fire Protection. Anti-fire flexible pipes;
  - EN 54-1 System of detection and alert – Introduction;
  - EN 54-3 System of detection and alert – Alert Equipments;
  - EN 12723 Pumps – General Terms of pumps and installations, definitions, quantity, symbols and units;
  - EN 60529 Protection Scale (Code IP) (IEC 60529:1989);
- ISO 65 Steel pipes with threads in line with Standard ISO 7-1;
  - EN 12094 Gas extinguishing systems;
  - EN 1356 Foam extinguishing systems;
    - UNI 9994-1 Portable vessels;
    - UNI EN 12416-2 Dust system;

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- UNI EN 13565-2 Foam System;
- UNI ISO 15779 Aerosol extinguishing system.

### *Constructive*

- EC0 Bases of structures design
  - EC1 Loads in structures
  - EC2 Design of r/c structures
  - EC7 Geotechnic design
  - EC8 Seismic Design of Structures
- Technical Conditions of Design KTP -1978
- Technical Conditions of Design for anti-seismic constructions KTP-N.2-89

### **TERMS**



Terms used in this designing tasks are referred to terminology defined in Law No. 69/2012, Dt.21.06.2012 “On pre-university education system in the Republic of Albania”.

#### Architectural/Engineering Terms

- Acoustic Amenity: Acoustic Condiitons in which schools and its users may act in maximal efficiency.
- Administrative spaces: Physical space of school dedicated to administrative activities.
- Movement spaces: Defined space for horizontal and vertical movement inside the building, such as halls, corridors and scales.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Climate amenity: Environmental conditions in which school and its users may act in maximal efficiency
- Education spaces : Physical space of school dedicated to education activities .
- Hygienic environment: General Conditions of hygiene in school affected by level of comfort and health of users that depend on physical and sanitary conditions of the buildings, water supply and sewerage systems which enables efficient and secure functions of school buildings.
- Orientation: Orientation of school building (part of education spaces) influenced by natural climate factors, such as sun and wind direction .
- Location of school building: Land surface where the education buildings are situated.
- Additional Spaces: Physical spaces in school buildings dedicated to support of educational and administrative activities.

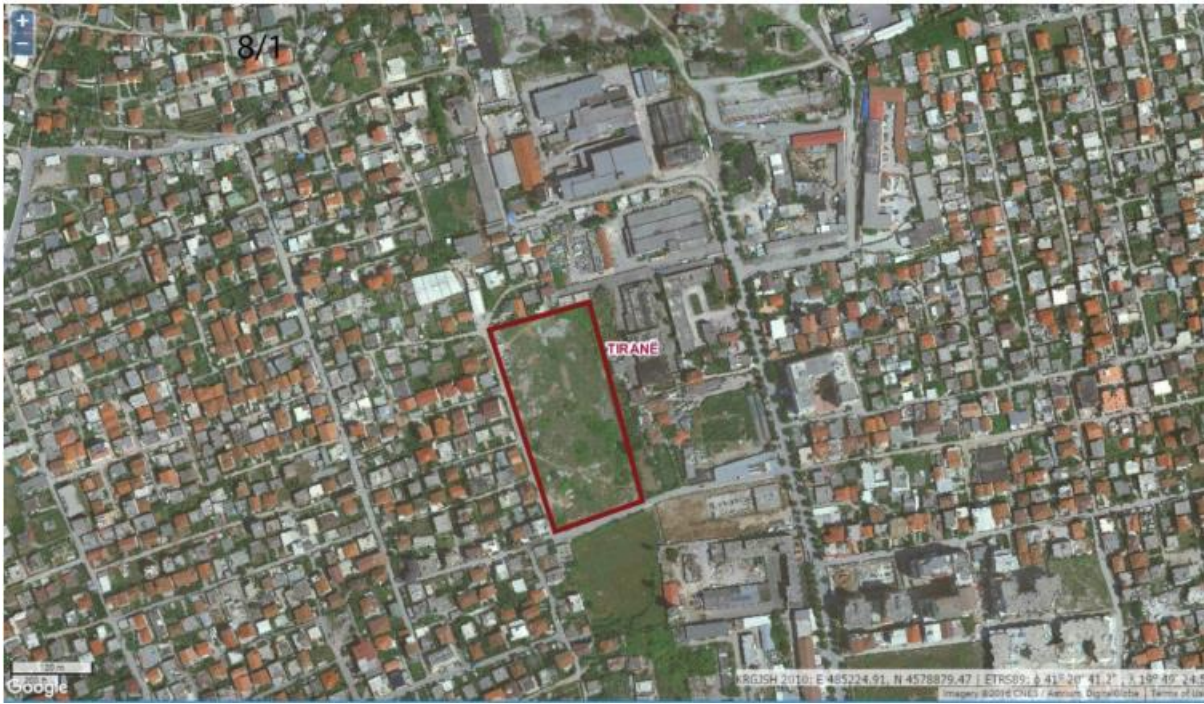


### 4. GENERAL DATA AND EXISTING STATE OF THE OBJECT

**Location.** The proposed site no. 8/1 for construction of type 1 and type 4 school is located near “5 Maji” str. Administrative Unit No. 8. Referred to Feasibility Study "*Improvement of educational infrastructure of Tirana Municipality*" November 2016)

**Description of the site :** Site 8/1 is situated in a relatively quiet zone with an easy access to the site. The road infrastructure may be problematic. It has a surface of about 17,510 m<sup>2</sup>.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**



**Picture 3** Location of the site 8/1 according to feasibility study

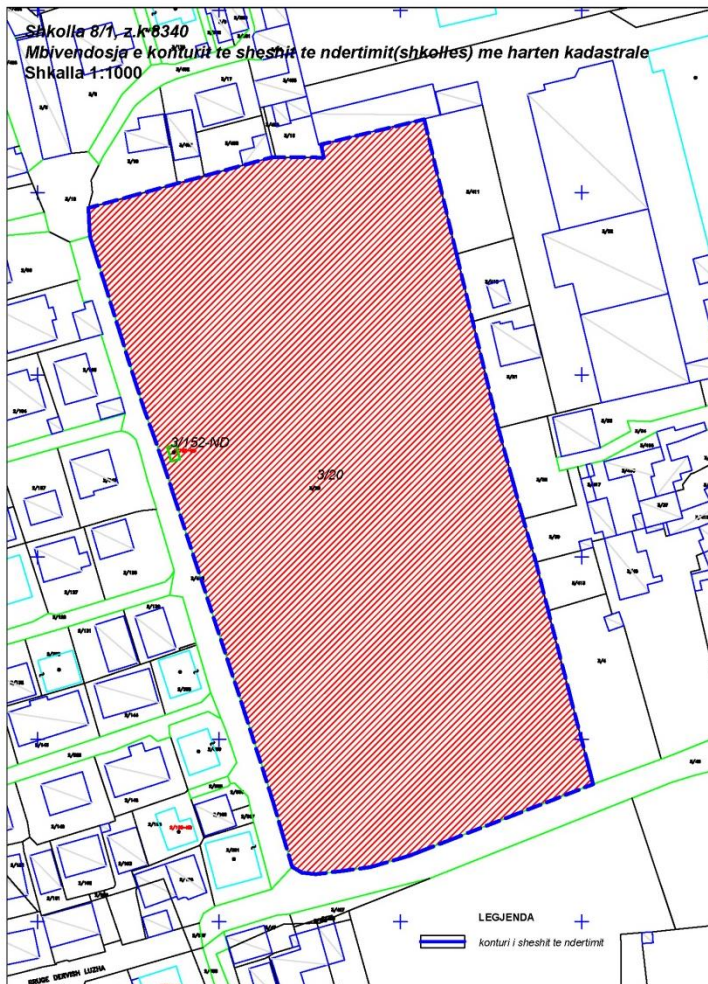


**Picture 2 – Photo of site 8/1**





Picture 3 – Cadastral map of the site 8/1



## 5. GENERAL DESIGN REQUIREMENTS OF SCHOOL CONSTRUCTION

In this territory will be built:

A. **School for urban higher middle education (Type 4)**

Construction of these objects will meet the needs for educational objects in this zone, as well as will affect the reduction of students' number in existing schools that are located in the borders of this unit.

**The higher middle education school** shall be equipped with all the necessary academic venues (teaching classes, including laboratories of physics, chemistry, biology, informatics, etc), gym with supporting spaces, administrative space, social space, etc. The object shall have an installed central heating system and fire protection system. Great attention shall be paid to organization of school yard. The external venues shall be systematized, including respective functional venues, sports premises, green spaces and external lighting.

### **Functionality**

During the school building design, there shall be created a balance between functionality and cost efficiency. This balance shall be achieved with different means, such as

Rational dimensions of spaces :

- (xi) Zones adapted to movement: movement spaces shall not be more than 25% of the fruitful built surface. They shall be adapted according to school users, they must be functional and respect the security demands;
- (xii) Optimal number of spaces: at first the number of spaces is calculated according to exploitation. In small schools, where the acceptable norm cannot be achieved, in particular for special teaching spaces, shall be considered creation of multi-purpose spaces;
- (xiii) Maximal compatibility: spaces shall have a maximal compatibility that would make them suitable for different subjects and changes, in cases when it meets their functional requirements;
- (xiv) Grouping of spaces: spaces shall be grouped in blocks according to function and interface. This would provide an easy identification of their corresponding activities and spaces, an easy communication between different spaces, without obstacles in movement and reception zones, an easy observation of spaces and an optimal exploitation of land at disposal;
- (xv) Integration of needs: establishment of spaces within the school shall follow the fundamental necessities, such as sanitary and hygiene rules, regulations of functional comfort and security, as well as acoustic, visual and climate amenity.

### **Flexibility**

Designer shall design sufficient spaces for flexibility in order to enable :

- (v) school staff to get used to schools venues and different teaching methods; and
- (vi) to enable planners to adapt the buildings for future needs of the school that correspond with the potential curricula and future program. a) Required flexibility for buildings (and furniture) that enables many teaching methods for normal classes (frontal teaching, work in groups, teaching through seminars, etc), laboratories and specialized halls (practical work in half groups, whereas demonstration in full groups), as well as multi-purpose spaces and sports areas (possibility of grouping several classes).

## **2.1 Main spaces**

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Referred to Feasibility Study "Improvement of educational infrastructure in Tirana Municipality" November 2016, the **Type 4** schools belong to higher middle education for urban zone with 21 classes.

For realization of the project according to typology of school and construction site, referred to “*Guideline for design of school building, norms and standards*”, drafted from the Ministry of Education and Sports, there shall be considered the following main parameters :

Higher middle education, classes 10 – 12, age 17- 19 years;

Number of cycles (parallels): 7

Number of classes: 21

Number of students/class 30

Total number of students 630

The abovementioned data are summerized in Table 4.

**Table 4<sup>3</sup>**

Type	Location	Cycle	No. classes	No/Class	No. st. total
Type 4	Urban	Higher middle education	21	30	630

**540.**

**541.**

**542. 2.1.1 Teaching classes**

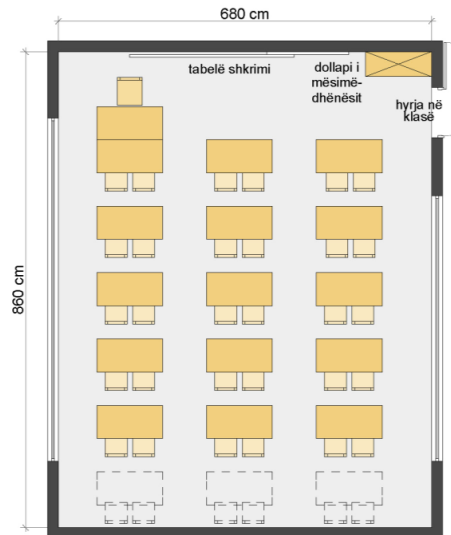
The design of teaching classes shall be calculated for a **1.94 m<sup>2</sup> / students - 2.18 m<sup>2</sup> /students** surface (optimal) for regular teaching rooms and 1.8 m<sup>2</sup> / students per specialized teaching rooms. Minimal height of classes (floor-ceiling completed) shall be 2.8 m.

Teaching classes are the main venues in a school. They shall be very suitable for the performance of the teaching process. A special care shall be paid to determination of the shape, dimensions, lighting and natural ventilation, as well as furniture. The surface of a class depends on the number of students in a class and is about **58 to 65 m<sup>2</sup>** in the zones with high density of population (**class with 30-36 students**). Number and dimensions of benches in frontal rows (3 double benches) as in length rows .

<sup>3</sup>Referred to Table no 2, page 44\_ Feasibility Study "Improvement of educational infrastructures in Tirana Municipality" November 2016 and Annex VIII5 for standard schools of higher middle education - urbane areas. Guideline for design of school buildings, norms and standards”, drafted by Ministry of Education and Science.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

**Surface of windows:** surface of windows is recommended to be 1/5 to 1/6 of floor surface, according to zones where the school will be built. For wide classes, in order to have a uniform lighting, the height of windows shall go up to the ceiling. The materials shall ensure the fire protection. From the floor up to 90 cm shall not be openable, and over 90 cm windows shall be openable only in vertical side, thus the object can be ventilated and does not allow jumping, i.e. boosting security.



**DHOMË MËSIMI STANDARDE**  
30 dhe 36 nxënës  
Niveli i Mesëm i Ulët dhe i Lartë

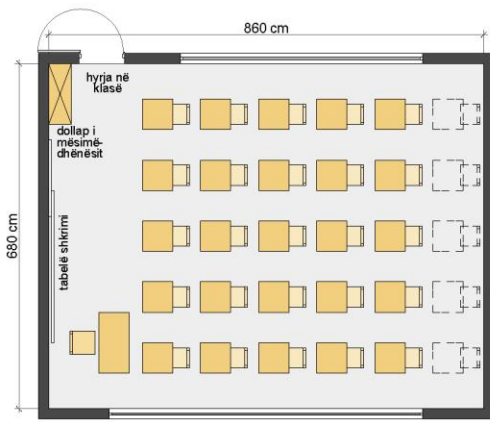
Plan of the classes are advisable to be rectangular (with a proportions of sides about 2:3) and almost square 6.8 x 8.6 m.

Depth of classes shall not pass 9m, nevertheless is obligatory that the student shall not be further than 6 meters from the window where the light comes. Classes shall minimally have two hours of direct light.

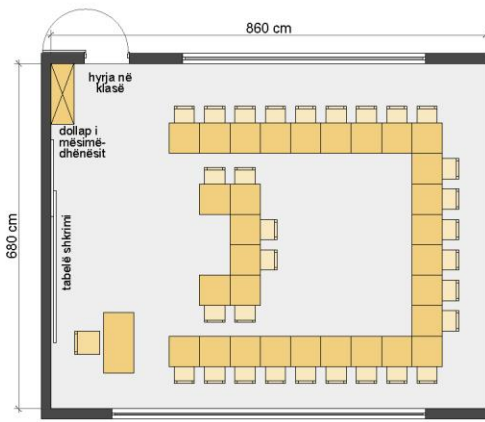
**Flexibility:** Designer shall design sufficient spaces for flexibility in order to enable the school staff to get used to schools venues and different teaching methods and planners shall adapt the buildings for future needs of the school that correspond with the potential curricula and future program.

The required flexibility for buildings (and furniture) enabling numerous teaching methods (see picture below) for normal classes (frontal teaching, work in groups, teaching through seminars, etc), laboratories and specialized halls (practical work in half groups, whereas demonstration in full groups), as well as multi-purpose spaces and sports areas (possibility of grouping several classes).

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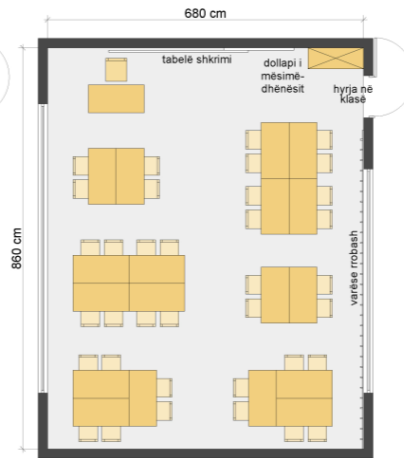
**Mësimi frontal, 30 -36 nxënës**  
Një tavolinë për një nxënës



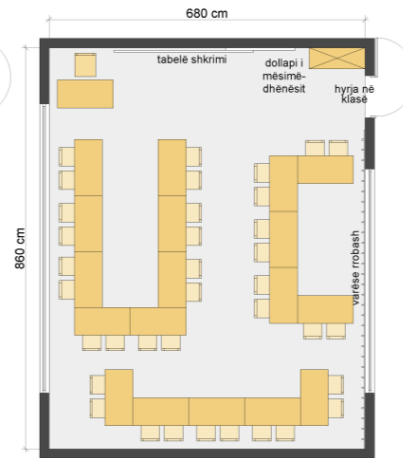
**Mësimi punëtor, 30 -36 nxënës**  
Një tavolinë për një nxënës



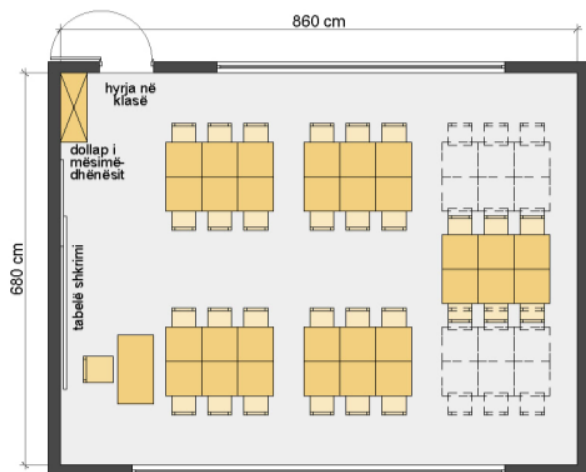
**Mësimi frontal, 30 -36 nxënës**  
Një tavolinë për dy nxënës



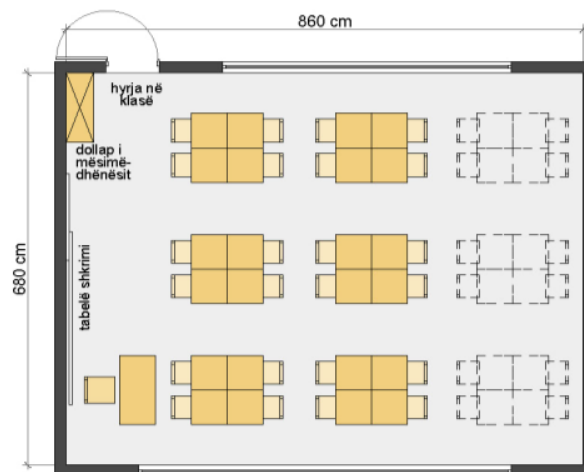
**Mësimi në grupe**



**Mësimi punëtor**



**Mësimi në grupe 30- 36 nxënës**



**Mësimi në grupe**

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

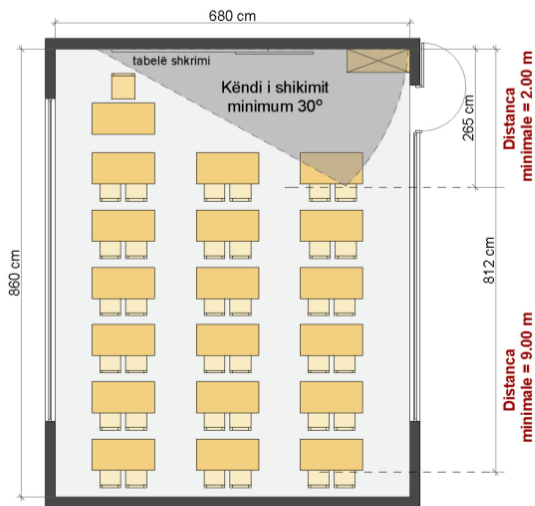
Types of separation of spaces in the design program shall be developed in structures that can be easily modified to meet other requests in the future. Flexible planning is essential in the schools design in order to meet the constant evolution in the education thinking and techniques of construction technologies. The same will help the adaptation of school with new exploitations through changes in planning and allow completion of these changes without big costs. In this respect, a flexible plan shall also enable easy adaptations for developments in the future regarding space planning, construction of buildings, artificial lighting, techniques of ventilation and acoustics. A flexible building (for example with a big of movable walls is in general very expensive and can be justified only in case changes are necessary and essential. There are not many reasons to determine several divisions and changes will happen only once a year.

**Visual angles and distances:** Often students complain that they are not able to see clearly the visual concretization means such as whiteboards and video-screens. Often the glow can cause difficulties in seeing clearly. Another important factor is the visual angle on which they see. Failure to see clearly may force students to stay in an uncomfortable position and this lack of comfort may cause loss of concentration. This is true for younger age students, whose eye angle distorts the image even in case of now powerful glow.

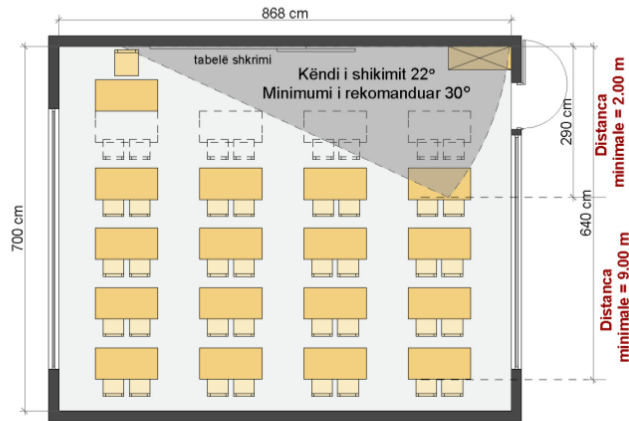
There exists evidence that students who sit where the eye angle is extreme or distance from the concretization mean is too big have lower results. If there exists the principle that students shall all have equal education rights, irrespective where they sit, then the designer shall pay attention to the arrangement of seats in order to :

- Maximal distance between the last row of students and writing board shall be about 9.0 m. Beyond this distance, it is difficult to read what is written and students force themselves to concentrate, to be able to understand the written text;
- Minimal distance between first row and writing board shall be about 2.0 m. Further, the first row students will not be able to see the entire writing board from an acceptable visual angle (see picture below);
- Minimal visual angle up to the writing board shall be  $30^\circ$  (see picture 1.3.6 below) so that the angle from which the concretization mean is seen does not alienate the understanding of what students see. Less than  $30^\circ$ , reading becomes difficult ;
- Main natural light shall be at maximum, coming from the left side of the students, in order that the shadow of their hand shall not fall on their work .

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**



**KOMODITETI PËR DHOMË MËSIMI  
ME 3 RENDE BANKASH**  
(30-36 dhe 42 nxënës në raste të jashtëzakonshme)



**KOMODITETI PËR DHOMË MËSIMI  
ME 3 RENDE BANKASH**  
(32 dhe 40 nxënës në raste të jashtëzakonshme)

**543.**

**Space of the table for each student**

*Width of the table for 1 student*

6 to 10 year old  
10 to 18 year old

*Width of table for 1 student*

6 to 10 year old  
10 to 18 year old

*Height of the table for 1 student*

6 to 10 year old                      65 cm  
10 to 18 year old                      74 cm



**Distance between two tables**

*Distance of table on the side :*

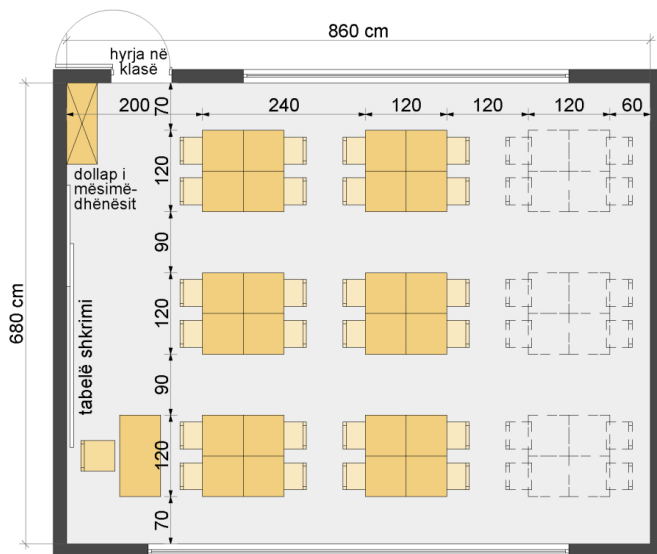
Up to the table or maximal height equipment                      55 cm  
Up to walls, radiators or similar    20 cm  
From the wall where the wardrobe is placed                              70 cm

*Distance of table from each other*

For tables with maximum 2 places close to each other  
10 to 18 year old    60 cm

For more than 2 places close to each other  
10 to 18 year old    65 cm

After the last row shall be envisaged some extra 5 cm .



Mësimi në grupe

- *Class furniture and their characteristics*

### General teaching class

#### 9. *Table for students, 2 students, dimensions: 1200 / 1300*

For tables for 2 students according to group age have the following dimensions:

First group : 1200 mm x 500 mm

Second group: 1300 mm x 600 mm

Material of working surface :

MDF board (Medium Density Fiber board).

Holding Construction :

Pipe skeleton in oval or paralleloiped shape. On both sides, outside of the table, a hook for hanging bags.

Made of plasticized or plated steel with a thickness of 1,5 mm.

#### 10. *Piled chairs*

Skeleton

Realized in aluminium, molded, plated, combined with a steel pipe and plastic cover, resistant to scratches and blows, vertical model on four legs that are piled, with a sliding base that moves by enabling the piling.



### Seat and back

Elaborated with plywood 8 – 10 mm thick in an anatomic shape, lacquered surface.  
The color depends of the interested person.

### 11. Universal double blackboard



Two-sided table that can be folded, where is possible to use chalk

Classical communication over 5 side (after being written on 5 sides)

Technical data are as following :

Traditional appearance mode

Chalk writing

Surface painted in green, magnetic

Easy to be wiped, thanks to extreme smooth structure of the surface

Aluminum frame with PVC gray corners

Scratchless surface and acid resistant

Matt green color, with a non-reflective surface

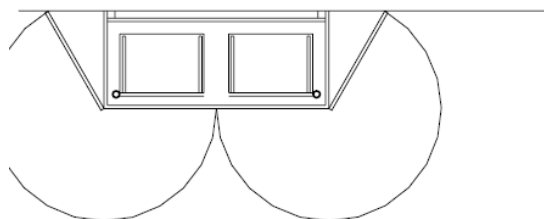
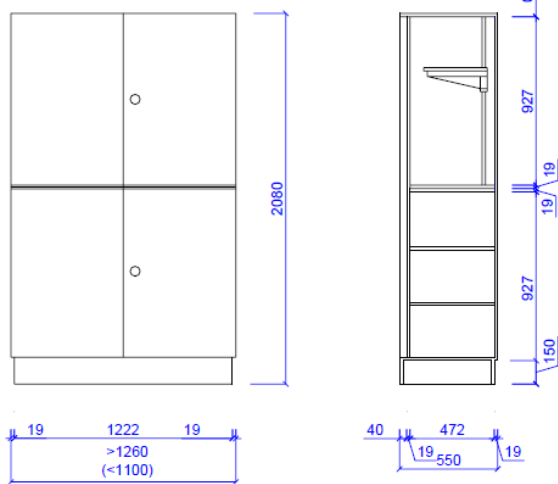
2 sided table that can be folded, enamelled on both sides

The delivery shall include also the chalk holder and mounting set .

Dimensions: 90 x (2 x 60) x 120 cm

100 x (2 x 75) x 150 cm

100 x (2 x 100) x 200 cm



### 12. Cupboard for the class

Dimensions : about 950 x 500 x 2030 mm

Upper part of the cupboard (separations for establishment of equipment):

A double fixed floor (through a **shlice** system same as in the parket floors) which could serve as a separation between the back and lower part of the cupboard.

2 drawers with changeable heights with a screwed floor serving as a holding surface for the projectors or other equipment of the class (weight to be held is about 20-25 kg)

Composed of two cupboard parts.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

For both parts of the cupboard two rotating folding roods 270 °, with a protection slat in closure

Removable base – 150 mm high

Made of melamin or MDF.

The body, separations of the drawers and doors are well-attached with the plastic on both sides with 1,0 mm– top base at least 1,5 mm.

All edging of the doors, body and separations of the drawers are coated on all side with a 3 mm plastic stripe.

Skeleton:

2 pieces of cupboard drawers with a changeable height movable in two pipes.

8 pieces of folding bolts made of metal – opening angle 270 degrees

544.

2 rotating supporting pieces of a cylinder at a big size.

### **2.1.2 Laboratories**

The designer shall envisage the following for new higher middle education school :

- 2 (two) laboratories of informatics
- 3 (three) laboratories of physics
- 2 (two) laboratories of chemistry
- 2 (two) laboratories of biology

For the calculation of space of these laboratory classes shall be considered the space for each student, as well as shall be calculated the additional venues for the equipment and pre-preparations.

- ***Furniture of laboratories and their characteristics***

#### 545.      Laboratory of Chemistry

- ***Students table for two places with sockets and tap***

Dimensions: total : about 1200 x 700 x 700 mm, out of which

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Upper surface : about 1200 x 700 x 40 mm

Skeleton: about 1200 x 700 x 700 mm

Two hooks for bags

Upper surface:

Enamelled ceramic material (without whirligig, as an only plaque) with three raised edges.

Connection to the energy pillar is acid-resistant and from the mechanic point of view

The upper surface is attached to the metallic skeleton by anti-mould screws.

Acid resistant.

Under the upper surface for each student there exists a space for putting books realized with a plated aluminium metallic net with the dimensions : 350 x 350 x 120 mm.

Skeleton:



In the shape of a steel pipe, plasticified or plated, square (30 x 30 mm), with a shim 1,5 – 1,8 mm, realized to be mounted in the floor, composed of a plated frame (not made of pieces but as a whole) with two metallic leg; the metallic legs are equipped with seals of changeable heights to create a horizontal plane, independent from the floor level.

- ***Laboratory table for techers with socket and acid***

***resistant***

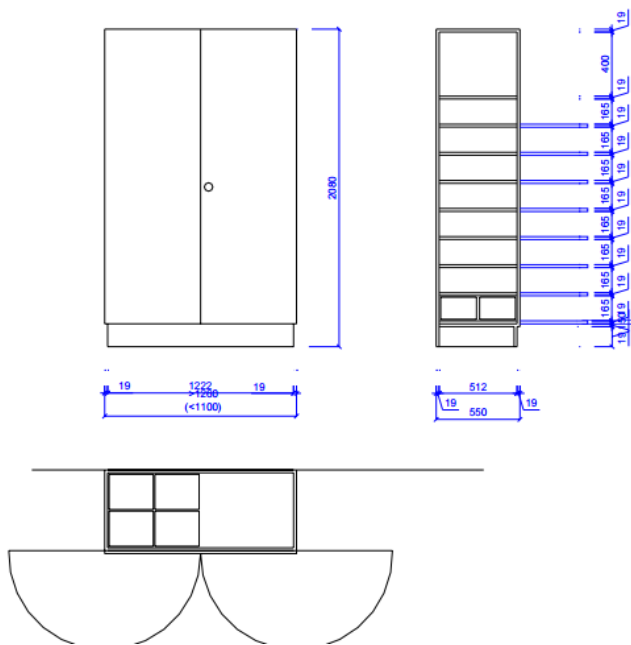
Dimensions: about 1800 x 750 x 900 mm

Upper surface :

Dimensions about 1800 x 750 x 40 mm, made of enamelled ceramic material, large surface with raised edges on all sides of the installed sink inside the upper surface (on the opposite side of the door leading to the laboratory) with an internal space of at least 510 x 360 x 300 mm, acid resistant with whirligigs resistant to acids.

- ***Cubboard for preservation of chemistry lab equipment***

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”



Dimensions: about 1260 x 550 x 2080 mm. Made of melamin coated with plastic and surrounding edges made of plastic stripes in a fixed of MDF manner. 1 melamin sheet or MDF (thickness min. 20 mm), separation of drawers of the cupboard with a changeable height, 8 melamin or MDF layers (thickness min. 20 mm), separation of drawers that can be fully opened with a protection cover of plastic material on all sides, 15 mm wide. 2 rotating doors with a protection slat against clashes. Lock with cylindric rotating with big handle.

### *Laboratory table resistant to acids*

Dimensions about 2300 x 1500 x 900 mm

#### *Upper Surface:*

Dimensions about 2300 x 1500 x 40 mm

With an enameled ceramic material on a large isolated surface and resistant to acids.

In the frontal part a sink (with internal space minimum 600 x 400 x 300 mm), on the left and right of the sink an inclined surface for removal of water drops. In the horizontal axis two sinks in the shape of a funnel (with an internal space at least 210 x 210 x 280 mm)

Skeleton of upper part where are put the chemicals.

Dimensions about 1800 x 350 x 700 mm.

Skeleton with six legs in the shape of a tube with two drawers fixed in the upper surface of the table; the upper edge of first drawer about 550 mm above the upper surface; in the lower part in the entire length and width between the metallic skeleton prepared on an installation edge about 150 mm high. Upper frame of the second drawer about 700 mm on the upper surface; on the side of the sink returned in its position about 300 mm. Both drawers are fixed and immovable with the metallic skeleton.

#### *Lower tallboy*

General dimensions (including the top base) about 2180 x 1380 x 860 mm

The height of top base 150 mm. Isolated on the ground.

4 tallboys each with 4 drawers and 3 holders for each drawer

4 tallboys each with a drawer division and a rotating door.

1 free space down the upper surface to place the washer of lab tools

Down the frontal part of the draining sink a shelter and a rotating door. All metallic bolts shall be resistant to scratches and plastic coated.

#### *Water supply*

In the frontal part of the sink a vertical exit about 300 mm high in a good external position, with the draining of cold water in a 200 mm distance from the vertical tube, with 3 draining valves; out of which

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

one is for the hot water with battery of mixture (sink group) connected to hot water supply (central system of hot water with a small boiler -10 liters under the table type)

Sink in the shape of a funnel: with a simple valve in a vertical exit about 300 mm high, draining about 150 mm from the vertical axis; a double valve in a vertical pillar about 300 mm high, draining about 150 mm from the vertical axis,

Distance about 120 mm.

### **Laboratory of physics /biology**

#### ***Table for students for 3 positions with sockets***

Dimensions: total – about 1800 x 600 x 760 mm; out of which

Upper Surface : about 1800 x 600 x 25 mm

Skeleton: about 1800 x 450 x 730 mm

Data on height without including screws that serve for its regulation.

Free space: minimum of height 650 mm

Metallic legs are placed on the left (students view)

According to the accompanying plan-sketch

Free space: Minimum height 650 mm

Upper surface:

It is a melamin or MDF layer coming out on the skeleton from its long side; 75 mm

Skeleton: with a profile in the shape of tube or square, suitable to be mounted on the floor and composed of a frame plated construction (compact), without interruptions, with four metallic legs.

Metallic legs are equipped in the end with regulatory screws to create an independent horizontal axis from the floor level; metallic legs in the sector of installation sector with a distance of about 75 mm, covered from all sides with melamin or MDF plaques. The cover of box is movable from internal side in order to carry out the installation.

Six hooks for hanging school bags.

Electrical installations in the installations box:

From the teachers side: double socket 220 V, emergency stop button for power supply in all students tables, 4 sockets with free capacity, earthed socket. All sockets placed inside for 4 mm.

From the students side : a double socket 220 V

Students table is placed according to the plan of arrangements.

#### ***Sink with a sub-construction (with tallboy)***

Laboratory sink with sub-construction with three doors (divisions) and an included dustbin.

Dimensions: length 1500 mm; width 560 mm; height 900 mm

Upper surface:

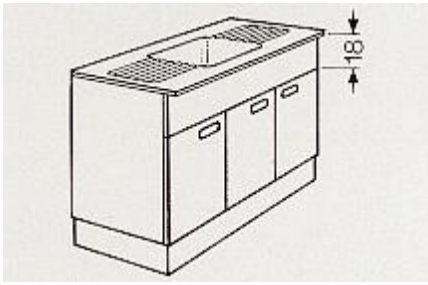
Sink with a hole of a light space from inside with a length of 510 mm,

width 360, depth 195 mm and with two parts for drying the vessels (left and right)

with total dimensions with a length of 1300 mm, width 560 mm.

The sink is made of stainless material.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**



Water supply: A vertical pillar about 300 mm high with a drain of 200 mm, equipped with a draining valve for cold and hot water (with a mixed battery)

Dressr :

Dimensions about 1500 x 500 x 860 mm; top base 150 mm high; divisions are 180 mm lower than the lower level of the upper surface; made of melamin or MDF.

Three rotating doors with protection slat against clashes.

**- *Collection cupboard of biology / physics***

Dimensions about 1050 x 560 x 2050 mm or 1200 x 560 x 2050 mm

Material: melamin or MDF.

2 bases of drawers with a changeable height.



7 bases of drawers that can be withdrawn outside up to half width (steel construction) easily to be removed for demonstration purposes. All bases of drawers with a 15 mm fixing slat on both sides and with a holding force of minimum 600 N  
2 rotating doors in two thirds of the height covered with glass and with rotating slats and three bolts each  
Lock with clip and rotating latch with a big handle.

**546. Laboratory of informatics**

**- *Students table for informatics with 2 positions (1600 x 800 mm)***

Tables of informatics are separated into tables for Deskops and table for Laptops

Dimensions of table for Deskop:

Total: about 1500 x 800 x 700 mm

Upper surface: about 1500 x 800 x 25 mm

Skeleton: about 1500 x 640 x 670 mm

Free space : minimum height 630 mm

2 hooks located in the inside for hanging bags of the students

1 channel under the table for passing cables and placing sockets

1 triple socket with a connection cable of minimum 1,5 m

Work upper surface:

Melamin plaque; coated with plastic substance and plastic lateral stripe coming out on the skeleton,

Skeleton:

In the shape of tube, realized to be mounted on the floor, composed of a construction with a plated frame (without interruptions) with metallic legs; the metallic legs are equipped with screws for changing the height in order to provide an horizontal level not depending on the floor level.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Channel for installation of the cable that provides the current and for the network cable on one side of the length, with a cover that can be unscrewed and a separation line in this cable channel.  
The entrance of the cable is possible on one of two ending parts of the installation box. The Cable exits through the gap to sensitizing devices placed on the table.  
Under the left or right upper surface is the holding construction of central unit made of melamin with dimensions : 500 x 250 x 600 mm.

**- *Students chairs with changeable height***

Skeleton:

Vertical columns with a base of 5 crossed legs made of plated metal and with support on the floor with caps made of PVC (fixed) or with wheels.  
Changeable height from 420 mm to 600 mm through an axis coated screw for the PVC cap type and 470 mm up to 670mm for the type with wheels.  
The seat and back is made of pressed plywood material.  
Color according to the orderer’s wish

**- *Movable one-sided table***

Dimensions : about 2000 x 1200 mm,  
Steel surface of glueing magnet without glow

**- *UPS 1000VA Specifications***

<b>MINIMAL TECHNICAL CHARACTERISTICS</b>	
<b>“OUTPUT”</b>	
<b>“Power”:</b>	1000 VA
<b>“Power Factor”:</b>	≥0.8
<b>“Wave Form”:</b>	Sinusoidal
<b>Nominal Voltage:</b>	220-240 VAC
<b>Frequency:</b>	50 Hz +/- 5%
<b>“Volt, regul. (On+/-10% battery)”:</b>	

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<b>“Output Connectors”:</b>	$\geq$ (4) IEC 320 C13 (from the battery)
<b>“INPUT”</b>	
<b>“Nominal Voltage”:</b>	220 - 240 VAC
<b>Frequency:</b>	50 Hz
<b>“Voltage Window :</b>	170 - 270 VAC
<b>Automatic Voltage Regulator “AVR”:</b>	<b>Yes</b>
<b>“Input Connectors”:</b>	(1) IEC 320 C14
<b>COMMUNICATION &amp; MANAGEMENT</b>	
<b>“Shutdown Software”:</b>	<b>Yes</b>
<b>“Led Indicators”:</b>	For all situations
<b>“Audible Indicators”:</b>	For all situations
<b>Data Communication Connector “Data”:</b>	(1) DB9 Serial use USB
<b>”Protection”:</b>	Overload, Discharge, and Overcharge Protection
<b>BATTERIES</b>	
<b>“Transfer time”:</b>	$\leq$ 4 ms

<b>“Back-Up Time”:</b>	$\geq$ 6 min. full charge
------------------------	---------------------------

<b>“Battery Type”:</b>	12 V DC 7 Ah Lead-acid
------------------------	------------------------

<b>ACCESSORIES</b>	
<b>“Power Cord”:</b>	(1) European IEC-C13



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<b>“PC Power Cord”:</b>	(2) IEC 320 C13 - IEC 320 C14
<b>“Data Cable”:</b>	(1) DB9 Serial - DB9 Serial ose USB- USB
<b>WARRANTY</b>	
<b>“Warranty” period: 2 years</b>	

*Specification for computers (minimum one computer/student and one computer for the teacher)*

<b>MINIMAL TECHNICAL</b>	
	5400
<b>Min points for processor according to: cpu</b>	
<b>“RAM”:</b>	4 GB, min. DDR3 1600 MHz Non-ECC
<b>“HDD Size”:</b>	500 GB
<b>“Media sizes”:</b>	7200 Rpm SATA 6.0Gb/s
<b>“Disk subsystem controller”:</b>	Serial ATA 6.0 Gb/s
<b>“Graphics”:</b>	≥ 1 GB
<b>“Media Device”:</b>	DVD+/-RE
<b>“Slots”:</b>	Minimum (3) PCI/PCI-E, out of which (1) x16 PCI-
<b>COMMUNICATION &amp; MANAGEMENT</b>	
<b>“Ports”:</b>	Min. (8) USB out of which: e. min (2) USB before f. min (2) USB 3.0 (1) RJ-45, (1) audio in/out, (1) mic. and headphone, (1) VGA.
<b>“Networking”:</b>	(1) 10/100/1000 LAN Integrated Gigabit Ethernet Port.
<b>“Sound”:</b>	Integrated Sound Card
<b>“Speakers”:</b>	Internal or Built-in Monitor
<b>“Security Management”:</b>	Embedded Security TPM
<b>“Preinstalled Licensed O. S.”:</b>	OEM Windows 10 64-bit Professional
<b>“Keyboard”:</b>	Standart Keyboard QWERTY
<b>“Mouse”:</b>	Minimum 2 Button scroll Optical
<b>“Power Supply”:</b>	220 V AC, 50 Hz
<b>ACCESSORIES</b>	
<b>“Power Cord”:</b>	European
<b>Recover CD :</b>	Recover CD/DVD ose Recover Partition
<b>MONITOR</b>	
<b>“Type”:</b>	
<b>“Size” :</b>	21”

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<b>“Native Resolution”:</b>	1920 x 1080 at 60 Hz
<b>“Constrast Ratio Static”:</b>	1000:1
<b>“Display Port”:</b>	(1) VGA and at least (1) of ports DVI/HDMI/DP
<b>“Response Time”:</b>	≤ 5 ms
<b>“Energy Efficency”:</b>	Energy Star
<b>“Power Supply”:</b>	220V AC, 50 Hz
<b>WARRANTY</b>	
<b>“Warranty” period:</b>	3 years

6. Specifications for Laptop (min. two laptop/ laboratory)

<b>MINIMAL TECHNICAL</b>	
	3400
<b>Min. points for the processor according to:</b> <a href="http://cpubenchmark.net">cpubenchmark.net</a>	
<b>“Chipset”:</b>	Intel ose Ekuivalent
<b>“RAM”:</b>	8 GB shared Dual Channel min. DDR3 1600 MHz
<b>“HDD Size”:</b>	500 GB
<b>“Media sizes”:</b>	7200 Rpm SATA
<b>“Graphics”:</b>	Integrated Graphics with 1 GB video memory
<b>“Media Device”:</b>	DVD+/-RW with DL Memory Card Reader
<b>“Diplay”:</b>	15.6” LED display, Anti Glare
<b>“Battery”:</b>	min 4-cell battery
<b>COMMUNCATION &amp; MANAGEMENT</b>	
<b>“Ports”:</b>	Min (3) USB ports out of which min. (1) USB 3.0 DisplayPort ose HDMI Out Integrated digital mics Integrated Web Camera Headphone jack/Microphone jack
<b>“Networking”:</b>	10/100/1000 LAN (RJ 45) Wireless 802.11
<b>“Sound”:</b>	High Definition Audio2.0
<b>“Preinstalled Licensed O. S.”:</b>	OEM windows 10 64-bit Professional
<b>“Keyboard”:</b>	QWERTY

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<b>“Pointing Device”:</b>	Touch pad & usb mouse
<b>AKSESORËT</b>	
<b>“Power Cord”:</b>	European
<b>“Recharger”:</b>	Yes
<b>Bag:</b>	Yes, from the producer. Suitable for laptops and other accessories
<b>“Recover” and “Drivers” CD/DVD:</b>	“Recover”, “Drivers” CD/DVD or Rec. Partition
<b>GARANCIA</b>	
<b>“Warranty” period:</b>	3 years

7. Specification for Printer/scan/photocopy

<b>MINIMAL TECHNICAL</b>	
<b>"Model":</b>	print/scan/copy
<b>“Print Speed” A4:</b>	≥18 ppm
<b>“Monthly duty cycle”:</b>	8000
<b>“Technology”:</b>	Laser ose LED
<b>“Print Quality”:</b>	600 x 600 dpi
<b>“Input Capacity”:</b>	150 sheets
<b>“Output Capacity”</b>	50 sheets
<b>“Media format”:</b>	A4
<b>“Memory”:</b>	≥32 MB
<b>“Min. optical scan resolution”:</b>	600 x 600 dpi
<b>"OS supported"</b>	Windows 7 and up (32 bit & 64 bit)
<b>“Toner”:</b>	Accompanied with Kit
<b>COMMUNICATION &amp; MANAGEMENT</b>	
<b>“Interface”:</b>	High Speed USB 2.0
<b>“Ethernet” Communication Port:</b>	Not specified
<b>ACCESSORIES</b>	
<b>“Power Cord”:</b>	European
<b>Software/Drivers CD:</b>	Yes
<b>USB Cable :</b>	Yes
<b>WARRANTY</b>	
<b>“Warranty”:</b>	1 year

547.

548.

549.

## 2.2 Social spaces

### 550. 2.2.1 Library

The users of the library may be the students and teachers, therefore the calculation of libraries spaces shall take into consideration this fact.

For high schools, the library space shall be calculated based on students number and necessary space for each student must be 0,15 m<sup>2</sup>. Designers shall take into consideration the space for books archive and reading positions for students. Designers shall take into consideration that the reading venue of the library shall have a natural lighting as much as possible. Each reading post shall include sockets.

#### - *Library table (1000 mm)*

Square shape

Dimensions: about 1000 x 1000 x 720 mm

Upper surface:

Dimensions: about 1000 x 1000 x 25 mm

Skeleton:

Dimensions: about 1000 x 1000 x 690 mm

Tube shape – coated with plastic or chrome-plated material with 4 plastic sliding basements that regulate the height and frame in the shape of a tube, plated (uninterrupted).



#### *Cupboard for files*

Dimensions about 940 x 500 x 900 mm

Corpus (body)

A vertical separation in the middle made of melamin or its equivalent, fixed up and down with screws.

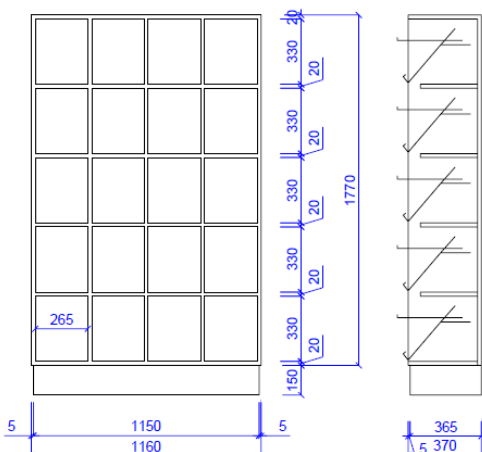
In every vertical sub-division are three drawers, made also of melamin, which will enable the placement of drawers.

16 drawers for about 15.000 kartela that can be easily extracted.

The drawers are made of wood with a place to be attached and removed easily.

Dimensions of drawers: 210 x 210

x 480 mm



#### - *Book shelves (depth 30 cm)*

Dimensions: about 900 x 320 x 2080 mm

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5 mobile divisions for drawers

According to the accompanying plan-scheme

The heads (main components ) shall be realized by taking into account the possible serial connection according to the space.

Construction with frames composed from main parts located on the sides and a drawer base situated above that is linked and fixed at the height of the top base.

The surface is made of a wooden base coated with rimesso.

4 sliding and movable bases made of plastic to regulate the height.

**- *Drawer for papers and magazines***

- According to the accompanying plan-scheme

Dimensions about 1160 x 370 x 1920 mm

The heads shall be realized by taking into account the possible serial connection according to the space.

Frame constructions composed of the main components placed on the sides and a drawer base placed in front and attached and fixed at the height of top base.

1 complete plaque placed from the behind

Open part with 20 units

For each unit there is one mobile drawers separation sliding according to a slip with tap that serves as a stopper of the type PVC and attaching slat PVC 35 mm placed in the frontal position.

**ii. *Multi-purpose space***

The multi-purpose spaces include venues that can be used for several purposes, such as meeting rooms for students and teachers, meeting rooms for teachers and parents, halls for organization of symposiums, display of different film materials, etc. This space shall be designed in the shape of an auditorium and count a seating capacity of at least 100 persons. There shall be a space to serve as a scene or special lectures enabling the school to organize broader activities. The hall shall have an audio sytem and technics room to control the lights, audio, projector, etc. The hall shall be acoustically functional. This space shall have two entrances, one direct entrance from school corridors and one directly connected to the public space of the school in order to be sufficiently flexible also for beyond school hours. Its minimal height shall be same as two floors of the classes, i.e minimum 5.6 m floor – ceiling.

Equipment for such a multi-functional hall :

**- *Overhead projector***

Overhead projector MENTOR 250 basic mode

Technical data

Projektor overhead for daily use

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Halogen lamp : 2x 24 V/250 W

Objective with 3 lenses with  $f = 315$  mm

Roboust carcass

Simple use

Rapid inclusive changer of the lamp, scratchless lenses of the make Fresnel, Ventilator, thermal fuse , 5 m network cable.

Weight: 13 kg

Dimensions : L 34 x B 36,5 x H 70 cm

Labor surface 285 x 285 mm

Clearness : about 2.200 ANSI-Lumen

The following picture presents a MENTOR 250 dia film. It is recommended the use of this projectors or a similar make that meets the same criteria

**- *dia film projector***

Followig are presented two types of different projectors with dia film, one is new with a remote control and the other connected to cable.

Technical data of the type: **OPLITE 7**

1 x Projector

ARCHITECTURAL/ENGINEERING SERVICES FOR PROCESSING OF SPECIFICATIONS OF CONSTRUCTION MATERIALS AND SPECIFICATION OF EQUIPEMENT AND FURNITURE OF SCHOOLS

MINISTRY OF EDUCATION AND SCIENCE

SPECIFICATIONS OF FURNITURE AND LAB EQUIPMENT Page -66-

2 x Lamps 400W - 36V

1 x Bag for its transport

1 x 3280 store for dia film

1 x enlargement objective 70-120 mm (1:2,8)

1 x cable for remote control

1 x control panel with 6 functions of the type IFR 8

The following picture presents a SIMDA dia film. It is recommended the use of this projectors or a similar make that meets the same criteria

Technical data of the type: **OPLITE 4**

1 x Projector

2 x Lamps 250W - 24V

1 x Transportation bag

1 x 3280 store for dia film

1 x enlargement objective 85-150 mm

1 x cable for remote control

Focus regulation + / -

The following picture presents a SIMDA dia film. It is recommended the use of this projectors or a similar make that meets the same criteria

**- *Working table for conference room***

Dimensions: rreth 1950 x 975 x 720 mm.

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Upper surface : Dimensions : about 1950 x 975 x 30 mm. Made of melamin or equivalent material, with plastic coat and plastic stripe for the edges.

Skeleton: Dimensions: about 1950 x 975 x 685 mm. Metallic tube with four legs based on the floor and equipped with height regulating screws made of PVC.

### 7.3 Communication Room (IT Room )

#### - *Specification of Network Equipment*

The IT room shall meet the following criteria:

- Dimensions of the room at minimum of 2 m x 2 m (4 m2).
- Note: *If it is planned that school will have a server there shall be an air conditioning system where the standard temperature must register a standard of 21 degrees.*
  - The server room shall have a rack for minimal cabling of 24 HU.
  - Minimally a UPS 1000VA for network devices such as switch, router wireless etc.
- Patch-panel 24 Port per cabinet (rack) depending on connections necessary for each position
  - Switch-e Layer 2 for network distribution
- Router Wireless for spreading of internet signal in places destined for internet acces.
- Patch-Cord 1 m ose 2 m, Cat6 (for connections between switches and patch panels)
  - Socket Rack 6 with sigurese (rack)
  - Switch with 5 ports

MINIMAL TECHNICAL	
"Type":	Switch Gigabit unmanageable 5 Ports
"Number of Ethernet Ports" :	5 Ports Gigabit
"Forwarding modes":	Store-and-forward
"IEEE Network Protocols":	IEEE 802.3 Ethernet IEEE 802.3ab 1000BASE-T
Certifkimi i produktit,	CE mark
"Accessories included":	Power Supply Power Adapter Quick Install

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“Warranty”:	1 year
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- Switch with 8 Ports

MINIMAL TECHNICAL	
"Type":	Switch Gigabit unmanageable 8 Ports
"Number of Ethernet Ports" :	8 Ports Gigabit
“Fowarding modes”:	Store-and-forward
"IEEE Network Protocols":	IEEE 802.3 Ethernet IEEE 802.3ab 1000BASE-T
"Certification":	CE mark
"Accessories included":	Power Supply Power Adapter Quick Install
	1 year

- Switch with 24 Ports

MINIMAL TECHNICAL CHARACTERISTICS	
Interfaces and HW characteristics	Switch 24 Port L2
Port PoE 10/100/1000Mbps RJ45 (Auto Negotiation /Auto	≥24
uplink port (copper/fiber) 100/1000Mbps SEP Slots	min. 2 Combo Optional
Porta Combo	Optional
Port Consol RJ45/RS232	1
Installation in rack	19” rack mountable
"INPUT"	
Nominal voltage	100~240VAC
Frequency	50/60Hz
PERFORMANCE AND FLEXIBILITY	
Bandwitdth/Backplan	≥ 48 Gbps



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<b>Throughput</b>	≥35 Mpps
<b>Jumbo Frame</b>	Optional
	16k
<b>Fan</b>	Optional
<b>STANDARDS</b>	
<b>IEEE 802.3 - 10BASE-T</b>	Yes
<b>IEEE 802.3u - 100BASE-T</b>	Yes
<b>IEEE 802.3ab -1000BASE-T</b>	Yes
<b>IEEE802.3z -1000BASE-X</b>	Yes
<b>IEEE 802.3ad –aggregation link</b>	Yes
<b>IEEE 802.3x -full duplex on 10BASE-T, 100BASE-TX, and</b>	Yes
<b>IEEE 802.1d -Spanning Tree Protocol</b>	Yes
<b>IEEE 802.1s- multi STP</b>	Yes
<b>IEEE 802.1ë- RSTP</b>	Yes
<b>IEEE 802.1q -VLAN</b>	Yes
<b>IEEE 802.1x - Port-based Network Access Control</b>	Yes
<b>IEEE 802.1p -QoS classification</b>	Optional
<b>IEEE 802.3at</b>	Yes
<b>IEEE 802.3af- PoE</b>	Yes
<b>OPERATIVE SYSTEM</b>	
<b>Oriented for LAN operations</b>	Yes
<b>Upgrade possibility</b>	Yes
<b>QUALITY OF SERVICE</b>	
<b>Priority queues</b>	Yes
<b>Queue scheduling</b>	SP, WRR
<b>Characteristics Layer 2 and 3</b>	
<b>IGMP Snooping</b>	V1/V2/V3
<b>Spanning Tree</b>	STP/RSTP/MSTP
<b>LLDP</b>	Yes
<b>BPDU Filtering/Guard</b>	Yes
<b>Loopback Detection</b>	Yes
<b>802.3x Flow Control</b>	Yes
<b>VLAN</b>	4k, (Voice VLAN Optional)
	802.3ad LACP
<b>Adressing IPv6</b>	Yes

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<b>DHCP/BOOTP, DHCP Snooping, DHCP Option82 for clients</b>	Yes
<b>Dynamic ARP inspection (DAI)</b>	Yes
	Port/Flow
<b>Policy-based routing (PBR)</b>	No
<b>Routing</b>	No
<b>SECURITY</b>	
<b>Access Control List</b>	min L2
<b>TCP/UDP Ports</b>	Yes
<b>Protocoll DSCP</b>	Yes
<b>Authentication</b>	TACACS+ , RADIUS, IEEE 802.1X, Port/MAC, SSH v1/v2, SSLv2/v3/TLSv1
<b>Storm Control</b>	broadcast, multicast, unicast
<b>MANAGEMENT</b>	
<b>Web-based GUI dhe CLI.</b>	Yes
<b>RS-232 console/ RJ45 Console</b>	Yes
<b>Telnet, SSH</b>	Yes
<b>CPU monitoring</b>	Yes
<b>SNTP</b>	Yes
<b>Upgrade of Firmware</b>	TFTP or Web interface
<b>Led screen</b>	Optional
<b>SNMP v1/v2c/v3</b>	
<b>SYSLOG</b>	Yes
<b>Warranty</b>	1 year

Router Wireless

<b>MINIMAL TECHNICAL</b>	
<b>"Type":</b>	Router Wireless Wi-Fi Gigabit
<b>"Operation Mode":</b>	Wireless router mode Access point mode Media bridge
<b>Rating:</b>	Min AC 1900
<b>"WiFi standards":</b>	IEEE 802.11a/b/g/n/ac
<b>"Network Standart":</b>	IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IE EE 802.11ac, IPv4, IPv6

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<b>"Ports":</b>	(1) Gigabit WAN Port (4) Gigabit LAN Ports (1) USB
<b>"WAN Connection Type":</b>	Automatic IP, Static IP, DDNS, PPTP
<b>"Transfer rate" :</b>	up to 1.3 Gbps
<b>"Routing protocols":</b>	IPSec, L2TP or PPTP
<b>"Band":</b>	Dual band: 2.4 GHz & 5 GHz
<b>"Antennas":</b>	Build-in or external
<b>"Security features":</b>	WEP 64/128-bit WPA2-Personal & Enterprise
<b>"LED indicators":</b>	Yes
<b>"Buttons":</b>	WPS Button Reset Button Power
<b>"System requirements":</b>	Windows 7, 8 ose 10
<b>"Power Supply":</b>	AC Input: 110V ~ 240 V (50 ~ 60Hz)
<b>"Accessories included":</b>	Quick start guide ROM with documentation External Antennas (optional) Ethernet cable
	3 year

**551. 2.2.3 Hall for physical education**

**High schools**

The high schools must have a special closed premise (gym) for physical education and venues in its extranral yard.

The minimal dimensions of the gym shall enable playing of basketboll and volleyball, i.e 18 m x 26 m. Its minimal height shall be equal to two floors, at minimum 5.6 m floor–ceiling.

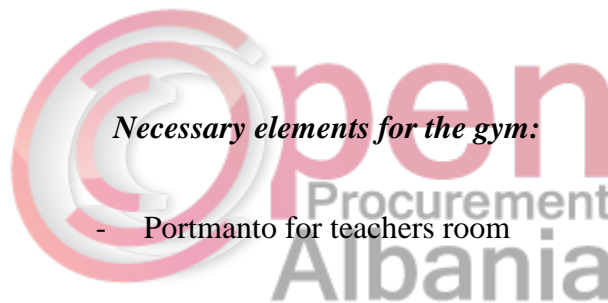
In this respect, the physical education hall shall include the following additional venues:

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- two wardrobes at minimum 20 m<sup>2</sup> each.
- two toilets – showers at minimum 20 m<sup>2</sup>
- a depot for tools at minimum 20 – 30 m<sup>2</sup>
  
- venue for teachers with toilet-shower and wardrobe minimum 16 m<sup>2</sup>

The gym shall envisage the paving with wood parket and lined for organization of volleyball/ basketball in it.

The gym shall also have the supports for placing volleyball nets and baskets and tables for basketball.



***Necessary elements for the gym:***

- Portmanto for teachers room
- Clothes hangers (for the gym)
  - Long benches
  - Baskets for internal venues
- Swedish double stairs 2x (1mx220 m)
  - Gymnastics mattress
  - Volleyball net

**552.**

**2.3 Administrative Space**

553. For each type of planned school following are made evident the number of academic and administrative staff :

Numri i stafit te nevojshem											
Shkolla sipas numrit te klasave	Nr. Nx	Nr Klasave	Mesues	Drejtor	Nendrejtor	Sekretar	Psikolog	Punjes Social	Roje	Punetore pastrimi	Mjek/Infermier
Shkolle 9-vjecare me 20 klasa, me 30nx/klase	600	20	26	1	1	0	1	1	1	3	1
Shkolle 9-vjecare me 30 klasa, me 30nx/klase	900	30	40	1	2	0	1	1	1	3	1
Shkolle 9-vjecare me 20 klasa, me 24nx/klase	480	20	26	1	1	0	1	1	1	3	1
Shkolle e mesme e larte me 21 klasa, me 30nx/klase	630	21	32	1	1	1	1	1	1	3	1

**554. 2.3.1 Office of headmaster /Office of deputy headmaster**

The office of headmaster and deputy headmasters shall be distributed in each floor in order to cover the school territory.

The office of headmaster for high schools shall be at minimum 25 m<sup>2</sup>

The office of deputy headmaster for high schools shall be at minimum 16 m<sup>2</sup>

Table: Dimensions about 3700 x 1020 x 720 mm

Surface about 1950 x 975 x 50 mm Melamin made of natural wood slat

Skeleton

Upper surface is based on two legs with a diameter of 500 mm, made of mass wood painted with natural lacquer.

**555.**

**556. 2.3.2 Secretariat /room for the administration**

These schools need a secretary office. The space for secretary office shall be at minimum 16 m<sup>2</sup>. It is preferable to be located on ground zero.

- Cupboard for registries

Dimensions about 1260 x 450 x 2080 mm

Material of the corpus and sub-divisions : Melamin plaque – with a plastic coat with plastic coating stripe of the edges.

Divisions are realized by taking into account the serial potential connection according to space and its better exploitation.

1 vertical uninterrupted division

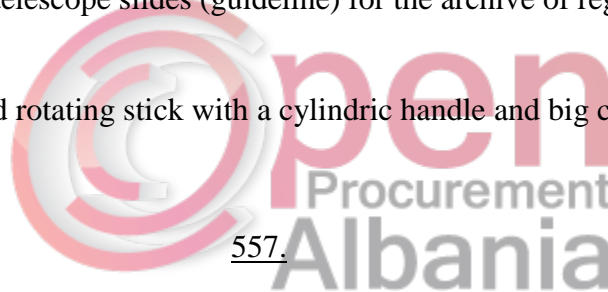
2 fixed drawers separations, in half width

2 drawers separations whose height can be regulated, in half width

1 frame in the telescopic slide (guideline) that can be removed by additions (small case) for inventory sheets and accounting – vertical (size of sheet 380 x 260 mm) in half width.

4 framews to be withdrawn in telescope slides (guideline) for the archive of registries with the dimensions A4 – in half width

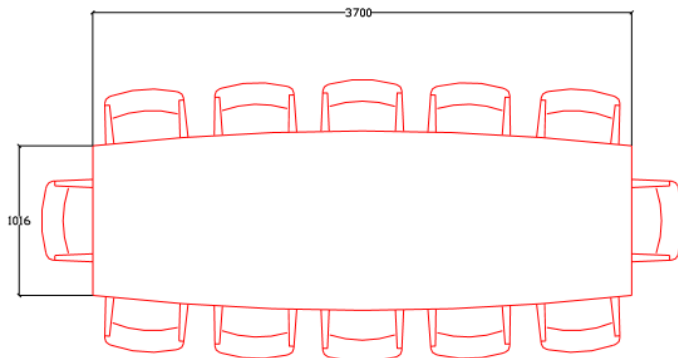
2 rotating doors with a lock and rotating stick with a cylindric handle and big cylinder suitable for the general closing system.



### **558. 2.3.3 Teachers room**

The space for teachers room in high schools shall be 2,5 m<sup>2</sup> per each teacher. If there are several teachers rooms, then it is preferable to have them in different floors.

- Meeting table



Dimensions about 3700 x 1020 x 720 mm  
Upper surface about 1950 x 975 x 50 mm.  
Melamin with natural wooden slat

Skeleton

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The upper surface is based on two legs with a 500 mm diameter, made of mass wood painted in natural lacquer.

**559. 2.3.4 Supporting staff**

For the supporting staff, where is included the maintenance staff, there shall be envisaged a venue of 2 m<sup>2</sup> per each person.

**560.**

**2.4 Additional venues**

**561. 2.4.1 Hygiene-sanitary**

Sanitaries, teachers, students, male/female

Sanitary block including toilets shall be in every floor.

***Location***

Teaching and recreation classes shall not be further than 50 m from the sanitaries.

***Number***

The determination of number of WC, it is based on norms indicated in the following table, which is valid for all school categories.

	No. students / Teachers	WC cabins	Pissoirs	Sinks
Male				
Students (boys)	About 100	2	4	2
Teachers	About 20	2	2	1
Females				
Students (girls)	About 100	4	One WC with bidet	2
Teachers	About 20	2	One WC with bidet	1
Maintenance room	2 m <sup>2</sup> for each floor			

It is not recommendable to have separated toilets for teachers and students. Thus, it is envisaged that they shall share the same service space, corridor, sink, etc.

A continuous care shall be paid to sanitary equipment to avoid concerning odors.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

*Furthermore, it is recommended:*

Walls shall be resistant to scratches, if possible, not able to write on them, i.e. to pave them with majolica tiles up to the minimal height of 1,6 m.

Doors of the toilets shall be about 70 cm and possible to open from outside.

The pissoir shall have plenty of water to avoid concerning odors.

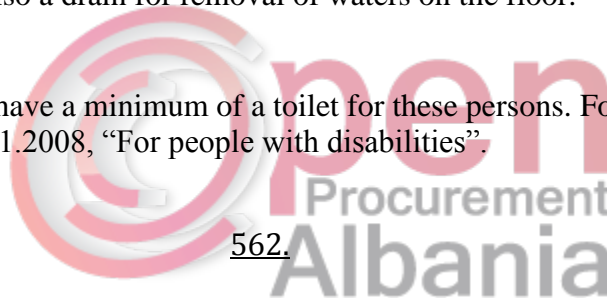
Minimum dimensions of a WC linkage shall be not less than 1,3 m x 0,9 with a minimal height of 2 m

Sanitations shall be hydro-isolated and with a good ventilation

For washing the WC venues, designers shall envisage a tap that can be connected with an elastic pipe and a drain for collection of waters. The pre-rooms of bigger sanitation groups shall be envisaged also a drain for removal of waters on the floor.

### ***Sanitations for the disabled***

All categories of schools shall have a minimum of a toilet for these persons. For further information refer to CoMD No. 1503, dated 19.11.2008, “For people with disabilities”.



562.

### **563. 2.4.2 Office of the physician**

The office of the physician is located in the ground floor of the building and counts a surface of 17-18m<sup>2</sup>, with recommendable dimensions of 6x3m. The 6m length is necessary for a regular performance of examinations for students visibility and hearing.

The office shall have a sink.

Natural illumination shall be provided by a window with a size equal to 1/6 of the office's surface. The artificial illumination shall be 100 lux.

### **Cupboard for medical instruments**

Dimensions about 1260 x 550 x 2080 mm

Material of the corpus and subdivisions :

Melamine plaque – with a plastic coating layer and a plastic stripe coating the edges.



## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Divisions shall be realized taking into account the potential serial connection according to the space and best exploitation.

1 drawers division that may be totally removed with a minimal holding force of 600 N (free illuminated space 250 mm)

2 drawers division that may be totally removed with a minimal holding force of 400 N each (free and illuminated space of 250 mm)

3 drawers divisions moving according to the height: one according to depth of cupboard, whereas the other two up to the depth of about 320 mm.

Divisions located in a depth of about 320 mm are movable according to the entire height, therefore an extra row is necessary for the drawers holder. All the divisions that may be fully removed are equipped on all sides with a holder 15 mm high.

Two rotating doors with a clash-protection slat. Cylindric lock and rotating lever with a big handle where it can be kept and a big cylinder.

### **564. 2.4.3 Office of the psychologist**

Office of the psychologist is located in the ground floor of the buildings and counts a surface of 17-18m<sup>2</sup>, with recommendable dimensions of 6x3m. The 6m length is necessary for duly performance of students' examinations.

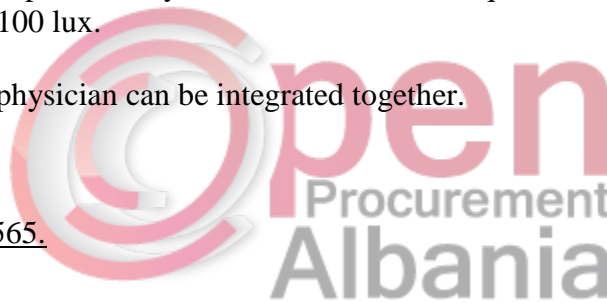
The office shall envisage a sink

The natural illumination shall be provided by a window with a size equal to 1/6 of the office's surface.

Artificial illumination shall be 100 lux.

The space of psychologist and physician can be integrated together.

565.



**566.**

### **2.5 Communicative venues, entrances, staircase, corridor, halls**

All the categories of schools required communicative venues, entrance, hall, corridors, staircase, ramps, handrails for the stairs.

School entrances shall enable free entries-exits of students. The dimensions of entry-exit doors shall depend on the number of students in the school. For each school entrance, the designer shall envisage a shelter.

There should be an emergency exit in each floor, in further possible distances from the main entrance.

The maximal distance between each door and emergency exit of the floor shall be 30 m. The width of the emergency exit shall be 0,55 m for each 60 persons.

The ground floor shall have at least two entrances.

### **567. 2.5.1 Corridors**

***They must meet the following criteria:***

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

The width of the corridor when it serves for classes only from one side shall be at minimum 2m.

The width of the corridor when it serves for classes from both sides shall be at minimum 3 m.

The height of the corridor shall be at minimum 2,8 m floor - ceiling.

Corridors shall provide a natural illumination

Furniture to be placed in the corridors:

***Metallic drawers that can be closed by key***

Dimensions: Depending on the number of divisions per width of the division 300 mm / 400 mm, we have: Drawers with a width : width per drawer with 1 division = 300 mm / 400 mm width per drawer with two divisions = 600 mm / 800 mm width for drawer with three divisions = 900 mm / 1200 mm width per drawer with 4 divisions = 1200 mm / 1600 mm width per drawer with 5 divisions = 1500 mm

The height of drawers depends on the way of organization and is :

For drawer with upper base: 1750 mm For drawers supported on legs: 1850 mm For drawers with a class A bench: 1950 mm. For drawers with class B bench: 2100 mm

Their priorities are:

Optimal self-ventilation

Long-lasting and robust metallic construction

Lateral holes that enable the simple joining of several drawers

Zinc-coated and painted legs

Elaborated round-edges metallic material

Sustainability and protection against physical damage

Metallic stable hook welded in the internal side of the door

Sustainable anti rust paint

Door with a ventilation gap and locking system with an individual key

In the internal part: 1 drawer in the upper part, 250 mm high

Metallic drawers shall be calculated in order to have a division at the disposal of each student.

**568.**

**569. 2.5.2 Staircase**

***It shall meet the following criteria :***

The width of stairs: minimum 1,2 m /100 students + 0,2 cm for every 100 students.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

There shall not be designed or implemented a spiral staircase

The height of the stairs handrail shall be 1,10 m

For stairs with a width up to 1,5 m, handrail is placed only on one side.

For stairs with a width up to 2 m, handrail is placed on both sides

For stairs wider than 2 m, there should be a handrail even in the middle.

Walking space shall be treated with anti slippery material

Staircase shall have a natural illumination

Staircase shall not have more than 18 threads in a ramp

For other elements of staircase design refer to CoMD No. 626, Dt. 15.07.2015 “Normative of dwellings design”.

For the disabled refer to CoMD No.1503, Dt. 19.11.2008 in approval of regulation “Exploitation of facilities by persons with disabilities”.

**570.**

**571. 2.5.3 Lift**

***It shall meet the following criteria:***

The lift shall serve for the vertical movement of the disabled or in other necessary cases, if there is no other technical solution.

Minimal width of the lift door: 85 cm

Holding pipes and control panel of the lift not higher than 90 cm

Dimension of the internal space of the lift not less than 1 m x 1.4 m

### **572. 2.5.4 Hall**

The hall is a very important and necessary element for schools. Halls on the ground floor enable quick movement of students from main entrance to classes and vice versa, as well as consist of the first visual contact of students with internal venues of the school. In other floors, the halls, beside function of distribution of students to classes, play also the role of venues where students stand during the breaks between teaching hours. Halls serve also as venues where are displayed different boards necessary for performance of the teaching process.

Halls as necessary parts of school organization shall enable the completion of the above-mentioned functions. Their size depends on the number of students, floors and organization of classes.

### **573. 2.5.5 Storeroom and additional corners**

The storerooms are venues serving for inventory and other materials. The storeroom surface may vary from 18 m<sup>2</sup> - 40 m<sup>2</sup>.

Technical rooms for installation of the boiler, sanitary water tanks, water pumps and pumps of fire protection system shall have a surface and geometric size that could enable the installation of all equipment and systems according to technical specifications of the producers, by calculating necessary space for repair and maintenance works.

- **2.5.6 External space**

External spaces are divided into three categories:

Spaces determined for recreation zones (fields) and sports premises;

Movement zones include vehicles (streets and parking) and pedestrians (pavement and alleys);

Green spaces and zones planted with trees, bushes, as well as valley.

Entrance to the school shall be clearly noticeable and easily to be found.

Billboard with the name of the school is placed in a noticeable position from far and in the vicinity of the main entrance.

If a bus stop for students is not situated within a reasonable distance, then there should be taken into consideration the projection of a bus stop near the school. This stop should not be in the school territory and should be defined with the understanding of the local power.

Parking for bicycles, if suitable, shall be easily accessible from the students entrance.

The installation of illumination system in school's territory shall be taken into consideration, because it will be used even beyond the school timetable. The designing level shall reflect also the location of the school and take into account the use of building beyond the normal school timetable.

Landscape elements: The background must be simple and easy to be maintained. It is encouraged the use of local plants and calculation of spaces where can be carried out garden activities by students. The designing team shall take into account the inclusion of landscape elements to promote a surface that



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

could help the teaching process, as well as spaces for sowing different plant. Large background spaces with solid materials must be avoided.

The perimetrical space of the school shall be surrounded with low walls and fence, or only iron fence at a minimal height of 2m.

The vicinity of streets and vehicles to the schools shall be at minimum. not be near the school, nevertheless there should be an access to school parking space. Where this can be inevitable, it shall have a clear physical distinction (pavement) between the pedestrian and vehicles streets.

If possible, there shall be projected a parking space for about 20% of the staff and at least a parking space for the disabled.

For sports premises, according to normative of designing and construction, there shall be used materials for layers and surroundings that meet the conditions of physical security. Such as absorbing tartan layer, protection materials in the baskets columns or surrounding of fields and wherever will be held physical activities.

**Two school objects shall have separated yards.**

In the schools yard shall be envisaged and designed the installation of an art work that could serve as an identifying and orientating element of the school in the community.

In each yard, it is necessary the creation of a volleyball field and basketball field, integrated or in a separated space, as well as the gymnastics corner. In cases, when the territory's surface enables creation of other sports venues, there can be projected mini-football fields, tennis courts, etc.

### 3.3 Didactic materials

Based on a document issued from the Institute for Development of Education, No. 340 prot., dated 29.05.2017, protocolled by Tirana Municipality under no. 16532/1 prot., dated 08.06.2017, didactic materials that will be put at disposal from the winning economic operator shall have the following specifications :

- For Laboratory of Informatics

No.	DESCRIPTION OF DEVICE	UNIT/QUANTITY	TECHNICAL SPECIFICATIONS
35	TABLETS PRESTIGIA	40 pieces	PRESTIGIO MULTIPAD Internal Memory Size 25GB, RAM 2GB
36	COMPUTERS	40 pieces	HDD 160 GB/250 GB  Procesor Core 2 Duo 30GH <sub>2</sub>  Ram (2-4) GB  Monitor 19

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

37	SOFTWARE OF PACKAGES	40 pieces	Office 2013, WINDOWS 7
38	CLIENT FOR ELECTRICAL TEXT	40 pieces	
39	LAPTOP LENARE LENOVO	1 piece	Lenovo - 15.6" Laptop - Intel Core i3 - 6GB Memory - 1TB Hard Drive  PROCESSOR I5, 8GB RAM, GRAPHIC CARD INTEL 4000
40	CUPBOARD FOR TABLETS	1 pieces	
41	UPS INTERNET	1 piece	650V FOR EACH
42	PROJECTO	1 piece	EPSON 673595
43	RENTER	1 piece	FG-60 D
44	WEB CHANGE SERVER APLIANSYUS		HP Server G5 or G6
45	CACHEBOX	1 piece	170
46	WIRELESS		HPMSM 430
47	RACK	1 piece	22U DIMENSIONS 600X1000
48	CABLE GRID	1 piece	
49	SWITCH 24 PORT		24 PORT POE GIGABIT
50	HP	1 piece	2530-24G-POEE+SWTCH
51	PRESENTATION WHITEBOARD	2 pieces	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- For Laboratories of Biology

<b>No.</b>	<b>Description</b>	<b>Duration in the course of years</b>	<b>Unit</b>	<b>Quantity</b>	<b>Technical specifications</b>
1	Apparatus for photosynthesis	10	Piece	1	Glass Ballon, scaled test tube with caps, with instructions
2	Retroprojector	20	Piece	1	Current: AC110/220 V 60/50Hz, Power 350W dimensions 285 x 285 mm, distance of projection 1.5-3.5 m, height ~300 mmm, halogen lamp of 24V 300W
3	Stripe Meter	10	Piece	5	1-2 m
4	Compass	15	Piece	10	ø 40-50 mm
5	Entomological net	5	Piece	10	Metallic circle, polyester net, plastic stick
6	Entomological neddle	1	Piece	200	Metallic, enamelled, coloured, 40mm
7	Chemical cup of different sizes	5	Set	5	glass, scalable with mouth, degrees, 50ml up to 500ml
8	Glass Cylinders of different sizes	5	Set	5	glass, scalable with mouth, degrees, 10ml up to 250ml
9	Test tube clip	15	Piece	10	Wood-made
10	Plastic vessel with loupe cap for collection of insects, etc	15	Piece	10	Organic glass cap with loupe ø40mm-60mm, 3x ose 5x
11	Alcohol lamp	10	Piece	10	Standard glass, with plastic cap
12	Hand magnifying glass	10	Piece	10	enlargement 2x ,3x
13	Test tube holder	15	Piece	10	standard, wood or plastic material ø18-20mm
14	Dropper	5	Piece	10	Glass + rubber
15	Scalable pipette	5	set	10	Glass with ø 900mm
16	Petri Dishes	5	Piece	10	Glass, no lips
17	Test tubes 12 x 100mm	5	Piece	100	Glass, no lips
18	Test tubes 16 x 150mm	5	Piece	200	Glass , enamel cap
20	Air Thermometer	10	Piece	5	With alcohol 0-40 °C
21	Laboratory Thermometer 0-50°C dhe -10-110°C	10	Piece	10	With alcohol
22	Glass mixer	5	Piece	10	Glass, length 200mm
23	Clock glass	5	Piece	10	Glass. ø70mm
24	Set of preparation tools (with 7 accessories)	10	set	10	With accessories: scalpel, scissors, preparation needle, tweezers
25	Lama	2	Box	5	Dimensions:: 25,4mm x 76,2mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

26	Lamela	2	Box	5	20mm x 20mm
27	Biological microscope	10	Box	10	Magnifying 600 x, ocular, three objectives
28	Alcohol per djegie	1	bottle	5L	Denaturalized, technical 92-96 Degrees
29	Dropper bottle 60 ml no color	1	Piece	10	Enamel
30	Dropper bottle 60 ml no color	2	Piece	10	Enamel
19	Glass bottle for colorless liquids 60 ml	1	Piece	20	Enamel cap
	Glass bottle for colorless liquids 60 ml	5	Piece	20	Enamel cap
31	Conical bulbs of different sizes	5	Piece	20	glass,with mouth,50ml deri 500ml
32	Funnels	5	Piece	10	glass, $\phi$ 75mm
33	Box for lama	5	Piece	5	Plastic box with 25 separated places
34	Holder	2	Piece	10	Metallic with three legs
35	Ceramic net	15	Piece	10	Metallic net with ceramic
36	Filter letter	1	box	3	$\phi$ 120 mm, boxes with 100 piece
37	Dissection plates	10	Piece	10	Metallic pan with wax or parafin
38	Half analytical scales with weighting stones	10	Piece	2	Maximal Capacity 1000g, Sensitivity 50mg, error margin 1.5, $\phi$ 120mm
39	Washing Pisetta	10	Piece	10	Plastic with glass gyp
40	Laboratory Stative with Accessories	15	set	5	Basement + rods+metallic circle+pressing+fixing
41	Brush for washing vessels	1	Piece	10	Plastic threads
42	Spatula spoon	10	Piece	10	Porcelain
43	Pezafilters	5	Piece	10	glass, low shape, 50mm x 30mm
44	Vessel for aquariums and incubators	5	Piece	2	glass, square
45	Porcelain bowl	10	Piece	3	With supressor $\phi$ 90 mm
	<b>Chemical Reagents</b>				<b>For all the list of reagents shall be meet the following specifications :</b>
46	Ascorbic Acid	1	bottle	100g	
47	Etanoic Acid (Acetic Acid)	1	bottle	100ml	Reagent of "p" classification . Packaged according to rules of technical security
48	Soluble Amidon	1	bottle	200g	The label shall contain : Description, chemical formula, expiry date
49	Ethanol 96°	1	bottle	500ml	Molar mass, quantity, signs of risks
50	Formaline	1	bottle	1000 ml	
51	Natrium Hydrogen Carbonate	1	bottle	100g	



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

52	Amon Hydroxide	1	bottle	250ml	
53	Calcium Hydroxide	1	bottle	100g	
54	Violet Metil	1	bottle	25g	
55	Chlorophorm	1	bottle	250ml	
56	Calcium Chlorur	1	bottle	100g	
57	Calium Chlorur	1	bottle	100g	
58	Parafin	1	plastic	200g	
59	Fehling A Solution	1	bottle	250 ml	
60	Fehling B Solution	1	bottle	250 ml	
61	Biuret reaction	1	bottle	250 ml	
62	Potassium Sodium Tartrate	1	bottle	100g	
63	NatriumTetraborat (Borax)	1	bottle	200g	
64	Iod-iodine of Calium solution	1	bottle	250ml	
65	Fenolftaleine	1	bottle	100ml	
66	Sodium Citrate	1	bottle	100g	
67	Indication letter pH	1	box	2	pH 0-14
	<b>Microscopic Preparations</b>				
68	Kelps – (Chlamydomonasi – one-cell)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
69	Kelps - (Spirogyra with chloroplasts in a cell)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
70	Amphioxus – roundmouther (Matured Individual)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
71	Bacteria - (types of bacteria)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
72	Tiglia. Vertical cut of the stem of two-cotyledons.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
73	Frogs – Larval Development (10mm)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
74	Frogs – Larval Development (3mm)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
75	Epithelium of human mouth	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
76	Euglena	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
77	Ganglion nerve (with nerve fibres and nerve cells)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
78	Human Blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
79	Adipose Tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>80</b>	Epithelial tissue – (simple, with one layer)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>81</b>	Bone Tissue. Vertical Cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>82</b>	Smooth muscle tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>83</b>	Layer muscle tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>84</b>	Nerve tissue – vertical cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>85</b>	Different legs of insects	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>86</b>	Sunflower (Heliantus). Cut of matured root of two-cotyledons.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>87</b>	Maize (Zea mays). Vertical cut typical of one-cotyledon stem	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>88</b>	Human Lungs. General View	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>89</b>	Mosquito – Mouth Apparatus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>90</b>	Medullary Bone	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>91</b>	Paramecium – General Construction	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>92</b>	Paramecium – Reproduction	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>93</b>	Pines (Pinus) – Leaf cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>94</b>	Planctons (Cyclops)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>95</b>	Planctons (Daphnia)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>96</b>	Allium. Longitudinal cut, epiderma, cell and nucleus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>97</b>	Allium. Type of roots of different levels of one-cotyledons	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>98</b>	Tapeworm in cattles (head)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>99</b>	Tapeworm in cattles (matured proglottid)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>100</b>	Stitch (Vertical cut )	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>101</b>	Different types of pollen. Middle multi-purpose cut.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>102</b>	Human Kidney - cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>103</b>	Lilium. Vertical cut typical of monocotyledons leaves .	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>104</b>	Small Intestine. Vertical cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>105</b>	Artery, blood vessels	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>106</b>	Nucleus of cell	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>107</b>	Esophagus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>108</b>	Womb of gall	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>109</b>	Frog	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>110</b>	Rabbit blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>111</b>	Pigeon blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>112</b>	Fish blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>113</b>	Hypophysis gland	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>114</b>	Lymphatic gland, section	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>115</b>	Tiroide Gland	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>116</b>	Milk glands	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>117</b>	Chloroplasts	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>118</b>	Chromosomes	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>119</b>	Human skin with sweat glans	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>120</b>	Human Liver	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>121</b>	Mitosis	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>122</b>	Pancreatic islets of Langerhans	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>123</b>	Medullary bone	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>124</b>	Human spermatozoid, sperm stain	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>125</b>	Human Tests	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>126</b>	Trachea, longitudinal cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>127</b>	Rabbit Uterus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>128</b>	Human Uterus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
			piece		
	<b>Liquid preparations</b>		piece		
<b>129</b>	Lizard Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
<b>130</b>	Chicken Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
<b>131</b>	Rabbit Dissection	10	piece	1	Dissection in formalin closed in a glassware , 200 x 70 x40 mm
<b>132</b>	Frog Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
<b>133</b>	Fish Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
	<b>Biological models (Plastic)</b>		piece		
<b>134</b>	Archeopterix (model of	15	piece	1	Relief PVC, 400 x 300 mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

	fossil)				
<b>135</b>	Archeopterix (model of poultry )	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>136</b>	Anatomic bust of man with removable head and other parts 85 cm	15	piece	1	3D model made of PVC and colorant, not toxic, length 850 mm, with removable parts, PVC support
<b>137</b>	Glomerules	15	piece	1	3D model made of PVC and colorant, not toxic,250 x 350 mm
<b>138</b>	Comparison of limbs in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, enlarged, limbs of 5 types of vertebrates
<b>139</b>	Larynx	15	piece	1	3D model made of PVC and colorant, not toxic,magnified
<b>140</b>	ADN Model (helicoidal)	15	piece	1	PVC, not toxical colorant, with removable parts
<b>141</b>	Vertical cut of leaf	15	piece	1	3D model made of PVC and colorant, not toxic,, 300x 400 mm
<b>142</b>	Vertical cut of stem	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>143</b>	Model of dicotyledon flower	15	piece	1	3D model made of PVC and colorant, not toxic,180x 300 x 60 mm
<b>144</b>	Model of monocotyledon flower	15	piece	1	3D model made of PVC and colorant, not toxic, 250 x 350 mm
<b>145</b>	Cross-section of the root	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>146</b>	Eye Anatomy	15	piece	1	3D model made of PVC and colorant, not toxic, external, middle ear, magnified 6 x, hearing bones, pipe, canals etc
<b>147</b>	Brain anatomy	15	piece	1	3D model made of PVC and colorant, not toxic, with two separated hemispheres, 2 movable lenses and removable components, magnified 3 x
<b>148</b>	Ear anatomy	15	piece	1	Model in basorelief made of PVC and non toxic colorants,70 x magnified, hair, epiderm, sweat-fat glands, etc.
<b>149</b>	Heart Construction	15	piece	1	3D model made of PVC and colorant, not toxic, with 3 removable parts, magnified 3-4 x

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>150</b>	Nephrons	15	piece	1	3D model made of PVC and colorant, not toxic, magnified
<b>151</b>	Jaws, teeth	15	piece	1	3D model made of PVC and colorant, not toxic, magnified, lower jaw with mobile teeth
<b>152</b>	Vertical cut of head	15	piece	1	3D model made of PVC and colorant, not toxic, 250 x 350 mm
<b>153</b>	Vertical cut of skin	15	piece	1	Model in basorelief made of PVC and non toxic colorants,70 x magnified, hair, epidermis, sweat-fat glands, etc.
<b>154</b>	Urinary system	15	piece	1	3D model made of PVC and colorant, not toxic magnified,
<b>155</b>	Human Skeleton 85cm	15	piece	1	3D model made of PVC and colorant, not toxic, length 850 mm, metal base
<b>156</b>	Model of plant cell	15	piece	1	3D model made of PVC and colorant, not toxic, 180x 300 x 60 mm
<b>157</b>	Kidney	15	piece	1	3D model made of PVC and colorant, not toxic, with removable parts, where are noted: hull,pyramids,cups,waterflow, 3-4 x
<b>158</b>	Model of animal cell	15	piece	1	3D model made of PVC and colorant, not toxic,, 180x 300 x 60 mm
<b>159</b>	Superstructure of cell (with cell organs)	15	piece	1	3D model made of PVC and colorant, not toxic,, 700 x400 x500 mm
<b>160</b>	Digestion apparatus	15	piece	1	3D model made of PVC and colorant, not toxic, with removable parts , 3-4 x
<b>161</b>	Model of protein	15	piece	1	PVC, non-toxic colorant, with removable parts
<b>162</b>	Models of simplified nucleotides for students	15	box	10	PVC, non-toxic colorant, with removable parts
<b>163</b>	Comparison of brain in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, magnified , brain of 5 types of vertebrates
<b>164</b>	Comparison of heart in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, magnified , heart of 5 types of vertebrates
<b>165</b>	Model of liver, with spleen, gall, pancreas and duoden	15	piece	1	3D model made of PVC and colorant, not toxic, magnified,
<b>166</b>	Neuron Model	15	piece	1	3D model made of PVC and colorant, not toxic, magnified
			piece		

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

	<b>Teaching tables on the wall</b>		piece		Content of tables in line with program requirements. In Albanian Language
167	Hearing Apparatus	10	piece	1	One or two sided material, plasticized or banner
168	Excretory Apparatus	10	piece	1	With plastic slide and movable hanger
169	Respiratory apparatus	10	piece	1	70cm x 100cm
170	Eye Apparatus	10	piece	1	
171	digestion apparatus	10	piece	1	
172	Human Teeth	10	piece	1	
173	ADN structure	10	piece	1	
174	Evolution of animal world	10	piece	1	
175	Birth of conditioned reflexes	10	piece	1	
176	Liver- supporting organ of digestion apparatus	10	piece	1	
177	Human Muscles	10	piece	1	
178	Anatomic Construction of bone	10	piece	1	
179	Construction of flower in enclosed plants (Angiosperms)	10	piece	1	
180	Female Genital Organs	10	piece	1	
181	Male Genital Organs	10	piece	1	
182	External View of Heart	10	piece	1	
183	Blood Composition	10	piece	1	
184	Ecological Pyramide	10	piece	1	
185	Components parts of skin	10	piece	1	
186	Positions of fetus before birth	10	piece	1	
187	Reproduction of cells - Mytosis	10	piece	1	
188	Reproduction of sexual cells - Meyosa	10	piece	1	
189	Blood Circulatory System	10	piece	1	
190	Nervous System	10	piece	1	
191	Vegetative Nervous System	10	piece	1	
192	Human skeleton	10	piece	1	
193	Plant cell structure	10	piece	1	
194	Animal cell structure	10	piece	1	
195	Mendel Legacy (1 <sup>st</sup> Law of Mendel)	10	piece	1	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

196	Mendel Legacy (1 <sup>2nd</sup> Law of Mendel)	10	piece	1	
197	Mendel Legacy (3 <sup>rd</sup> Law of Mendel)	10	piece	1	
198	AIDS Virus	10	piece	1	
199	Drugs	10	piece	1	
200	Risks from alcohol	10	piece	1	
201	Risks from smoking	10	piece	1	
202	Biosynthesis of proteins	10	Piece	1	
203	Earth's Terrestrial Biomes	10	Piece	1	
204	Air pollution : Smog	10	Piece	1	
205	Air pollution : Carbon monoxide and sulphur dioxide	10	Piece	1	
206	Sea pollution	10	Piece	1	
207	Devastation of tropical forests	10	Piece	1	
208	Food chain in the sea	10	Piece	1	
209	Food Pyramide in the lake (Ecological Pyramide)	10	Piece	1	
210	Forests echosystems	10	Piece	1	
211	Environment Protection from Wastes	10	Piece	1	

- For Chemistry Laboratories

	CHEMICAL REAGENTS				Technical Specifications
	Description	Duration	Unit	Quantity	For all reagents, the list must meet these specifications:
1	Salicylic Acid	1	bottle	100g	Clasificated reagent "p" . Packaged as technical safety rules. Label shall have: Description, chemical formula, expiry date, molar mass, quantity,risks signs
2	Benzoic Acid	1	bottle	100g	
3	Oleic Acid	1	bottle	250ml	
4	Ethanoic Anhydrite	1	bottle	250ml	
5	Ethanoic Acid glacial	1	bottle	500ml	
6	Ethandoic Acid	1	bottle	200g	
7	Phosphoric Acid 85%	1	bottle	250ml	
8	Chlorhydric Acid 36%	1	bottle	2000ml	
9	Methanoic Acid	1	bottle	250ml	
10	Nitric Acid 63%	1	bottle	500ml	
11	Silicic Acid	1	bottle	100g	
12	Sulfuric Acid 98%	1	bottle	1000ml	
13	Sulfanilic Acid	1	bottle	50g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

14	Perchloric Acid 65%	1	bottle	100ml	
15	Aluminium (powder)	1	bottle	50g	
16	Soluble starch	1	bottle	100g	
17	Aniline	1	bottle	100ml	
18	Copper (pieces)	1	bottle	100g	
19	Copper – powder	1	bottle	100g	
20	Benzene	1	bottle	250ml	
21	Bromothymol blue	1	bottle	25g	
22	Brom (brom water)	1	bottle	100ml	
23	Potassium bromide	1	bottle	200g	
24	Butanol- 1	1	bottle	100ml	
25	Cyclohexane	1	bottle	100ml	
26	Dextrine	1	bottle	100g	
27	Natrium dihydrogen phosphate	1	bottle	100g	
28	Ammonium Dichromate	1	bottle	200g	
29	Potassium dichromate	1	bottle	100g	
30	Natrium dichromate	1	bottle	100g	
31	Dchloroethane	1	bottle	100ml	
32	Ethanol 96% (ethyl alcohol)	1	bottle	500ml	
33	Denatured ethanol	1	bottle	5 L	
34	Ethanoate ethyl	1	bottle	250ml	
35	Diethyl ether	1	bottle	250ml	
36	Ethanoat sodium	1	bottle	200g	
37	Lead ethanoate	1	bottle	200g	
38	Calcium ethanoate	1	bottle	200g	
39	Calcium phosphate	1	bottle	200g	
40	Calcium fluor	1	bottle	100g	
41	Phenol	1	bottle	100g	
42	Phenolphthalein	1	bottle	250ml	
43	Potassium Ferricyanide	1	bottle	100g	
44	Potassium Ferrocyanide	1	bottle	100g	
45	Formaldehyde (formic aldehyde )40%	1	bottle	250ml	
46	Red phosphorus	1	bottle	50g	
47	Sodium phosphate	1	bottle	100g	
48	Iron powder	1	bottle	200g	
49	n – Hexane	1	bottle	100ml	
50	Hydrogen phosphate sodium	1	bottle	100g	
51	Hydroxide amides (ammonia in water 25%)	1	bottle	500ml	
52	Hydroxide Calcium	1	bottle	200g	
53	Hydroxide Potassium	1	bottle	200g	
54	Hydroxide sodium	1	bottle	500g	



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

55	Universal indicator pH: 0-14 (Indicator)	1	Kuti	3	
56	Iod (crystals)	1	bottle	50g	
57	Potassium iodines	1	bottle	100g	
58	Potassium iodide	1	bottle	100g	
59	Calcium (metallic)	1	bottle	50g	
60	Potassium (metallic)	1	bottle	25g	
61	Carbamide (urea)	1	bottle	100g	
62	Activ Carbon	1	bottle	25g	
63	Ammonium carbonate	1	bottle	100g	
64	Sodium carbonate	1	bottle	200g	
65	Calcium Carbonate (granuls)	1	bottle	200g	
66	Calcium Carbonate (powder)	1	bottle	200g	
67	Calcium Carbide	1	bottle	200g	
68	Tin- grain (granuls)	1	bottle	100g	
69	Chlorates of potassium	1	bottle	500g	
70	Ammonium chloride	1	bottle	200g	
71	Copper chloride (II)	1	bottle	100g	
72	Barium chloride	1	bottle	200g	
73	Chlorine iron (III)	1	bottle	200g	
74	Hydrate calcium chloride	1	bottle	200g	
75	Potassium chloride	1	bottle	100g	
76	Magnesium chloride	1	bottle	100g	
77	Natrium chloride	1	bottle	200g	
78	Copper chloride	1	bottle	100g	
79	Nickel chloride	1	bottle	100g	
80	Tin chloride (II)	1	bottle	100g	
81	Cadmium chloride	1	bottle	100g	
82	Lithium chloride	1	bottle	100g	
83	Strontium chloride	1	bottle	100g	
84	Aluminium chloride	1	bottle	100g	
85	Zinc chloride	1	bottle	200g	
86	Mohr's salt	1	bottle	100g	
87	Potassium chromium sulfate	1	bottle	100g	
88	Sodium chromate	1	bottle	100g	
89	Xylene	1	bottle	250ml	
90	Blue reagent paper	1	Kuti	3	
91	Red reagent paper	1	Kuti	3	
92	Filter paper 120mm	1	pako	3	
93	Magnesium (powder)	1	bottle	50g	
94	Magnesium (stripe)	1	m	5	
95	Metanol (metilic alcoho)	1	bottle	250ml	
96	Metilorange (indicator)	1	bottle	25g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

97	Red metil (indicator)	1	bottle	25g	
98	Natrium (metallic)	1	bottle	50g	
99	Ammonium nitrate	1	bottle	200g	
100	Aluminium Nitrate	1	bottle	100g	
101	Silver Nitrate (crystals)	1	bottle	25g	
102	Copper Nitrate	1	bottle	100g	
103	Barium Nitrate	1	bottle	100g	
104	Cobalt Nitrate	1	bottle	100g	
105	Potassium Nitrate	1	bottle	200g	
106	Natrium Nitrate	1	bottle	200g	
107	Lead Nitrate	1	bottle	200g	
108	Sodium Nitrite	1	bottle	100g	
109	Nitrobenzene	1	bottle	250ml	
110	Octanol – 1	1	bottle	100ml	
111	Aluminium oxide	1	bottle	200g	
112	Lead oxide (II)	1	bottle	200g	
113	Iron oxide (III)	1	bottle	200g	
114	Calcium Oxide (granuls)	1	bottle	200g	
115	Chromium Oxide (VI)	1	bottle	100g	
116	Phosforus Oxide (V)	1	bottle	100g	
117	Manganese Oxide IV. (manganese dioxide)	1	bottle	200g	
118	Magnesium Oxide	1	bottle	200g	
119	Lead Oxide (IV)	1	bottle	100g	
120	Zinc Oxide	1	bottle	200g	
121	Paraffin	1	bottle	200g	
122	Potassium permaganate	1	bottle	500g	
123	Propaentriol 1,2,3, (Glyyerine)	1	bottle	250ml	
124	Propanone	1	bottle	250ml	
125	Natriumi Peroxide	1	bottle	100g	
126	Sulfur (powder)	1	bottle	100g	
127	Ammonium sulphate	1	bottle	200g	
128	Aluminium sulphate	1	bottle	200g	
129	Carbon Sulfur	1	bottle	100ml	
130	Ammonium Sulfur	1	bottle	100ml	
131	Natrium Sulfur	1	bottle	100g	
132	Chromium Sulphate	1	bottle	100g	
133	Sodium Sulphite	1	bottle	200g	
134	Hydrated copper Sulphate	1	bottle	500g	
135	Iron Sulphate (II)	1	bottle	100g	
136	Calcium Sulphate	1	bottle	100g	
137	Potassium Sulphate	1	bottle	100g	
138	Nickeli Sulphate	1	bottle	100g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

139	Magnesium Sulphate	1	bottle	100g	
140	Sodium Sulphate	1	bottle	100g	
141	Zinc Sulphate	1	bottle	100g	
142	Sulfocianuro ammonia	1	bottle	100g	
143	Sulfocianuro potassium	1	bottle	100g	
144	Iron Sulfur	1	bottle	100 g	
145	Potassium Sulfur	1	bottle	100g	
146	Aluminium shape	1	bottle	100g	
147	Chrome Shape	1	bottle	100g	
148	Potassium and sodium tartrate	1	bottle	100g	
149	Tetraclorometano (carbon tetrachloride)	1	bottle	100ml	
150	Turpentine	1	bottle	100ml	
151	Sodium thiosulfate	1	bottle	100g	
152	Triclorometan (Chloroform)	1	bottle	100ml	
153	Toluene	1	bottle	100ml	
154	Granular zinc (granuls)	1	bottle	200g	
155	Zinc powder	1	bottle	100g	
	<b>Didactic devices and measuring devices</b>				
	<b>Description</b>		<b>Unit</b>	<b>Quantity</b>	
156	Kipp´s apparatus	10	piece	2	classic type with security tubing 125ml
157	Simple Kipp´s apparatus	5	piece	5	with buckle insurance
158	Electrolytic electrical conductivity devices	5	piece	5	with carbon electrodes
159	Vacuum filtering equipment	5	piece	2	erlenmayer bunsen, porcelain funnels, glass pumps
160	Liquid distillation apparatus	5	piece	3	Insurance funnel
161	Apparatus for electrolysis of water (Hoffman´s Voltmeter)	10	piece	3	With two electrods , continued current 6-12V
162	Device for water synthesis (Eudiometer)	10	piece	1	With escalation, glass
163	Simple device for studying the properties of gases	5	piece	10	refractory glass
164	Simple apparatus for gases that are not dissolved in water	5	piece	10	refractory glass
165	Simple apparatus for gas preparation heavier than air	5	piece	10	refractory glass
166	Simple apparatus for gas preparation lighter than air	5	piece	10	refractory glass
167	Pajisje te thjeshta per djegien e gazeve	5	piece	10	refractory glass
168	Pajisje me spekter te gjere perdorimi	5	piece	10	refractory glass
169	Apparatus for electrolysis of salt	5	piece	5	Glass funnel U, carbon elektrodes
170	Apparatus for the preparation of chlorine, hydrogen chloride	5	piece	1	Glass ballon 500 ml, glass funnel, funnel Z
171	Apparatus for the preparation of hydrocarbons	5	piece	1	Erlenmayer 800 ml, glass funnels separator,

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

172	Apparatus for demonstrating the galvanic element (with Galvanometer)	5	piece	3	Glasses 100 ml, elektrodazinc and copper
173	Metallic Barometer	15	piece	1	standart type
174	Higrometer or Psikrometer (with termometer)	15	piece	1	standart type
175	Calorimeter	15	piece	10	400mm , ø20mm,aluminium
176	Areometer (density measure for liquids with $d < 1$ )	15	piece	5	With alcohol
177	Areometer (density measure for liquids with $d > 1$ )	15	piece	5	With alcohol
178	Laborator thermometer -10-100°C	5	piece	10	With alcohol
179	Laborator thermometer 0-200°C	5	piece	5	With alcohol
180	PH-meter	15	piece	1	pH 0-14.0pH with resolution pH:0.1ph
	<b>Glasses</b>				
181	Adaptors (Alunge)	5	piece	2	refractory glass
182	Burets for acides 25 ml or 50 ml	5	piece	10	Glass water tap
183	Burets for bases 25 ml or 50 ml	5	piece	10	With glass and rubber pipe
184	Measuring cylinder 10 ml	5	piece	10	Scalable with mouth
185	Measuring cylinder 25 ml	5	piece	10	Scalable with mouth
186	Measuring cylinder 50 ml	5	piece	10	Scalable with mouth
187	Measuring cylinder 100 ml	5	piece	10	Scalable with mouth
188	Measuring cylinder 250 ml	5	piece	2	Scalable with mouth
189	Measuring cylinder 500 ml	5	piece	2	Scalable with mouth
190	Measuring cylinder 1000 ml	5	piece	2	Scalable with mouth
191	Eksikator	5	piece	2	glass, sanded
192	Vertical Cooling	5	piece	2	type Liebih
193	Chemical glasses (Bekera) 50 ml	5	piece	10	High form, scalable, with mouth
194	Chemical glasses (Bekera) 100 ml	5	piece	10	High form, scalable, with mouth
195	Chemical glasses (Bekera) 250 ml	5	piece	10	High form, scalable, with mouth
196	Chemical glasses (Bekera) 500 ml	5	piece	5	High form, scalable, with mouth
197	Chemical glasses (Bekera) 800 ml	5	piece	2	High form, scalable, with mouth
198	Chemical glasses (Bekera) 1000 ml	5	piece	2	High form, scalable, with mouth
199	Glasses pipes with different diameter	5	kg	1	glass, with different diameter
200	Glasses pipes with T form	5	piece	10	glass, with different diameter
201	Glasses pipes with Y form	5	piece	10	glass, with different diameter
202	Drying pipes	5	piece	5	glass, with different diameter
203	Safety pipes with bule	5	piece	5	with 1 bule
204	Glasses funnel Ø 75 mm	5	piece	10	Short tail

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

205	Glasses funnel Ø 90 mm	5	piece	5	Short tail
206	Dividing funnels (separatore) 125 ml	5	piece	10	Sanded cup
207	Dividing funnels (separatore) 250 ml	5	piece	5	Sanded cup
208	Dividing funnels (separatore) 500 ml	5	piece	2	Sanded cup
209	Glass bell with cap	5	piece	2	Sanded cup
210	Crystallisator Ø=180mm, h=90 mm	5	piece	10	With mouth
211	Crystallisator Ø=90mm, h=40 mm	5	piece	10	With mouth
212	Drying column	5	piece	2	Sanded neck
213	Alcohol lumps	5	piece	15	Plastic cup
214	Microburette	5	piece	2	With tap
215	Pjata Petri# plates (sett)	5	piece	10	ø 90mm
216	Escalating Pipets (cannuls) 1ml or 2 ml	5	piece	10	glass, standard type
217	Escalating Pipets (cannuls) 5ml	5	piece	10	glass, standard type
218	Escalating Pipets (cannuls) 10ml	5	piece	5	glass, standard type
219	Escalating Pipets (cannuls) 25ml	5	piece	5	glass, standard type
220	Regulated Pipets 1ml or 2ml	5	piece	10	glass, standard type
221	Regulated Pipets 5ml	5	piece	10	glass, standard type
222	Regulated Pipets 15ml ose 20ml	5	piece	5	glass, standard type
223	Bulb (sphere ballonns ) 100 ml	5	piece	10	Tight neck
224	Bulb (sphere ballonns ) 250 ml	5	piece	10	Tight neck
225	Bulb (sphere ballonns ) 500 ml	5	piece	2	Tight neck
226	Bulb (sphere ballonns) 1000 ml	5	piece	2	Tight neck
227	Distillation bulbs with side pipes	5	piece	2	Tight neck
228	Bulbs with flat bottom (Balloons with flat bottom) 100ml	5	piece	10	Tight neck
229	Bulbs with flat bottom (Balloons with flat bottom) 250ml	5	piece	10	Tight neck
230	Bulbs with flat bottom (Balloons with flat bottom) 500ml	5	piece	2	Tight neck
231	Bulbs with flat bottom (Balloons with flat bottom) 1000ml	5	piece	2	Tight neck
232	Conic bulbs (Erlenmajer) 50 ml	5	piece	10	Scalable, Tight neck
233	Conic bulbs (Erlenmajer) 100 ml	5	piece	10	Scalable,, Tight neck

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

234	Conic bulbs (Erlenmajer) 250 ml	5	piece	10	Scalable,, Tight neck
235	Conic bulbs (Erlenmajer) 500 ml	5	piece	5	Scalable,, Tight neck
236	Conic bulbs (Erlenmajer) 1000 ml	5	piece	2	Scalable,, Tight neck
237	Conic bulbs (Erlenmajer) with sanded cup	5	piece	10	Scalable, Tight neck
238	Poça konike me gyp anesor (Erlenmajer Bunsen)	5	piece	2	Scalable,, Tight neck
239	Test tube 12 x 120 mm	5	piece	100	refractory glass, with borders
240	Test tube 16 x 150 mm	5	piece	200	refractory glass, with borders
241	Test tube 18 x 100 mm	5	piece	200	refractory glass, with borders
242	Test tube 24 x 200 mm	5	piece	50	refractory glass, with borders
243	Signed bulbs (tarated) 100 ml	5	piece	10	Glass, standart type
244	Signed bulbs (tarated) 250 ml	5	piece	10	Sanded neck
245	Signed bulbs (tarated)500 ml	5	piece	5	Sanded neck
246	Signed bulbs (tarated)1000 ml	5	piece	2	Sanded neck
247	Pesafilters	5	piece	10	Sanded cup
248	Glass taps	5	piece	2	sanded
249	Agitable glass (agitator)	5	piece	10	200 mm
250	Glass Bottle with sand dropper without colour 60 ml	5	piece	20	Specifications as nominations
251	Glass Bottle with sand dropper with colour 60 ml	5	piece	20	Specifications as nominations
252	Glass Bottle, for liquid reagents with sand without colour 60 ml	5	piece	20	Specifications as nominations
253	Glass Bottle, for liquid reagents with sand with colour 60 ml	5	piece	20	Specifications as nominations
254	Glass Bottle, with neck with sand without colour 60 ml	5	piece	20	Specifications as nominations
255	Glass Bottle, with wide neck with sand withcolour 60 ml	5	piece	20	Specifications as nominations
256	Bottle Mariot (for distilated water) 2,5 l	5	piece	2	Specifications as nominations
257	Clock glasses	5	piece	10	Specifications as nominations
	<b>Moleculares models or crytalline</b>				
258	Set of moleculares models	20	piece	1	suitcase, rubber models and metallic bars
259	Micromolekulare models	20	piece	10	box, rubber models and metallic bars
260	Orbital atomic model px	20	piece	1	Plastic model with metallic elements
261	Orbital atomic model py	20	piece	1	Plastic model with metallic elements
262	Orbital atomic model pz	20	piece	1	Plastic model with metallic elements
263	Orbital hybridization model sp2	20	piece	1	Plastic model with metallic elements
264	Orbital hybridization model sp3	20	piece	1	Plastic model with metallic elements
	<b>Wood, rubber plastic instruments</b>				

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

265	Rubber pipes (laborator) with diameter 6 ÷ 8 mm	20	m	10	Specifications as nomiantions
266	Test tube holder	20	piece	20	Wood material
267	Pipes holder	20	piece	10	Plastic material
268	Test tube holder	20	piece	10	Wood material
269	Washable plastic Bottle (pisets)	20	piece	10	plastic with glass pipe
270	Rubber cups with different diameter with hole	20	piece	50	nr 00,01,1,2,3
271	Rubber cups with different diameter without hole	20	piece	50	nr 00,01,1,2,3
	<b>Metallic instruments</b>				h=150 mm, ø16 mm
272	Bek Bunsen	20	piece	1	standart
273	Cames (pirosti)	20	piece	10	metallic
274	Laboratory Jack screw	20	piece	2	standard
275	Spoon incineration	20	piece	10	standard
276	Spoon for substances	20	piece	10	standard
277	Magnet in horseshoe form	20	piece	1	standard
278	Tongs per pots	20	piece	10	
279	Laboratory tenter	20	piece	10	bar,antimorsete, metallic circles,Metallic fixing
280	Weighter, teknich-chimical with stone weight box	20	piece	10	Maximal capacity 200g, sensitivity 0.1g, tolerance mistake 1.5, pan diameter ø90mm
281	Weighter, half analytic with stone weight box	20	piece	1	Maximal capacity 1000g, sensitivity 50mg,tolerance mistake 1.5, pan diameter ø120mm
282	Ceramic mesh	20	piece	10	Ceramic and metallic mesh
283	Puncture cups	20	piece	2	With 3 dimenstions
284	Constriction for burets with fixing	20	piece	10	metallic
285	Constriction for pipes with screw (Hoffman staple)	20	piece	5	metallic
286	Elastic Constriction for rubber pipes (Mohr staples)	20	piece	5	metallic
	<b>Porcelain instruments</b>				
287	Porcelani bowl		piece	5	porcelain
288	Funnel for filtration in space (Buhner funnel)	10	piece	2	porcelain
289	Spoon - spatula	10	piece	10	porcelain
290	Kapsuls (cupshore) porcelain	10	piece	10	porcelain
291	Kroogiola (pote) porcelain	10	piece	10	porcelain
292	triangular for pos post	10	piece	10	porcelain and metallic
	<b>Instruments and different materials</b>				
293	Laboratory distiller for distilated water	10	piece	1	2-3 liter in hour, monofase
294	Instrument for cutting glass pipes	10	piece	2	Metallic with screw
295	Brush for washing instruments	1	piece	10	metallic with plastic cord

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

296	gloves - protection	1	piece	10	anti acid, anti alcal, anti corrosive
297	Protection masks	5	piece	10	anti acid, anti alcal, anti corrosive
298	Protection glass	5	piece	10	anti acid, anti alcal, anti corrosive
299	Universal Current feeding universal or current leader	10	piece	1	0-24V / 6A
300	Keeper for infiltration instruments	15	piece	2	Metallic with me rubber pins
301	Fast help box	2	set	1	With 7 accessory, as technical safety instructions
302	Fire extinguishing (exintore)	20	piece	1	With powder
303	Dynamic model for demonstration of atomic orbital	15	piece	1	500 x 350 mm current 24V
304	Chemical-physical caracterisics and methods for using chemical reagents in school	20	piece	1	In albanian language
305	Instructions for technical safety	20	piece	1	In albanian language
	<b>Instructional signs</b>				
306	Danger signs of chemical substances	15	piece	1	70cm x 100cm
307	Safety rules in laboratory	15	piece	1	70cm x 100cm
308	Method of separationof substances	15	piece	1	500 x 350 mm 24V
309	Ambience of acid -base of solution	15	piece	1	70cm x 100cm
310	Electrolitic dissolution	15	piece	1	70cm x 100cm
311	Alcanes	15	piece	1	70cm x 100cm
312	Isomery	15	piece	1	70cm x 100cm
313	Chemical Substances dissolubility in water	15	piece	1	140cm x 100cm
314	Chemical elements table (long version)	15	piece	1	140cm x 100cm
315	Base unit of SI	15	piece	1	70cm x 100cm
316	Ionisation energy of elements as group A of periodic system	15	piece	1	70cm x 100cm
317	Electronegativity	15	piece	1	70cm x 100cm
318	Molecules geometry	15	piece	1	70cm x 100cm
319	Elementary reactions and velocity equation	15	piece	1	70cm x 100cm
320	Thermodynamic information for some substances	15	piece	1	70cm x 100cm
321	Constans of jonic equilibrium	15	piece	1	70cm x 100cm
322	Solubility product	15	piece	1	70cm x 100cm
323	Potenciale te reduktimit	15	piece	1	70cm x 100cm
324	Value relation of quantice numbers for n=4	15	piece	1	70cm x 100cm
325	Moles relation	15	piece	1	70cm x 100cm
326	Table of chemical elements (long variants) for personal use	15	piece	300	150mm x 300mm folding



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- For Laboratory of Physics

No.	Definition of the device	Unit/quantity	Technical specifications
1	<b>MECHANICS</b>		
2	Simple apparatus for demonstration of free fall	1 piece	Metallic or plastic spheres with $\phi$ (20-30)mm
3	Tube of Newton	1 piece	Used for demonstrating independence of free fall from mass and shape of a body. Composed of a vacuum tube, with a feather and a metallic piece inside. Dimensions 5x105 cm, pesha 0,7 kg
4	Apparatus for inertia	1 piece	
5	Apparatus for rotating motion in vertical plane	1 piece	Demonstrates transformation of Ek in Ep. Composed of a metallic rut, mounted on a wood basement and a metallic sphere with a $\phi$ (12-15)mm
6	Tribometer	1 piece	Axis with dimensions ( 81.5 x 10 x 2) cm, coach with dimensions 10 x 8 x 4cm, 200g, a roll with a small friction fixed on one edge. The axis is supported on different angles ( 0-45) degrees on a metallic protractor metalik, fixing sticks
7	Dinamometer , force measuring , (0-5) N	3 pieces	Measuring scale (0-5) (500g) ,
8	Dinamometer , force measuring (0-10) N	3pieces	Measuring scale (0-10) (1000g)
9	Disc for moment equilibrium	1 piece	Diameter not smaller than 245mm, scale 4x10-80
10	Communication vessels	1 set	4 glass pipe with different dimensions and shapes mounted on a plastic or wood support
11	Halfspheres of Magdeburg	1 set	Composed of two halp-spheres with me diameter $\phi$ (100 – 110)mm, made of metal or plastic, with vacuum pipe
12	Scales stone with hooks	1 set	Box with 10 metallic stone with weight from 10g up to 500 g
13	Caliber	2 pieces	Metallic equipment for measuring lengths in mm
14	Lab coach	4 pieces	Dimensions 290x140x90mm; 0.87kg. Coach line (1.5x0.3m), 10 springs (50x15)mm 10 springs holder, 10 elastic cords with rings in the end 150mm long, wheels with bearings with spheres, with small friction
15	Set of capillary pipes	1 set	Series of glass pipe of different diameters
16	Set of rrolls	1 set	Maximal allowed weight 2kg
17	Chronometer	3 pieces	Chronometer for determination of time per second (Classical type – mechanic or digital)
18	Micrometer	1 piece	Metal made for measuring lengths in mm
19	Equipement for demonstration of parallel forces	1 piece	Composed of a metallic linear (40-

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

	(Lever)		50)cm long, with a hole and diameter (3,5-4,5)mm, scalable. Used to study relations between force and its direction and moment and serves to hang weight stones with hooks
20	Equipment for demonstration of Archimedes force (Double cylinder of Archimedes)	1 piece	Diameter $\varnothing$ 28mm, height 55mm, dimensions of cylinder 35 g, plastic material
21	Equipment for demonstration of principle of preservation of mechanical energy	1 piece	Height ~ 250 mm, dimensions of the set ~380x130x150mm, roll $\varnothing$ 110mm.
22	Equipment for demonstration of distribution of pressure in fluids (Law of Pascal)	1 piece	Steel spheres, size ~350 mm, weight ~300 gram
23	Hand vacuum pump	1 piece	Vacuum pressure shall be less than 6700 Pa
24	Equipment for measuring pressure in fluids	1 piece	General scale, not less than 24 cm, with center of scale 0
25	Thread-Level Indicator	1 piece	Hanging string
26	Physical scales-technical with weight stones	1 piece	Maximal capacity (200 – 300)g, sensitivity 0.1g, error tolerance not more than 1.5, diameter of pan $\varnothing$ (90-110) mm
27	Spheres of different sizes	1 set	Diameter (10-20)mm, steel metal
28	Sensor of gas pressure	1 piece	Requires a signal in proportion with gas pressure
29	Motion Sensor	1 piece	Serves to calculate distances crossed by a body when time and signal output and input is given. Frequency is 50 measures per second and measurement scale from (0.15 -6) m. Connected to smartboard E46. Touchscreen control
30	Force Sensor	1 piece	Force sensor measures withdrawing and submersive forces of about -50N +50N. Connected smartboard. Touchscreen control
31	Tribometer	1 piece	Wooden
32	Hydraulic pressure	1 piece	
33	Stripe-meter	1 piece	Plastic, metallic, 1,5m, 2m,
34	Metallic tripod with accessories	1 piece	Diameter of rod $\varnothing$ 10-13 mm, basement of triangle iron, height 700-900mm, 1 rod with isolation head, 1 rod with hooks, 2 morsette
35	Unscalable Springs	10 pieces	Maximal allowed weight of 500gram
36	Bodies with same density and different volumes	6 pieces	Bodies with the same shape and dimensions and different materials, such as: wood, plastic, bronze, aluminum, iron, lead etc.
<b>TERMODINAMICS</b>			
37	Apparatus for change of thermal conductivity	1 piece	Composed of three metallic rods, different metals, equipped with a metallic ring, movable, with dimensions (300 x 150) mm
38	Pyrometer	1 piece	
39	Apparatus for demonstration of bulge of fluids and gases	1 piece	Indicates changes during fluids bulge. Composed of 5 glass pipes with a spherical ending, height 400 mm, mounted on a plastic basement and scaled in mm.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

40	Apparatus for demonstration of bulge of rigid bodies	1 piece	Diameter of sphere s $\varnothing$ 20 mm, weight 0.2kg, length 300 mm
41	Apparatus for transformation of thermal energy B29	1 piece	Composed of :copper pipe, holed clips, plastic corks and friction strings. Height about 470 mm, weight about 600 gram,
42	Apparatus for demonstration of Boil-Mariot Law	1 piece	Dimensions 300 x 200 mm, rubber cover, cylindric pipe, volume measurement, measurer of pressure, scale 0.5,1,1.5,2.
43	Apparatus for demonstration of adiabatic process	1 piece	Cylindric vessel with glass valve, with dimensions (64x65x200)mm, diameter (25x130)mm
44	Teaching Barometer	1 piece	Analogue metallic body diameter 10cm
45	Aneroid Barometer	1 piece	Measures air pressure, values (690-790) mm Hg, and scale 1mm Hg
46	Communication vessels	1 set	4 glass pipes with plastic support
47	Equipment for demonstration of convection B51		Diameter of the pipe $\varnothing$ 12mm, dimensions: 300mm x 200 mm. Numeric values of technical specifications are flexible up to 15%.
48	Calorimeter	1 piece	Copper made, nicke-plated, with dimensions 54x34 m For the determination of specific heat in fluits with electrical method.It is composed of a calorimeter, copper plated with dimensions (54 x 34 )mm, placed inside an external vessel with dimensions 70x45 mm.Voltage of electrical feeder U = 6V, Resistence of the heater R=2-6 Om, Current : I=0.5--2 A.
49	Bimetallic sheet	1 piece	Material: copper, iron, length about 200 mm.
50	Temperature Sensor	1 piece	Shkalla: -30/+1350C Resolution: 0.10C Frequency: over 10 matje/s Connected to smartboard. Touchscreen Control. E109 .
51	Gas Pressure Sensor	1 piece	Requires proportional signal in proportion with gas pressure. The required values is 156.050 kPa. Measuring unit may be Bar, kPa, atm. Frequency is 100 measures per second and scale 0-200 kPa. Connected to smartboard. Touchscreen control. Collection and preservation of data on USB. Permanent connection with cord.
52	Combustible Engine	1 piece	
53	Thermometer (0-50) Celsius degrees	10 pieces	Scale (0-50) degres with mercury
54	Thermometers (0-200) Celsius degrees	10 pieces	Scale (0-200) degres with mercury
55	Thermometers (-10-110) Celsius	10 pieces	Scale (-10-110) degres with mercury
<b>ELECTRICITY AND MAGNETISM</b>			
56	Laboratory Ampermeter	4 pieces	Measure scale -0,2~0~0,6A / -1~0~3A,sensitivity 75 mV, Dimensions about (133 x 97 x 100 )mm
57	Ampermeter-voltmeter for demonstrations	1 set	DC direct current,1mA,100mA,1A,10A, DC voltage (0-10)V,(0-30)V

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			AC/alternative 10mA,100mA,1A,5A AC voltage 10V,30V,250V
58	Apparatus for distribution of current	1 piece	Metallic sphere mounted on an isolating handle
59	Apparatus for action of magnetic force on current conductor	1 piece	Dimensions: about (500x250x270) mm $I=2A$
60	Apparatus for demonstration of Kulon Law	1 piece	Metallic basement, thread made of medullary wood
61	Apparatus for demonstration of line in a magnetic field	1 piece	Box with dimensions (98x55x55)mm, with a tunnel, internal diameter 10mm and length 70mm and magnetic rod with dimensions (50x7)mm long.
62	Light source (battery)	5 pieces	3 V, 4,5V
63	School teaching compass	1 piece	Diameter not less than (50) mm
64	Rumkorff coil	1 piece	220V/50Hz,dalja (20-100)Kv,distance 100mm
65	Couple of induction coils	3 sets	Primary coil $\phi 35$ mm, length 120mm and 380 wire secondary coil $\phi 65$ mm,481 wire, as well as iron nucleus
66	Switch with cassette	1 piece	Voltage 36V and direct current 6A
67	Switch for electrical circuit	5 pieces	$U= 36V$ with direct current 0-3A
68	Conductive thread	10 pieces	50cm length with terminal two-sided pin
69	Electroscope with sheets	1 piece	Diameter not less than 200mm, with a support of plastic or glass material
70	Horseshoe-shaped electromagnet	1 piece	Composed of two rolls, one with a nucleus with iron rod in U shape, and a closing metallic armour with a hook and voltage 6V and current 1A.
71	Magnetic needles with support	3 pieces	Length of needle not less than 40mm
72	Small magnetic needles	3 pieces	Length not less than 30 mm
73	Plastic pipes	6 pieces	Plastic material
74	Faraday Cage	1 piece	Dimensions (600x300x150)mm
75	Conducting cables with terminal plug	10 pieces	With a length 50cm and two-sided terminal plug
76	Condensator with discs	10 pieces	Plastic discs with a diameter (200-300)mm
77	Resistance box mounted in the cassette	1 set	10x0,1 $\Omega$ ; 10 x 1 $\Omega$ ; 10x10 $\Omega$ ; 10x100 $\Omega$ ; 10x1000 $\Omega$
78	Small lamps	25 pieces	Standard type, 6V
79	Lamp holder	1 set	Plastic basement with lamp holder $U= (0-30)V$ , $I=(0-3) A$
80	Model of three-phase generator	1 piece	Output $> \text{ose} = 8V$ when rotating velocity is about 1600 rot/minute
81	Model of an electromotor	1 piece	Dimensions 50cmx50cm
82	Pendolini elektrizues	1 piece	Plastic support with silk threads
83	Horseshoe-shaped magnet	2 pieces	80mmx200mm, 0,05T80mm x 200mm <sup>2</sup> , 0,05T.
84	Simple magnet	4 pieces	5x25cm
85	Equipment for density of loads	1 piece	Dimensions (600x300x150)mm
86	Voltaic pile	3 pieces	Carbon rod, copper plaque, lead plaque, zinc plaque
87	Rectangular conductor with plastic plaque	1 piece	Composed of three different conductions, plastic basements
88	Record for Winston bridge	1 piece	(1000x100x50)mm, tel Ni-Cr

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

89	Rheostat 50U with cursor (sliding)	1 piece	Resistenca (0-50) om, current 5A
90	Electrostatic Net	1 piece	
91	Catode Rays	1 piece	(640x440x590)mmm with plastic support
92	Alternative sources systems B46	1 piece	Used in different experiments for study of renewable energy, such as solar, hydric, wind. It is composed of a solar panel, wind turbine, hydraulic turbine, cell with hydrogen, ventilator, rotor. Dimensions 50x45x15 cm. Weight 5.5 kg
93	Series of metallic threads mounted on a plaque	1 set	Material of threads : iron, copper, nickel-chrome
94	Sphere with an isolating handle	1 piece	Plastic handles or metallic spheres with a diameter not less than $\varnothing 50$ mm
95	Glass rod	2 pieces	Length not shorter than 300 mm
96	Ebonite rod	1 piece	Length not shorter than 300 mm
97	Discharging rod	10 pieces	Plastic end – Metallic rod (500-700)mm
98	Magnetic rod	2 pieces	With colored poles 160mm, 0,06 T (160 x 200) mm, 0.06T.
99	Magnetic spectres	1 piece	(500x330x250 )mm
100	Power security incentive		Simulates technical problems of the electrical system: short circuit, current leak, over load and fuse. Places in aluminum case filled with foam. Dimensions about: 30x35x10 cm.
101	Sensor for voltage and current	1 piece	Combined Sensor. Measure Frequency 50000 measuring /s. Connected to smartboard. Touchscreen Control.
102	Transformer	1 piece	
103	Geisler pipes (light source with different gases)	1 set	Pipes with hydrogen, oxigen, helium,carbon dioxide, neon, argon.
104	Universal feeder (0-24)V, 6A	1 piece	Outputs of alternative and direct current (2-24)V with 12 scales. Maximal current of work up to 6A. Dimensions about (270 x 120 x 210) mm, 6,5 kg
105	Laboratory Volmeter	3 pieces	Measuring scale -5~15V, sensitivity 1mA. Dimensions (133 x 97 x 100 )mm
<b>ACUSTICS, VIBRATIONS, WAVES</b>			
106	Apparatus for demonstration of wave-spreading phenomenon	1 piece	Voltage (0-6)V; number of vibrations 13; $\varnothing$ of vibrator 15,6mm, dimensions (450mmx200mmx300mm)
107	Diapason 440Hz	1 piece	Composed of : two forks with the same frequency 440 Hz, with vertical session (6,5 x 16 )mm, length of wings 109 mm, distance between 17mm,
108	Mathematic pendulum	1 piece	Sphere hanged in an unextendable thread, fixed on a basement
109	Pendulum for resonance	5 pieces	5 pendulums of different lengths, metallic frames (400 x 300) mm.
110	Resonance Box	1 box	Suitable for diapason 440 Hz; about 145x88x53 mm
111	Springs set	1 set	Used for demonstration of horizontal and vertical waves . Springs with a diameter of 8 cm, unextendable length 13 cm,it may reach up to 5 m, weight 0.6 kg. Spring 2 with a 2 cm diameter,

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			not extended 1 m long, weight 0.5 kg.
112	Sonometer with cords		Used for study of sound dependence from length, pressure and thickness of vibrating cord. It is composed of a resonance box made of wood 60 cm long, scalable. Completed with a dynamometer, two steel cords, diameter, $\Phi 0,4$ mm, one steel cord with a diameter, $\Phi 0,8$ mm and three immovable bridges for fitting the length of cords.
113	Kundt Pipe	1 piece	Glass pipe with a length of 1,5 m and diameter 35mm, wooden rod 390mm long, basement of wood 1,5 m long and diameter 13mm.
114	Equipment for study of electromagnetic waves		Waves transmitter: diode Gunn 10.7GHz ( $\lambda=2.8$ cm), power 30W voltage (10-12)V në (2 - 3.5)V. Cylindric case with a diameter 83mm and length 70mm. The general length 25 mm. Waves receiver : Similar to transmitter. Sond Detector: silicon microwave diode , same with the receiver but mounted in a shorter rod, Vertical, not metallic. 4 sockets with external circulation, dimensions (75x50x135)m.
115	Stroboscope		Used to observe phenomena than happen very soon. Dimensions (20x12x14) cm, weight 1.8 kg. Frequency (1-300) Hz.
	<b>OPTICS</b>		
116	He-Ne Lazer		Used for experiments of defraction and interference. Dimensions 35x10x14 cm, pesha 1.5 kg, coherent red light, wave length 633 nm
117	Accesories for analogue optical experiments		Reflecting surface (200x300)mm, (60x300)mm, glass plaque with parallel sides (200x300)mm, polarization net (200x200)mm, convec-plane lenses with a hole that during work is filled with paraffin oil; prism with gap filled with paraffin oil (45x90x45) degrees ;
118	Photocamera	1 piece	Digital, cyber shot, mbi 10 Mega pixel.
119	Optical disc	1 piece	Disc with colors and rotating rope. Used for fragmentation of white light. It is composed of the disc with a diameter of 200 mm, two sets of spectres of colors, a rotor with handle. Axis of the handle coincides with the axis of the disc. It is placed on a plastic base with dimensions about (120x120) mm, with rubber legs, general height about 32 cm.
120	Concave mirror	2 pieces	Glass F' = 65mm, $\phi=100$ mm
121	Convex mirror	2 pieces	Glass F' = 65mm, $\phi=100$ mm
122	Flat mirror	1 piece	Distance f=65mm, $\phi = 100$ mm
123	Filters with different colors	1 set	Plastic, 40x20 mm7 with basic colors of spectrum, with dimensions about

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			535x310 mm each filter
124	Eye Model		Physical view of eye functioning, including sight impair and their correction. Mounted on a wooden or plastic basement. Dimensions not less than (320 x 180)mm
125	Caleidoscope		Diameter (180 x 35 )mm
126	Summarizing lenses	2 pieces	Made of glass
127	Distribution lenses	2 pieces	Made of glass
128	Convex lenses	2 pieces	Made of glass
129	Glass prism	1 pieces	Point of view 85 <sup>0</sup> , 25mm-75mm / 50mm-15mm
130	Glass plaque with parallel sides	1 pieces	Dimensions (50x20)mm
131	Ceramic net	1 copë	1235x125 mm dhe 150x150mm
132	Magnifying glass	2 copë	Magnifying not less than 4 x
133	Light sensor		Scale: (0 -2 000 )lux / (0 -30 000) lux Resolution: 0.5 lux/10 lux Frequency : over 1000 measures/s Connection to smartboard. Touchscreen control.
	<b>MODERN PHYSICS</b>		
134	Radiation Monitor ( $\alpha$ , $\beta$ , $\gamma$ )		Composed of Geiger-Myler pipe and measurer of frequency mounted in a small plastic box, made of rubber and with an analogue meter. The unit works with battery and can be used without a PC for measuring radiation $\alpha$ , $\beta$ , $\gamma$ . It can be used for measuring radiation statistics, to measure frequency of nucleus fragmentation and to monitor radon transformations
135	<b>GENERAL</b>		
136	Alcohol	1 bottle	1kg alcohol in glass bottle
137	Sulphur Acid	1 bottle	250 gram in glass bottle
138	Glass Beaker	10 pieces	100ml, 250ml,500ml, glass
139	Scalable cylinders	10 pieces	25ml, 100ml,500ml, glass
140	Colors disc	1 piece	Colorful Disc with a rotating rope, diameter 200mm
141	Wind measurer	1 piece	Plastic ose inox
142	Glass vessels with different shapes but same volume	5 pieces	100ml, 250ml,500ml, glass
143	Glass vessels with different shapes and volume	5 pieces	100ml, 250ml,500ml, glass
144	Weighting stones with hooks	1 set	Box with 10 metallic stones, 50gr.each
<b>145</b>	Chemical cup	5 pieces	Chemical cup 50 ml 100 ml 250 ml
146	Plastic pipe with different diameters	5 pieces	Transparent, $\phi = 6-8$ mm
147	Small glass pipe U-shape	5 pieces	$\phi = 16$ mm, h= 150mm
148	Scissors	1 pieces	Iron-made, plastic handle, 10cm long
<b>149</b>	Glass funnel	3 pieces	Glass
<b>150</b>	Test tupe clip	1 piece	Wood
<b>151</b>	Alcohol Lamps	4 pieces	Made of glass with alcohol, with a cover and wick
<b>152</b>	Color pencils	2 packages	Box with color pencils wood and water
<b>153</b>	Color marker	5 pieces	Color markers
<b>154</b>	Rubber	10 m	Thin rubber
<b>155</b>	Spoon for substances	2 pieces	Glass, inox, plastic

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

156	Test tubes holder	2 set	Wooden
157	Microscope	1 piece	Simple microscope
158	Nafthalene	200 gr.	Pure chemical reagent
159	Level indicator	1 piece	Wood or plastic material with an air bubble
160	Adhesive	2 piece	Small and big adhesives
161	Paraffin	250 gr.	Pure chemical Reagent
162	Dropper	3 piece	Made of glass with rubber clips, about 10cm
163	Plasteline	1 package	In colors 70x150mm
164	Iron powder	200 gr.	Pure chemical Reagent
165	Technical scales with weighting stones	1 piece	Simple scales with dishes
166	Test tubes	6 pieces	Glass, 12x100mm
167	Bulbs of different volumes	3 pieces	Volume 100 ml 250 ml 500ml
168	Lead-thread	1 piece	Lead hanged in a thread
169	Petri dishes	4 pieces	Material prej petri
170	Spheral bulbs of different volumes	4 pieces	Volume 100 ml 250 ml 500ml
171	Plastic Protactor	1 pieces	Standard type, basement 50cm
172	String	10 m	Non-extendable thread
173	Different size spheres	10 pieces	Dimensions with diameter (50-100) mm
174	Plastic Support of silk threads	1 piece	Dimensions (500x300x250)mm
175	Spring	1 set	Diameter 8 cm, length 13 cm, weight 0,6 kg
176	Glass mixer	2 pieces	Glass-made, 30-50 cm
177	Ballons	10 pieces	In different colors
178	Balls for ping-pong, tennis, football	3 pieces	Balls for ping-pong, tennis, football
179	Ceramic Net	1 piece	125x125mm ose 150x150mm
180	Copper sulphat	1 bottle	250gram
181	Glass bottle for liquids	5 pieces	Volume 60ml, 100ml
182	Plastic syringe	3 pieces	big, plastic
183	Rainmeter	1 piece	Plastic or inox, classic PVC
184	Sulphuric Acid	1 bottle	250gram
185	Long plastic linear	1 piece	Dimensions 100 cm
186	Triangle linear	1 piece	Dimensions (30x40x50) cm
187	Clock glasses	2 pieces	Glass made
188	<b>TEACHING TABLE</b>		
189	International System of SI units	1 piece	Dimensions (70x100)cm
190	Fundamental Physics Dimensions	1 piece	Dimensions (70x100)cm
191	Thermodynamic processes	1 piece	Dimensions (70x100)cm
192	Karnoy Cycle	1 piece	Dimensions (70x100)cm
193	Fundamental Constants in nature	1 piece	Dimensions (70x100)cm
194	Lorence Transformations	1 piece	Dimensions (70x100)cm
195	Mendeleev Table	1 piece	Dimensions (70x100)cm
196	Work Principle of Refridgerator	1 piece	Dimensions (70x100)cm
197	Gravity center and equilibrium conditions	1 piece	Dimensions (70x100)cm
198	Shell movement	1 piece	Dimensions (70x100)cm
199	Thermodynamic processes	1 piece	Dimensions (70x100)cm
200	Transformations of substance states	1 piece	Dimensions (70x100)cm
201	Magnetic field	1 piece	Dimensions (70x100)cm
202	Earth as a magnet	1 piece	Dimensions (70x100)cm
203	Phase Transformations of liquids	1 piece	Dimensions (70x100)cm
204	Bulge of rigid bodies	1 piece	Dimensions (70x100)cm
205	Electromotor	1 piece	Dimensions (70x100)cm
206	Transformer	1 piece	Dimensions (70x100)cm
207	Model of three-phase generator	1 piece	Dimensions (70x100)cm
208	Model of electrical bell	1 piece	Dimensions (70x100)cm



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

209	Principle of Generators	1 piece	Dimensions (70x100)cm
210	Electromagnetic Induction	1 piece	Dimensions (70x100)cm
211	Electrical voltage	1 piece	Dimensions (70x100)cm
212	Ohm Law	1 piece	Dimensions (70x100)cm
213	Electromagnet	1 piece	Dimensions (70x100)cm
214	Magnetic field of solenoid with current	1 piece	Dimensions (70x100)cm
215	Connection of conductors in parallel	1 piece	Dimensions (70x100)cm
216	Left hand rule	1 piece	Dimensions (70x100)cm
217	Moon eclipse	1 piece	Dimensions (70x100)cm
<b>218</b>	Globe (physical and political)	1 piece	With a basement on the table or ground
219	Dark room	1 piece	Dimensions (70x100)cm
220	Electroscope	1 piece	Dimensions (70x100)cm
221	Serial connection circuit	1 piece	Dimensions (70x100)cm
222	Parallel connection circuit	1 piece	Dimensions (70x100)cm
223	Integrated circuit with mixed connection	1 piece	Dimensions (70x100)cm
224	Short circuit connection	1 piece	Dimensions (70x100)cm
225	Amper Force	1 piece	Dimensions (70x100)cm
226	Crystal Diode	1 piece	Dimensions (70x100)cm
227	Transistor	1 piece	Dimensions (70x100)cm
228	Magnetic Spectres of gases	1 piece	Dimensions (70x100)cm
229	Atom's Construction	1 piece	Dimensions (70x100)cm
230	Galvanometer	1 piece	Dimensions (70x100)cm
231	Experiment of Thomson on cathode rays	1 piece	Dimensions (70x100)cm
232	Scheme of energy generation from HPP to houses	1 piece	Dimensions (70x100)cm
233	Hydraulic system of breaks	1 piece	Dimensions (70x100)cm
234	Solar systems and planets	1 piece	Dimensions (70x100)cm
235	Refraction of light rays from glass prism	1 piece	Dimensions (70x100)cm
236	Law of reflection and refraction	1 piece	Dimensions (70x100)cm
237	Full internal reflection	1 piece	Dimensions (70x100)cm
238	Interface Experiment of Jungs' splits	1 piece	Dimensions (70x100)cm
239	Light Polarization	1 piece	Dimensions (70x100)cm
240	Light Dispersion	1 piece	Dimensions (70x100)cm
241	Spectres (with stripes, continuos, absorbtation)	1 piece	Dimensions (70x100)cm
242	Fragmentation of white light and unification of colors	1 piece	Dimensions (70x100)cm
243	Hydraulic and electrical circuit	1 piece	Dimensions (70x100)cm
244	Electronic Microscope	1 piece	Dimensions (70x100)cm
245	Electronic Microscope	1 piece	Dimensions (70x100)cm
246	Diagram of energy levels of atom and hydrogen	1 piece	Dimensions (70x100)cm
247	Lazer Diagrama	1 piece	Dimensions (70x100)cm
248	Series of nucleuses fragmentation	1 piece	Dimensions (70x100)cm
249	Nuclear reaction	1 piece	Dimensions (70x100)cm
250	Chain reaction	1 piece	Dimensions (70x100)cm
251	Magnetic Resonance	1 piece	Dimensions (70x100)cm
252	Diagram of cyclotron	1 piece	Dimensions (70x100)cm
253	Work principle of steam engine	1 piece	Dimensions (70x100)cm
	<b>SECURITY TOOLS</b>	1 piece	
254	Plastic protection glasses	1 piece	Children syze
<b>255</b>	First aid box (security means during work in laboratory)	1 set	Classical first aid box

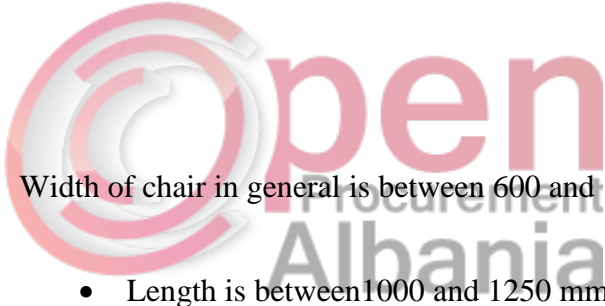
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#### **4.1 Design for persons with special needs**

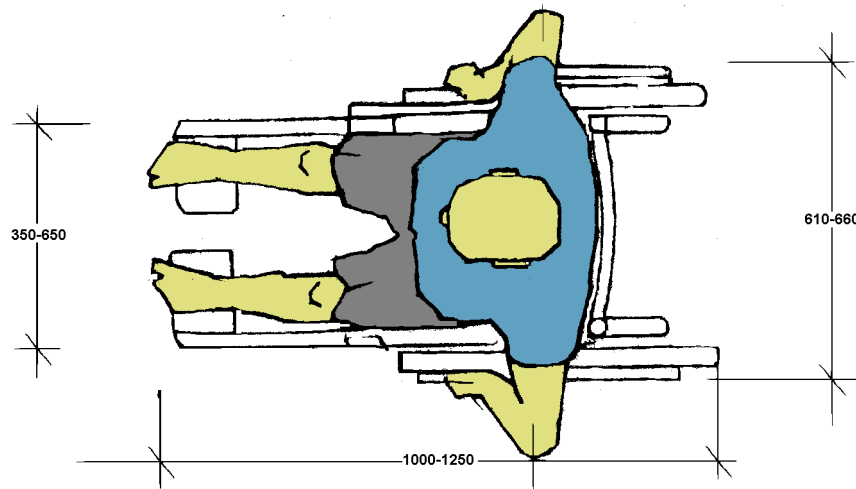
The design of school buildings shall provide a free approach for movement, stay and learning process of students with special needs, referred to special respective legislation for this category. Therefore, designers shall take into account these legislation, as well in this guideline where are presented the most specific technical conditions for school buildings. Types of special needs that can be addressed in a standard school will be limited, due to practical reasons, into those with special needs for the movement, loss of hearing that can be regulated with hearing devices, partial or total loss of sight. The latest category of persons cannot participate in all school activities.

Persons with special needs may be students, teachers, guests or staff. Their main problem is the mobility due to the use of wheelchairs, canes and crutches. This problem requires special determination of movement areas, door space, sanitary equipment, evacuation passages and spaces of classes to accommodate the persons with special needs.

Dimensions of wheelchairs shall be taken into account by the designers in determination of school space and movement. The wheelchairs have different dimensions according to the age of students and type of item. Nevertheless, following dimensions coincide with the average dimensions of adults and shall be taken into consideration. (see picture 1.3.13 and 3.14) :

- 
- Width of chair in general is between 600 and 700 mm
    - Length is between 1000 and 1250 mm
  - The external range is between 1300 and 1500 mm

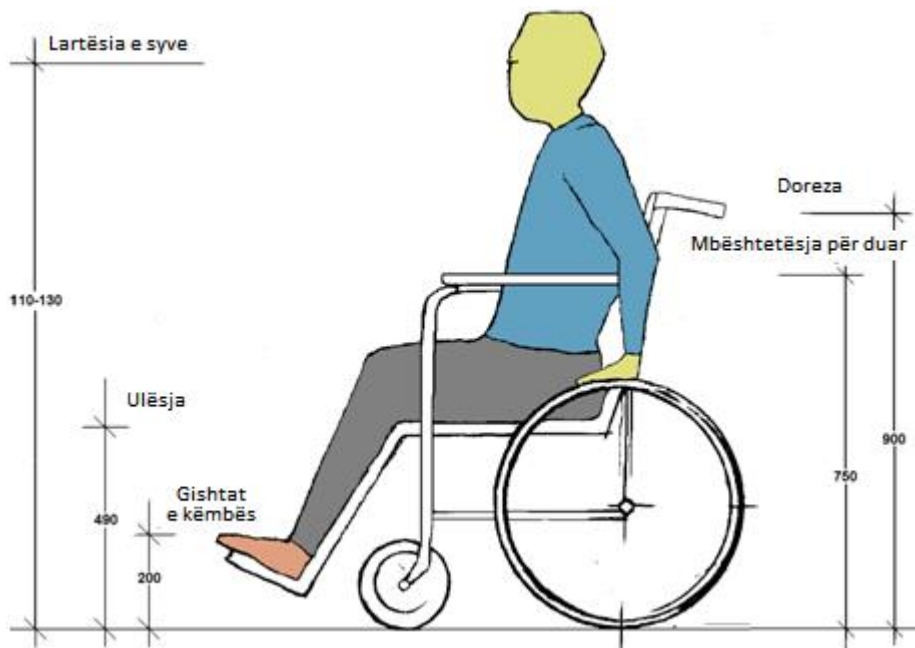
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Picture 1.3.13

Space where persons with special needs in wheelchairs arrive shall be defined :

- Between 230 and 300 mm above the floor level;
  - Between 1100 and 1300 in height;
- Between 300 and 400 mm from lateral sides of the chair ;



Picture. 3.14



Special parking for vehicles shall consist of a big space on one side (3.80 m instead of 2.5 m wide);

Borders of pedestrian alleys shall always have interrupted edges and pedestrian space shall be separated from vehicles traffic with pavement stones (blocks) ;

Alleys shall respect the minimum required width of about 1.5 m for a wheelchair, return surface and floor layer shall be composed of anti-slippery material and free of any obstacles;

Inclination of the walking path shall not be more inclined than 1:12 or 5% and long inclinations shall be divided into phases;

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Pavements shall have a minimal widths of about 0.90 m if they have been projected on one side and 1.80 m on both sides;

Alarming shall be visible and rationally continuous;

The approach to entire building shall be accessible from persons with special needs, if possible with platforms, whose inclination be over 1:12 (5%) with flat rests every 9 m along the entire length of the platform;

All other passages to sports premises shall be designed with platforms, if necessary. The final part of these platforms shall be composed a anti-slippery materials such as concrete blocks, stones or asphalt;

Platforms shall be equipped with a lateral handrail and/or pavement block along the length of the platform;

### **Internal space**

Main entrances of the buildings shall be clearly noticeable, easy to open and simple to pass through them;

Thresholds of the doors shall be avoid or not higher than 20 mm;

In the teaching rooms, working space with a diameter of about 1.5 m shall be kept free and with no obstacles, so that the wheelchair can return and positioned before the table;

Blackboard shall be reachable also from the sitting position. A changeable blackboard can be an option;

Small changes of the level shall be avoided. If inevitable, small platforms are more preferable than stairs;

In order to help students with eye problems, the design shall avoid fully glazed doors, different colors shall be used in the staircase for the rests and stairs, windows at the end of the corridor shall be avoided (exaggerated contrast in illumination);

Lift (s) shall be placed near the building entrance, lift space shall be big enough for wheelchairs, whereas the control signs shall be accessible for persons with special needs. Lift cabin shall contain also signs, such as Braille alphabet, acoustic and visual call and voice explanations for each floor.

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## **4.2 Schools as a Community Center**

The initiative “Schools as a Community Center” means that the school is put at the disposal of the community, without hampering the teaching process, completing it beyond the official working hours.

In this respect, it is necessary that the designer shall think about the school functions program and access by the community beyond the official working hours of the school. The architectural solutions shall offer flexibility and at the same time guaranteeing school security and easily accessible venue after school hours.

Schools, including their territory shall be divided into three privacy categories. A. Totally school, students and staff function. B. Spaces for school, but also the community. C. Total space for community.

A. Functions totally dedicated to school are those function that will be used only by students and staff of the schools, such as classes, laboratories, staff venues, etc. There shall be enabled such entrance that could provide necessary security of the venues, limitation of entries and exits, easy to be monitored.

B. Spaces for the school and community are those that serve the teaching timetable for students and staff and after the official timetable it is dedicated to the community. These functions can be related to the gym, multi-purpose spaces (auditory, concert hall, exhibition, parents meeting, etc), library. In such cases, they shall be accessible. The designer shall design these spaces by offering easy access for the community, if possible directly from outside, without using spaces such as corridors or classes. These venues shall have separated toilets to be used by the community. The designer shall think also about these specific spaces of how they can be function integrated with the schools, but also separately.

Likewise, the school yard shall be flexible taking into account the school security, but at the same time, it shall be easily transformable into public space with a potential use from the entire community after teaching timetable. In this respect, the access shall be easy, transparent surrounding, big entrance gate. It shall have green spaces and trees to make enough shadow, benches, as well as urban illumination also during the night.

C. Spaces dedicated totally to the community are those places that during school hours are always accessible by the community. The designer shall take into consideration that one part of the school yard, coinciding also with the entrance to this yard, could consist of a public space, serving as a public space for the community, used by students after the teaching timetable, where parents bring and wait for children, etc. It shall have green spaces and trees to make enough shadow, benches, as well as urban illumination also during the night.

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**4.3 Thermal Amenity (Temperature)**

578. **4.3.1 Definitions and terminology**

*Thermal amenity* is usually attributed to two key parameters : (1) feeling of thermal amenity as a result of the balance between calories accumulated and lost in the body, and (2) control of thermal conditions, including sun position and radiation, temperature, humidity and odors. Designers of the school buildings shall take into account thermal conditions of the school location. In these instructions are presented also the thermal conditions in Albania, but detailed and additional data shall be collected for exact conditions of respective zones, such as: (1) minimum and maximal average monthly temperature, (2) local hygrometry, and (3) dominating winds for each climate season and frequency of strong winds and storms.

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580. **4.3.2 Improvement of thermal amenity**

To improve the thermal amenity of the school spaces, the potential measures for monitoring the temperature are classified into two categories:

**Natural** or passive measures, including orientation of building, position and opening dimensions, quality of materials, thermal isolation, planting of trees in the vicinity of buildings, etc.

**Artificial** or active measures, including mechanical means, such as heating, ventilation.

Regarding heating system, it shall be envisaged a boiler using wood pellets.

Regarding cooling system, school shall be designed to guarantee an air temperature of 26°C which is the limit for a normal activity in schools, where with the proper movement of air, natural air stream from the open windows and air circulation means, such levels can be achieved in all class all year long.

Ventilation of the object is designed to guarantee the air quality through natural ventilation. In venues where natural ventilation is not possible, then it is considered a solution through artificial ventilation systems.

For the control of thermal effects in school spaces, the designer shall undertake some simple measures at the beginning of the designing process. These measures consist of :

**Orientation of buildings:** It recommended that orientation of classes spaces shall be toward the east and west, because this orientation offers protection from direct sun rays. This preferable orientation may be changed for about minus or plus 30° (due to location requirements or due to orientation of dominating odors) without any great impact on convenience of teaching classes (see the picture below):

**Establishment of buildings:** distance between buildings shall be in proportion with the height of the buildings to allow circulation of fresh air and natural light also in the lowest levels. For the same reason, a minimal distance of about 4m shall be kept between the main sides and surrounding wall. Likewise, the southern facade of the school shall not be closer than 10m from the nearest building.

**Shape and design** of buildings, such as possibility of indirect air circulation for regeneration of fresh air with natural ventilation during the hot season or option of the culmination with four inclination levels in zones with heavy snowfalls;

**Planted surface :** planting of herbs may play a fundamental role in creation of micro-climate, whenever necessary. The plating of herbs efficiently contributes in protection of dust, winds and sun rays. Nevertheless, planting of bushes enables protection of sun rays reflection from the ground;

**Proper elements of the building:** this includes draining from the roof and draining around the buildings, creation of shadows with regulated window shutters, sun tents, sun curtains, umbrellas and/or gallery that could provide additional protection from sun rays, especially when building orientation is not favorable.

- **Proper construction materials**, including materials of facades with potential sun reflection, isolating materials for increase of thermal action of the walls and culmination, with anti-allergic materials or not harmful for students health.

### 581. 4.3.3 Active Control of Temperature

**Low temperatures:** amenity level of low temperatures may considered the one between 19°C, for countries where are exercised activities of work that do not include movement and 15°C for movement zones. Efforts to provide heating in order to achieve such levels of temperature in internal venues shall not be very high. Nevertheless, a much lower minimum can happen in each of the months of heating season, where the heating system may have a capacity of reaction against these low temperatures.

**High temperatures:** Albania climate is mainly dry and hot from May to September, where majority of this period is sunny. The hottest months are July and August with regional variations due to high level. Nevertheless, air temperature of 26°C is the limit for normal activity in schools, where with the right movement of air from natural air stream, from open windows and air circulators, these levels can be normally achieved in classes all year long.

### 582. 4.3.5 Isolation Standard

The better the thermo-isolation of an external constructive element against external air, the smaller the possibility of warm air to go outside.



The badly isolated constructive elements have a low temperature of internal surfaces; the worse the isolation, the greater the risk that on surfaces under the influence of a relatively healthy humidity of air of about 40-60%, the minimal critical temperature reaches below 12,6 °C.

Special attention shall be paid to the so-called thermal bridges zones, such as ceilings of external walls, because the temperature of the surface here may be lower than the one of constructive elements in regular zones.

### **583. 4.3.6 Thermal bridges**

#### **584.**

Thermal bridges are weak thermal points localized in the thermal transmittance cover of the building. In comparison to untroubled constructive elements, in these points there occurs a huge thermal loss from in out. The higher the energetic standard of a building the more important is the elimination of thermal waters.

#### **Types of thermal bridges**

Conditioned geometrical thermal bridges are created if size of thermal absorbing and emitting surfaces change, e.g. external angles of the building, different thickness of constructive element or columns.

Thermal bridges conditioned from the type of material are created during use of materials with different thermal conductivity and with such different isolating characteristics, which may be placed on the side or one over the other. Therefore, in the place of the construction material with the highest thermal conductivity is created a higher thermal stream. A typical example is the concrete constructive elements inside an external brick wall.

Thermal convective bridges are created when thermal energy of an air stream is transported through the thermal transmission cover of the building. They are caused from the failure to isolate the surface. Open connections of the isolation layer in the roof area or non-isolation of the window spaces are examples for creation of these thermal waters.

A big number of thermal waters may be avoided with the help of a good designing work, careful supervision and through selection of the right materials.

#### **Advices during designing**

- To avoid structures with many branches;

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- To establish thermal divisions of constructive consol elements (concrete slabs of the balcony, columns, holding consols) with structures in the edge;
- Undivided layers of the isolation material, e.g. thermo-isolation systems of external walls and passages of special isolation levels without affecting the insulation values.

### **585. 4.3.7 Requirements of U-values $U(W/m^2K)$ (thermal transmittance coefficient)**

According to legislation in force (Law No. 8937 dt. 12.09.2002 “On preservation of heat in buildings” and respective by-legal acts, CoMD No. 38 dt. 16.01.2003 “On approval of norms, rules and terms of design, construction, generation and preservation of heat in buildings”) for climate zone A where Tirana is situated (not less than 1500 heating degree days per year) The loss coefficient  $G_v$  for buildings is between  $0.54 - 1.03 W/m^3C$ . The lowest value for buildings with a S/V ratio (external surface/warmed volume) lower than 0.3 and highest value for buildings with a S/V ratio higher than 0.9. For buildings with S/V between these values, the  $G_v$  coefficient is calculated in proportion. In order to have a loss coefficient that meets the law requirements by respecting at the same time even the economic criterion cost-gain, it is calculated that buildings in Tirana shall have an external insulation layer (cavity wall) of polysterol EPS 5 cm ( $U = 0.35 W/m^0K$ ) or with mineral fiber with the same transmittance parameters of heat and double-glass windows (6 x 12 x 6 mm) with a plastic or aluminum insulation profile. **Thermo-isolation (insulation) layer shall be installed from outside** and rigorously respect the requirements of producers about the way of fixing (beside glueing material also installation system with plastic screws) as well as the obstacle layer of water steam. Every other installation method may cause condensation in the internal walls, mold and damage of insulation layers.

### **586. 4.3.8 Windows and Doors**

Penetration of natural light in internal venues from inside and outside the window and free bird-view within the entire building are very important elements for students premises.

Windows shall be places in the walls separating the classes from external venues, classes from classes and classes with internal corridors.

To meet these requirements, design shall take into account the students and teachers. Attention shall be paid. to elements such as height and window frames, type of glass, clearness of the view (not to be blocked horizontally neither from adults nor students) light control and risk assessment impact, as well as security factors. The evaluation of security may recommend that guard place shall be positioned within the center in order to monitor entries and exits can be monitored from the guards of the buildings. Or may be recommended any alternative way in this respect. The designer shall try to plan at least one window per class. If this cannot be realized and the internal space must be occupied by students, the designer shall envisage the best penetration of light and view from the windows, lateral windows, glass windows and doors (secure). Students' spaces in new constructions shall have a total surface with windows of at least:

8 % of the floor surface if windows are from south and directly connected to external venues.

(Note: glass surface viewing south is smaller because quality of light coming from south is better);

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

10% of room surface if windows are oriented from east of west;

15% of room floor surface if windows view north;

20% of room surface if windows are on an external wall

Surfaces that do not need windows are toilets, conference rooms, halls and storeroom.

The placement of metallic bars is not allowed.

External doors and windows shall have a case made of PVC material with thermal divisions or aluminum case with thermal divisions. Technical specification of windows shall be detailed and take into consideration at least the following points:

Coefficient U - 1.2 (W/m<sup>2</sup>K)

Thermal division –

Resistance against the atmospheric factors –

Isolation ability – (class 4)

The glass coating can demonstrate a higher value of sun rays isolation (g). This value does not specify the sun radiation. In today’s glasses of thermo-isolated windows, this value is recommended to be about g = 60%.

To avoid thermal bridges, the window shall be placed under the thermo-isolation level or at least installed in the external corner of the wall. Thus, the isolation is placed on the window frame. It is essential to realize a continuous hermetical unification of the window during the installation. Foam fixing is not enough, because during the drying phase it shrinks, and therefore does not guaranty a hermetical isolation.

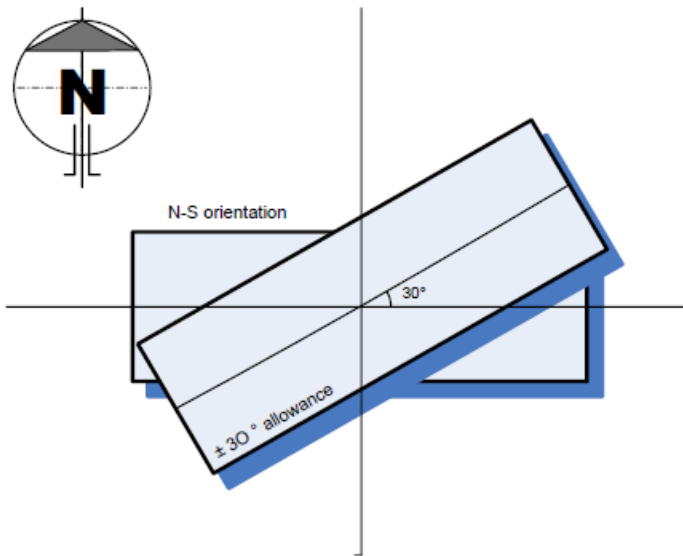
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### 588. 4.3.9 Passive control of temperature

Monitoring of penetration and creation of heat may be naturally minimized by a duly design of walls and plastering of the building. The main source of heat is sun, therefore elimination of the direct sun light from the internal side of the building is essential. As mentioned above, the external walls can be excluded from the important sources for creation of heating during the day in schools. This means that windows are elements that require attention. This is achieved with the help of two methods: orientation and sun reflection. Means for creation of shadows from the sun inside the glass are not efficient because the material gets hots and creates reflections inside. It is essential to prevent the sun hit on the glass, heating is not reflected outside through the glass, because the wave length changes and the venue gets warm. Use of double glazing is inefficient for prevention of sun penetration, this is efficient in prevention of the external heating loss.

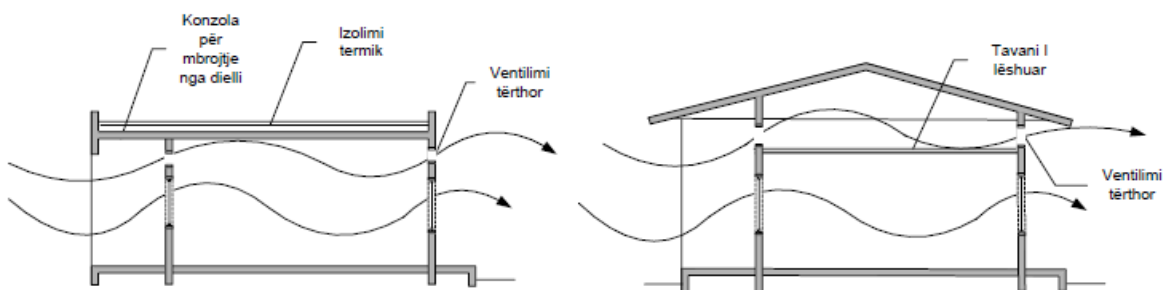
**Sun orientation:** orientation or the best orientation to have natural light during the day on the window is north-south (see picture below):

Orientation from North in Albania does not directly reflect the sunlight on the window, whereas orientation from south reflects minimal rays, on the window under the smallest and narrowest corner during the day: in the hottest part of the day, the sun will be on zenith and radiation corner of windows from South will be the narrowest.



*Recommended orientation of school*

- **Ventilation (indirect ventilation)** will be a natural factor of comfort for the hottest periods of the year (see picture below) but also in the highest is more necessary to bring out the warm air passing through warm and dry land. Nevertheless, the buildings with spaces and option of openness on both sides are not economic, even though this method is recommended as the most optimal. School, as any other construction group shall have an inclination of suppression in different wind conditions and directions, in order to enable the air movement within the building from the positive and negative suppression, as much as it is allowed by divisions and internal spaces. Hence, potential fresh air during the night is enabled, which will be helped from the external lights entering from external windows of upper level.

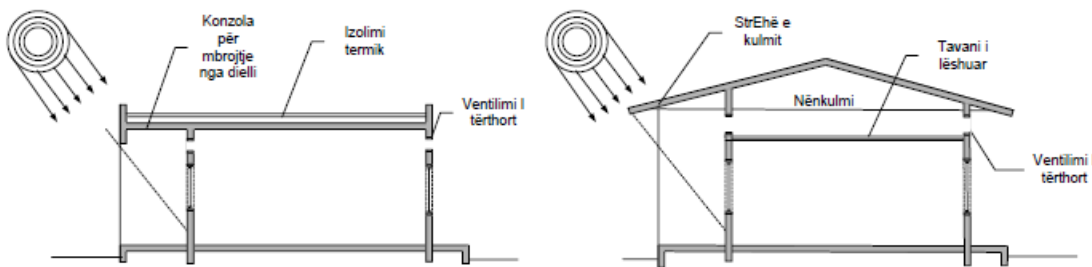


*Thermal amenity / Indirect ventilation*

**Sun reflection:** efficient equipment for sun reflection may be designed to function for every orientation, as long as the sun angle is fully predictable. Nevertheless, due to seasonal change in height, exclusion of sun rays during the year will require movable elements. In practice, reflection is normally a compromise, and if an optimal reflection has been designed, then reflection after realization would be effective. Taking as an example the south orientation, the window shall be reflected from an external

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

horizontal axis in the level of window peak, with a design that depends on the desired duration of time for prevention of sun rays coming into the hall or falling on the window. During winter, there shall be benefits from sun reflection, therefore the angle of sun reflection to be excluded is the one from May to October. It is essential to avoid sun rays falling on the window, because heat is very efficient when the environment and glass itself gets warm, by increasing the heat effect. The use of double glass is inefficient for prevention of the sun and it is efficient only in prevention of loss of sun from outside. Construction of a major peak coming out of windows with shutters are part of the normal solutions of sun protection (see picture below), but the project can not envisage other measures than enable reduction of radiation on the window, such as bri-slab, external tents, etc. The proposed solution shall not obstacle the entrance of light but only direct radiation on the glass, (not shutters).



*Thermal Amenity /Sun protection*

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**4.4 Visual Amenity**

*Defintions and terminology*

Need for high standards and a well-designed lighting for school buildings is based on :

- **natural lighting** resulting from the direct or reflected sun light from earth and other external or internal surfaces:
  - **artificial lighting** from sources of electrical current (lamps, fluorescent pipes);
  - **shine** or intensity of light either from natural or artificial source or from another surface or inpenetrating object which is not transparent;
  - **contrast** of shine or color.

*Average factors of light reflection*

Materials	%
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**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Plaster	85
White letter	84
White paint	75
Cement	55
Gray stones	50
Natural wood material (light color)	33
Red bricks	20

Lightening is very important for each zone of activities because is a key element to create a warm possible venue.

The quality of light shall create a positive feeling to students.

Powerful lightening is suitable for spaces where is carried out moving activity; whereas lighting with focus on a specific task is needed for manipulative activity; weaker lighting is necessary for calm areas. Quantity and orientation of natural light shall be taken into account in the design and variety of light level.

In the rooms with poor natural lighting, it is allowed a maximum of about 500 lx. Rooms that do not have windows on the ceiling or external windows shall be equipped with conveying tubes of natural light. Spaces of lights that transfer the light deeper inside can be used in the entire sides from south. The designer can refer to the table about minimal values of light for different functions.

In this respect, designers shall take into consideration that: with the reflective light children cannot directly see the light source, a fact causing blinding shine and eye fatigue. Lights with focus, such as the hanging types for residences shall be used only when reading, painting or carrying out a delicate work. Design of variety in lighting with means as light level control, special switches, cables with regulating orientation and hanging cables shall be placed in working areas. There shall be tried the use of specific lighting to display works of art, several lamps to create a joyful atmosphere and high levels of lights to encourage physical activity.

The external light shall be controlled through curtains or other types of windows shades. The external light shall be sufficient to enable movement and security. All the lamps shall have lenses or covers to be resistant to refraction

*Recommended Lux in school spaces*

<b>SPACE</b>	<b>LIGHTING</b>	<b>LIGHTING LUX</b>
Classes	Natural light	300
Classes (near the black board)	Natural light	500
Laboratories	Natural light	400 - 500
Labor room	Natural light	400 - 500
Music/drawing room	Natural light	400 - 500
Storehouse		300 - 500
Library		300 - 500
Multi-purpose space		300 – 400
Physical education hall	Natural light	300 – 400
Office of headmaster/deputy headmaster	Natural light	500
Secretariat	Natural light	250 - 350

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Teachers room	Natural light	500
Space for additional staff	Natural light	250 - 350
Toilet		150 – 250
Office of the physician	Natural light	500
Office of the psychologist	Natural light	500
Depot		250 – 350
Hall	Natural light	300 – 400
Stairs	Natural light	330– 400

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**4.5 Acoustic Amenity**

In school buildings, a special attention shall be paid to acoustic isolation. In urban level, the school position, as mentioned above, shall be situated in quiet areas far from important road axis. It is preferred a location inside the residential areas.

If this is not possible then there exist different solutions, either physical barriers, such as walls, or green physical barriers, such as high plants.

Inside the school, structures shall guarantee a specified acoustic isolation according to the following table:

<b>Construction elements</b>	<b>Requirements in <math>R_w</math> in dB</b>
Walls between the classes venues and similar spaces	47
Walls between classes venues and corridors	47
Walls between classes venues or similar spaces and staircase of the building	52
Walls between the classes venues or similar venues “particularly noisy” (e.g. administration space)	55

During the design of systems and other structures shall be taken into consideration the following recommendations:

all pipelines (air conditioning, hydric supply) crossing the walls that transfer noises shall be covered with material for acoustic protection;

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

in venues where will be created high acoustic levels, there shall be placed furniture elements that would reduce the acoustic noise, such as linoleums, carpets, etc;

to reduce acoustic levels, during design shall be used materials that could decrease the level of noise inside the kindergarten;

glass of doors and windows shall be acoustically laminated glass with an acoustic isolation ability 35dB, with an air space from 50mm to 100 mm;

doors opened from noisy zones shall secure a high acoustic isolation

it is advisable to use textile materials to reduce the acoustic level;

for a better isolation of the rooms zone from the external space or administration space shall be used double doors or tamboura system. The same is recommended also for the selection of double windows. This solution helps also in achievement of a better thermal isolation taking into account that doors and windows are the most delicate zones in relation to acoustic and thermal meaning;

boxes of electrical sockets shall not be installed on the back

Noises protection inside an object does not depend only on amount of voice transmission into the division construction elements but also from the amount of longitudinal voice-isolation of the related construction elements. Even though, this practice is often subject of lack of attention. The voice-isolation of an object achieved only with the special value of division construction elements is not sufficient because long voice-isolation of construction elements defines the limit of performance in voice-isolation. Only one weak point in the isolation of elements (e.g. uninterrupted plaques of the floor layer, light elements of the facade, walls with hollow bricks) reduces the voice-isolation amount, turning irrelevant the changes in the amount of voice-isolation of construction elements. Responsible planning is first of all related to achievement of clearness of voice-isolation mass of construction elements and in this field are met the necessary conditions for positive results of longitudinal voice-isolation in the building. Later on, there shall be selected the division walls in harmony with circumstances.

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**4.6 Colors and their usage**

**594. 4.6.1 Meaning of colors**



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Colors influence students in different ways by making them feel happy, sad, calm or meditative. Colors influence in the perception of the size, amenity of the venue, etc.

Colors may change our perception for dimensions and distances. A wall painted in a darker or warmer color may make it look nearer than it is. This is helpful when walls at the end of narrow corridors are painted with dark colors.

In case when the venues are small there shall be used light colors with cold tonality .

In this respect, their use in schools is necessary, but there shall be taken into consideration also their influence to children.

**Red** is related to the sun and increases the heart beats. It is a very stimulating color and symbolizes activity and desire to live life, as well as transmits warmness.

**Orange** is a less strong version than red. It is compared to joy that encourages yellow. Offers joy and helps get through traumas. It represents the sunny and beautiful nature.

**Blue** in therapy of colors is known as the color of transition. Blue offers support and protection and is the color of peace, calmness and wisdom

**Pink** same as blue has relaxation effects and suggest warmness and calmness.

**Green** is the color of youth, growth, hope, joy, life and freshness. It is also the color of harmony and equilibrium.

**Yellow** is the color of optimism and is efficient, a solar stimulating color. It provides clearness.

In particular, students need a dynamic and stimulating environment to improve and shape their intellect. Rooms painted in orange, green or blue go along with a didactic dimensions, stimulate their sensorial activities and make them feel calm.

In the general theory of colors, their division is made between warm and cold tonalities.

Warm tonalities are characterized by yellow, red, orange and all the intermediate tonalities. These colors are active, positive and are related to action, high sounds and continuous movement. An experiment shows that heart beats faster in a red painted room than in a light blue room.

Cold tonalities are light blue, blue, purple, which are calm colors, passive that stimulate meditation and calm.

In spaces used for games and active work is recommended the use of warm colors, between light yellow, orange yellow or light orange because they stimulate production of adrenaline and as a result affect the creativity and capacity

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- In calm zones are preferred cold colors and tonalities because in the philosophical point of view, an environment with green-blue-light blue tonalities affects the reduction of heart beats offering a feeling of calmness.

### 595.

#### 596. 4.6.2 Use of colors

Before thinking of specific colors, it is important to determine the natural light of the venue and identify the small and difficult areas. To define the function of the rooms and classes and later on define the atmosphere that is needed, i.e. if it is necessary a cold, harmonic or warm, welcoming or cosy.

Colors shall be chosen attentively to create an emotional equilibrium. If the activities performed in these zones would require different color schemes by keeping the main scheme soft, there shall be used strong and brighter colors in some zones, such as windows, doors, corners and frames. As a solution to maintain the equilibrium, one of the simplest and most successful ways is the use of two, three or more colors that suit each other in the point of view of colors, such as peach, apricot and orange, or green, blue green, aquamarine and light blue.

Use of these schemes is called mixture or harmony, because all the colors are combines, balanced without clash of two colors.

If it is required a calm and fresh atmosphere, then there shall be chosen green colors, such as green blue or blue green. If the atmosphere shall be warm then this is achieved with red, pink, orange or yellow colors.



### • 5.PLANTS AND INSTALLATION SYSTEMS

#### **General**

The plants and installation system projects shall refer to the technical terms of design and standards in the Republic of Albania (K.T.P - STASH) and for special elements not envisaged in these norms, the designers shall before the Euronorms (EN) and Eurostandards (EN,HD) as well as recommendations of CEI, CENELC, DIN, VDI/VDE, or local norms and European Community standards.

Installation projects shall include :

Full project of heating and ventilation accompanied with respective details, list of materials and technical specifications of materials.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Full project of electrical system (including telephony and computer system) accompanied with respective details and table of materials and technical specifications of materials.

Full project of water supply system accompanied with respective details and table of materials and technical specifications of materials.

Full project of sewerage network accompanied with respective details and table of materials and technical specifications of materials.

Full project of fire protection accompanied with respective details and table of materials and technical specifications of materials.

Final specifications of materials and equipment.

Full schedule of works.

Methodology of works implementation specifying the manner of preservation of environment from pollution (environmental project)

Detailed IPR of construction costs in the budget agreed by parties for each object conditioned by the geographical zone where is built. For the key categories shall be presented the respective construction analyses.

**597.**

**598.**

**Full project of heating and ventilation**

**599. Meteorological data and external conditions of the environment**

During the initial phase of design of mechanical plants, shall be taken into consideration the geographical position of the object which conditions the way of design due to external meteorological conditions of the areas, as well as the internal factors affecting the venue’s temperature, such as lighting, equipment transmitting heat, etc. Among many factors influencing the thermal amenity can be listed the following:

Temperaturee

Air Humidity

Solar radiation

Winds

The following table shows the external designing temperatures for winter period and geographical data according to cities in the Republic of Albania.

**Table No.3. Table of external designing temperatures**

No.	City	Height above sea level (m)	Geographical width (grad,min)	tlog
35	Tirana	110	41 20	-1.0

\* In these cities, the climatology series is less than 30 years

**600. Designing norms and recommended values of temperatures in venues**

Thermal conditions within the education buildings shall be in harmony for the activity performed in them. It is necessary for the designer to take into consideration the function of activities and the activity to be performed. The following table offers the recommended values of internal temperature, relative humidity, quantity of fresh air, level of noise and speed of air movement that shall be taken into consideration during design phase of school venues.

**Table No.2. Table with recommended values of internal climate parameters**

Destination of the venue	Winter	Summer	Humidity	Quantity of fresh air	Volumes of air per hour	Noise level	Air speed m/s
Classes	22	26	35-60%	8 (L/s*person)	6	35-40 dB(A)	0.15
Auditors	22	26	35-60%	8-10 (L/s*person)	12	30-35 dB(A)	0.15
Laboratories	22	26	-	10 (L/s*person)	10	40 dB(A)	0.13-0.15
Reading room	20	25	55% +/-5%	8 (L/s*person)	-	45 dB(A)	0.07-0.15
Offices	22	26	55% +/-10%	8 (L/s*person)	6	45 dB(A)	0.07-0.15

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Library	22	26	45-50%	8 (L/s*person)	-	40 dB(A)	0.13
Dressing rooms	24	-	-	2.5 (L/s*m2)	10	55 dB(A)	0.15
Corridor, staircase	20	27	-	0.5 (L/s*m2)	4	50 dB(A)	0.15
Storehouse	18	-	-	-	4	55 dB(A)	0.15
Technical venues	16	-	-	-	-	55 dB(A)	0.15
Bars, refectory	21-23	23-26	20-30% / 55-60%	10 (L/s*person)	12	50 dB(A)	0.13-0.15
Gym	20-22	25-26	30-70%	8 (L/s*person)	6	45 dB(A)	0.12-0.15
Swimming pool	26	30	50-60%	-	4-6	45 dB(A)	0.13
Hostels	20	25	50%	15 l/s/ dhome	4	30 dB(A)	0.15
Sanitary system	24	-	-	2.5 (L/s*m2)	6-10	55 dB(A)	0.15
Services, shops	22	26	50%	1-1.5 (L/s*m2)	-	47-56 dB(A)	0.015-0.2
Museum	20	25	55% +/-5%	10 (L/s*person)	-	40-50 dB(A)	0.13
Cooking facilities	20-23	28-30	-	508-762 l/s/m2	12	55 dB(A)	0.15-0.25

Mechanical plants are very important for functioning of a building and normal development of activity destined to be used by users.

Irrespective of the function and use of buildings, mechanical system shall meet the basic necessary criteria toward design, implementation of works in the object and exploitation from users that are :

Harmonization and comfort in use,

Function reliability,

Full technical control,

To guarantee hygienic conditions and technical security,

To enable a partial dedicated use,

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

To guarantee saving of used energy,

To respect environmental conditions,

To guarantee low maintenance costs,

To construct with standard components.

Projects, implementation works and exploitation from uses are based on legal framework and Decision of Council of Ministers of the Republic of Albania, and in cases when this framework does not envisage special terms or arguments, they are based on Italian standards, norms and instructions (UNI, UNIEN) and European (ISO, EN).

Heating system shall be boiler operating with pellet, with panel radiators equipped with thermostatic valves, The sending-return network of water shall be:

For pipes with a diameter smaller or equal to 28 mm, with Pex-Al-Pex material or copper with a insulation coat according to the standards

For pipes with a diameter bigger than 28 mm shall be with black steel pipes without dart or with any other material, thermo-isolated according to necessary standards for pipe dimensions

For gyms may be applied heating systems on the floor or heating systems with hot air (aero-therms type).

Inverter circulation pumps

The designer together with the project shall present also the calculation of thermal losses

The design of heating system with pellet shall meet the following criteria :

To have a pellet tank with a considerable autonomy (up to two months based on thermal calculations of the object)

The pellet tank of deposit shall guarantee the filling without the need of extra labor forces, but directly from the standard self-emptying machineries

The pellet tank of deposit shall guarantee protection of pellet from atmospheric factors

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

The system shall be automatic, equipped with respective mechanisms of pellet transport from the pellet depot in the intermediate deposit (if necessary even at the boiler) without the need for extra labor force.

The pellet deposit, tank of intermediate silos, as all as the boiler shall be placed in venues by respecting all the necessary norms of fire protection, ventilation, necessary spaces for maintenance and repair works, etc.

The boiler shall be monoblock or several pellet boilers with pellet placed in the position to generate the required thermal power. In any case, the efficiency of each boiler shall at least be 89% calculated according to BS 845-2:1987 norm or any equivalent norm.

It should be taken into consideration the light discharge of ashes from burning and removal of wastes in determined places as suitable waste deposit place.

### Ventilation

As long as school venues are high density zones and considering also the immunity system of students to attend these premises is relatively low, the ventilation system of venues is of great importance and requires a special care in calculation and selection of typology that will be used according the each case. The ventilation system in school venues shall enable to meet the main purposes of its application, such as :

*To meet the requirement for ventilation and fresh air supply for breathing needs of persons to use these venues.*

*To enable the elimination of pollutants and bad odors from the venues and enable improvement of air quality.*

*Possibly to regulate the air humidity in these venues*

*Improvement of thermal amenity by preserving thermal regime of heating/cooling systems.*

Value of air exchange in school venues and schools depends on the destination of use of the venue.

**Table no 2** presents the recommend quantity of air change according to the venue’s destination of use.

All the classes, gym, library, laboratories and other venues of mass use shall have mechanical ventilation systems with recovery of heat (at least 60%) and shall be equipped with a filter of minimum F7 class. Air pipes and grills shall be positioned in order to guarantee a good distribution of air and level of noises shall be within then allowed norms for each venues. The air pipe values shall be insulated.

Ventilation system shall take into consideration that in case of fire it shall go off automatically and in case of a design as central units (serving to more than one venue), shall include also the fire dampers.

### **Ventilation of sanitary system**

During ventilation of sanitary system, it shall be considered that:

Air speed shall not pass 6m/s.

Flexible piles shall not pass the length of 3000 mm.

Points of air absorption shall be placed in every closed venue.

## **601. Thermal Power Station**

During the design phase, special attention shall be paid to the right concept of thermal power station. In order to have a well-functioning thermo power station, it is necessary to avoid at maximum problems during operation time, the designers shall take into account:

There should be space of at least about 10% of gross surface of the building for mechanical systems.

Technical venue shall be completed with stairs and in some cases even some elevating means for necessary maintenance and to enable the replacement of equipments.

The doors of technical venues shall at minimum have the dimensions of 230x180. External doors shall be possible to open and removable in case of replacement of large equipment which do not come in pieces.

The underground technical room shall be equipped with special spaces and dimensions that allow replacement of large equipment in the technical venue.

Ventilation points of technical premise shall be positioned at least 50 cm above land level

All the outputs of lines or channels shall be accompanied with collars for fire protection.

Technical venues shall not be used as an area for output and input of air from machineries.



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

A condensation pipe shall be placed in every part of equipment using steam. Condensation pipe shall discharge with self-flow which will later on end up in the drain or drainage pumps.

There should have suitable spaces for passages around the equipments in the technical venue in order to allow the maintenance, to bring the repaired equipment, temporary equipments, replacement of old equipments and security of high voltage.

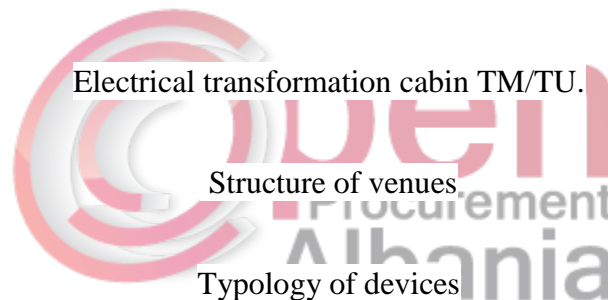
There should be sufficient lighting inside the technical venue to facilitate the work of maintenance workers.

### **602.**

### **Complete project of electrical network:**

The electrical project shall consist of the following systems:

Middle voltage TM supply system.



Schemes and calculation of loads according to requirements

System of emergency energy supply - Generators

Structure of venues

Typology of equipment

UPS security system of energy supply

Main energy supply lines of electrical panels from electrical substation

Functional characteristics of main distribution network

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Secondary Distribution network

Electrical box

Electrical box of the floor, zone ....

Secondary Distribution network

Special venues box

General Power Grid

Supply of general consumers from normal network

Supply of preferential consumers from generator

Supply of important consumers from UPS

Lighting network

Network of general normal lighting

Night lighting system

External lighting system

Security lighting network

Emergency lighting network

Evacuation lighting network etc.

Earthing grid, atmospheric discharges and equipotential schemes

**Project of special installations shall contain the following systems:**

Security system

Fire and gas detection and alert system

Sound alert system

System for blocking unwanted entries

Doors control system

CCTV monitoring system.

Communication system installation

System of structured cables, optical fiber

Active devices of data transmission network

TV-SAT signal system .

Video-doorbell system

The above-mentioned system shall be accompanied with all the calculations and selected technical specifications.

### **Power supply system.**

This system will be designed to enable the uninterrupted power supply in all the venues. In this case, there shall be 3 sources of power supply.

From the network of electricity system - normal voltage

The distribution of power supply lines depends on the organization of venues. E.g. security systems shall have uninterrupted supply from UPS, same for high sensitivity zones for children, the UPS lines will supply also the informatics systems and those of preservation of uninterrupted information, if any.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

With critical voltage (from generator after 15-20 sec) will be supplied those consumers who for 15-20 sec period will not lose the work parameters and do not influence in the normal development of the garden's activity.

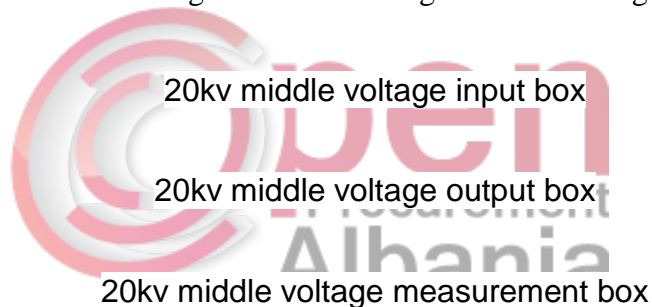
With this voltage will be supplied consumers of general lighting, emergency lighting, security systems, etc.

With normal voltage will be supplied all the venues of the garden considering it as basic supply, but for security and continuity reasons shall be doubled with voltages from the generator and UPS automatically, which shall be envisaged in the designing schemes.

For the power supply of the object in cases when the required power passes the value of 150 kW and when there is no possibility of power connection of low voltage in that area, it shall be envisaged the construction of a substation, which will included the following technical rooms:

### middle voltage room

This room will be equipped with middle voltage boxes according to the following listing:



### Control and protection box of TR1

In the second room, it is envisaged the establishment of middle voltage transformers TM 20/0.4 kv with resin.

Transformers are divided from the venue with an iron grill 40x40x4 (mm) with secured doors and protection elements in case of doors opening.

The third room envisages establishment of generators and after necessary calculations shall be determined even their power.

In the fourth room will be established the panel of automatic passing into generator network, and regulation panel of  $\cos \Phi$  which will be calculated based on the installed power and calculations shall be presented, etc.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

It is better to place the low voltage box nearer to the venues that they supply for saving energy and having a stable voltage. Middle voltage panels and generators shall be placed outside the object. Establishment of low voltage boxes within the kindergarten building makes them more controllable, manageable and economic. During the design of electrical installation, we recommend that the low voltage lines shall be carried out by respecting TNS system for three phase voltage and by respecting TS system for mono phase system. The realization of TU panels design is carried out in conformity with CEI norms, programmed by implementation of powers, dimensions, temperature, lines length and type of consumers. During the design of the project, there shall be considered that lines shall be straight, no joints, labelled according to destination, different from one another, i.e. Grid, Generator, UPS as well as derivation boxes shall be labelled and easily readable. The electrical boxes must contain the protection controlling and measuring elements, protection from atmospheric discharges, etc. Voltage boxes shall provide sustainability REI -120.

The designer shall provide the Approval of Electrical Projects in ISHTI and CEZ, as well as determined the point of power connection from power grid (sub-station or zone transformer).

The electrical project shall be accompanied with the certified license of the electrical engineer, which will serve for further procedures for approval of connection point with CEZ.

### Lighting System

The design shall take into consideration that this system will clearly include :

Schemes of normal lighting

Schemes of emergency lighting

Schemes of evacuation lighting (indication)

Lighting flow shall be respected according to the venues where will be installed by respecting Lux per m<sup>2</sup> in relaxing venues, eating, teaching, corridors, kitchen, toilets, etc.

The control mode of lighting shall be used with efficiency in order to save as much energy as possible.

The lighting shall be with LED lamps with high energy efficiency and minimal consumption. LED lamps shall be specified so that the lighting body (lamp) shall be changeable without needing to change the entire lighting set in case of a defect and capable to operate for 50.000 working hours and meet the DIN EN 60598-1 requirements (VDE 0711-1): 2005-03

Technical specifications of lights shall take into consideration all the necessary standards in order to avoid installation of uncertified products.

### Power System in venues

In all venues shall be envisaged monophase sockets working with normal voltage and generator in harmony with furniture as well as lighting output in the toilets and aspirator if necessary. Në të

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

In corridors in 15 -20 m distance shall be envisaged installation of mono phase sockets with normal voltage for cleaning equipment.

### **Equipotential scheme**

In special venues, such as technical, mechanical, electrical, kitchen spaces, etc, during the realization of the project shall be equipped with a equipotential busbar placed after each door where all the metallic parts will be connected on the floor, walls or ceiling with the equipotential scheme.

VO!

Realization of equipotential scheme during the design shall be absolutely separated from the earthing scheme and lightening rod system.

Inside the equipotential box is envisaged a copper busbar with holes for realization of all connections in equipotential points. The equipotential scheme begins in every venue and ends in the electrodes places on the ground outside the object.

### **Earthing scheme**

During the design of earth scheme shall be taken into consideration all the elements, such as sigma of the earth, type of earth, humidity, so that during the calculation the final resistance shall be less or equal to  $4 \Omega$ . The quantity of electrodes depends on RT realization. During the measuring with controlled currents differential from 2mA-30mA, the differential relay shall act within this diapason.



The scheme shall be realized by the designer taking into consideration that  $R_r$  shall be smaller or equal to  $10 \Omega$ . The counture on earth surface and terrace shall be realized with a zinc stripe 30x3 and zinc rods  $L=1.5m$ , whereas surrounding counture and connector of electrodes on the ground with bare copper conductor  $S= 50mm^2$ . For every discharge shall be placed the disjoint for measuring. Number of discharges shall address the report  $n=P/15 +2$  and resistance of the lightening rod will be calculated with a smaller value than 10 om.

### **Schemes of supply and control of mechanical and hydronic devices**

During realization of the project shall be taken into consideration the realization of schemes of supply and control of heating system, ventilation and water supply. Therefore, in the framework of the prepared schemes by the mechanical and hydrotechnic designer, the electrical project shall contain the following:

panel and cables of ventilation units

panel and cables of pumps (heating, cooling, twins)

panel and cables of boiler

panel and cables of fire pump

panel and cable of water supply pumps I

panel and cables of submersible pumps (if any)

### **Security systems**

Cameras, alarms and control access shall be placed in order to provide uninterrupted information through venues, as well as monitoring of the entire situation in all the venues of the garden - inside and outside. For realization of the electrical installation project shall be carried out a coordination of work with all the designing groups in order to serve at best all the specialties and realize a qualitative service of the staff and apparatus.

### **Fire Detection System**

During realization of the project of fire detection shall be taken into consideration the selection of detectors according to their function and location.

During completion of the project shall be taken into consideration the distance of establishment of detectors, sirens, alerts, so that the entire zone could be covered. The project shall envisage multifunctional detectors, optical, CO<sub>2</sub>, NO<sub>2</sub>, and temperature detectors. The alerts shall be placed on the corridors in the quotes 1 m and 40 cm from quote 00 of the floor. Internal and external sirens shall be placed in the most positions with the best acoustics. The station to be used shall offer all the informations to the system, location of all elements of the scheme and be equipped with GSM. The station shall have a voltage 24 and 48 V for controlling electromagnetic dampers, etc.

The magnifying glass of this station shall not pass 80-125 elements including detectors, sirens, etc. The station shall be connected with the public system of the zone without causing panic in other zones. The fire system software shall be accessible in more than two points and display in a clear situation of the entire system.

### **Satellite and terrestrial TV system**

During the design, this system shall take into consideration the equipped of all entertaining and relaxing rooms of children with territorial and satellite system.

### **Sound alert system**

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Sound alert system shall be used to offer information to the staff in cases of emergencies and special occasions. All the components, such as voice center, central, distribution and connection components shall be envisaged and adjusted for every venue. They can be connected with the central CD player device to play music in suitable hours.

Following zones/rooms will be equipped with sound alert

- Corridors
- common venues

During the designing phase, planned exits shall be coordination with those of the client.

### CCTV System

In line with requirements and standards of the installation, the project shall envisage a CCTV system for common school venues. It shall cover the necessary fields required by the benefiter, which are divided into categories. Based on these special requests in every field, the selection of equipment shall meet these requirements. For the outside areas, there will be the main entries and other requirements that will be coordinated with the benefiter, mobile cameras, suitable for the installation, anti-intervention protection, with IP-66 case and motion detection, etc.

For the internal area will be used high-resolution cameras placed in key monitoring points. All the data will be registered with NVR registration equipment, which shall be placed in the server room with a calculated capacity with the time required by the benefiter. The monitoring room shall display the images of the cameras of the monitor covering the entire divided space in the screen with all the envisaged cameras.



**603.**

### Complete project of water supply system

The supply with cold sanitary water is necessary for normal performance of teaching activity.

Water supply in education venues can be carried out from the urban network or wells in cases when the urban network does not guarantee the needs for water supply of these venues.

Likewise, beside the need for water reserves that will serve for fire protection system, there shall be provided also the quantity and necessary reserve quantity for consumption needs on the users bases.

The referring values for necessary flow in all the hydrosanitary equipments used in the teaching venues is indicated in the following table expressed in “l/s”.

<b>NOMINAL FLOW TO BE PROVIDED IN EACH TAP</b>			
Hydrosanitary equipment	Cold water (l/s)	Hot water (l/s)	minimal pressure mk H <sub>2</sub> O
Sink	0.10	0.10	10
Bide	0.10	0.10	10



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WC	0.10		10
Shower plaque	0.15	0.10	10
Basin	0.20	0.20	10

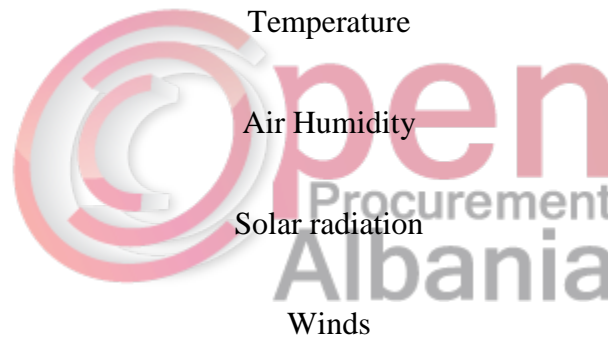
604.

605.

Full project of heating and ventilation

**606. Meteorological data and external conditions of the environment**

During the initial phase of design of mechanical plants, shall be taken into consideration the geographical position of the object which conditions the way of design due to external meteorological conditions of the areas, as well as the internal factors affecting the venue’s temperature, such as lighting, equipment transmitting heat, etc. Among many factors influencing the thermal amenity can be listed the following:



The following table shows the external designing temperatures for winter period and geographical data according to cities in the Republic of Albania.

**607. Designing norms and recommended values of temperatures in venues**

Thermal conditions within the education buildings shall be in harmony for the activity performed in them. It is necessary for the designer to take into consideration the function of activities and the activity to be performed. The following table offers the recommended values of internal temperature, relative humidity, quantity of fresh air, level of noise and speed of air movement that shall be taken into consideration during design phase of school venues.

Minimal daily consumption necessary to support the European Standards shall be provided to meet the requirements for sanitary water is 25 liters/user.

Sanitary cold water supply is done through the external network from the controlling manhole.

**Connection point shall be coordinated with the water supply enterprise.** Water supply system from external network shall guarantee sufficient water for sanitary use. Through the flow and pressure of external network is enabled the supply of general water reserves. A water supply group shall consist of:

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

water measuring, pressure reduction tool, non-return valve and “Y” filter. The pumping group shall be placed in the technical venue.

Water reserve basins shall be calculated in order to provide water quantity for the required amount (maybe 1 day). Specifications (quantity, capacity, etc) shall be defined from the designer based on the diagram of daily use by consumers. Beside sanitary cold water reserves placed in the technical premise, the project shall contain also a water tank in free flow as well as its connection with toilets and pissoirs in cases of power cut. The tank volume shall be calculated by the designer and cover the needs for at least 1 day.

The taps in sanitary connections shall be equipped with water flow timer time press to enable water saving, as well as the hot water mixers shall have thermostatic valve.

The pumping station is the most important part of the system. The pumps parameters shall be calculated in line with daily needs diagrams for water and network configuration.

In this respect, there shall be calculated the pressure, flow, pump power and other technical specification. The project design shall include a pumping station, which is installed in line with the project requirements.

The distribution network comes from the pumping station to the technical building and sanitary connections. Every joint from the main magistral serving as a supplying branch or a columns for shall be equipped with a stopper valve for interruption of water when is necessary to intervene in the system without interrupting the supply for other consumers. The pipeline system of sanitary water needs all the requirements of defined norms and standards. The entire distribution network will be insulated to eliminate the condensation phenomenon and will be equipped with stopping valves wherever necessary, in case of necessary interventions for potential repairs. The system of sanitary water pipes will meet the requirements of norms and standards defined and selected since the designing phase by the engineering staff, as well as preliminary requests of the investor. The pipes shall be sustainable against mechanical blows and resistant to atmospheric agents. The pipes of this system are divided according to the function of their material as following:

Zinc-plated steel tubes without dart for columns;

Tubes PE-Xa – (Reticulated Polyetilen) for distribution into floors;

Tubes PPR;

Tuba PEHD (polyetilen with high density).

Before use, the sanitary water shall be treated (filtered) based on its physical-chemical characteristics.

Filtration may be:

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Mechanic filter;

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Cartridge filter;

Sand filter;

Carbon filter;

Ultraviolet filter.

**Plant for supply with hot sanitary water**

The hot sanitary water shall be prepared in solar panel systems for hot water, where shall be taken into consideration at least 1 m<sup>2</sup> solar panel over every 100 liters of hot water per day. Panels may be either with a thermosiphon system, without electrical resistance, but designed in order to supply the boiler directly or with central system with pumping circulation.

Hot water accumulation shall have a temperature not less than 60 °C. Nevertheless, for the children security, for reduction of risk from very high water temperatures, regulations of kindergarten venues require that the temperature for use (in the output of hydro-sanitary equipments) shall not be higher than 43 °C for all the hot water equipment. Such thing is achieved through thermostatic mixture completed by the mixer.

The dimensions of sanitary hot water network shall be carried out based on the designing norms and standards.

The sanitary water system shall serve for providing cold and hot water from the pumping station to collectors and after this shall provide the water distribution in equipment of sanitary venues. the distribution of sanitary water is realized through:

Hot water distribution lines;

Re-circulation of hot water (if it is chosen the version with hot water central boiler)

Water supply collectors (if it is chosen the collector version from the designer)

608.

**Full project of sewerage system**

The sewerage system consists of the network of collection of atmospheric waters, sewers, gray waters and waters containing fats.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Atmospheric waters are waters falling on the earth surface in the form of liquid falls (rain) and solid form (hail and snow)

Sewers are all the waters collected by the sewerage system of WC of all schools.

Gray waters are waters collected by the draining network of sinks, bidets, showers, washing-machines, etc.

Waters containing fats are collected from the draining network of all kitchens in different building.

In the water draining system in which we have presence of waters containing fats, it is installed the plant of collection of fats before outflow in the main collector of sewerage system.

**609. Dimensions of draining plants, normative values of draining**

Dimension of draining network of waters is made based on calculations of flows for draining units of different equipment, velocity of flow of liquids in pipes and inclination of pipes. The water flow in the draining system shall not create pressure that could create hydraulic blows in the pipes. Pipes shall have a sufficient diameter to enable free circulation of air ventilation that provides the stability of network pressure.

**610. Values of drain units accompanied with respective details and table of materials and technical specifications of materials.**

Every sanitary equipment is characterized by a defined norm of water flow, which depends on its size and functioning. Norms of dimensions addressed for the draining network are proposed by **UNI 9183** standards.

**Table 1 – Amount per draining unit for equipments (UNI 9183)**

<b>Equipments</b>	<b>Draining unit</b>
Tube (no shower)	2
Shower (per one siphon)	2
Shower (per every siphon installed together)	3
Sink	1
Bidet	2
WC with cassette	4
WC with cassette incorporated in the walls	8
Kitchen sink	2
Sink	3

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Dish washer	2
Washing machine	2
Floor drain	1
Combination Sink-Bidet-Tube-WC with cassette	7
Combination Sink-Bidet-Tube-WC with cassette incorporated in the wall	10
Combination Sink-WC with cassette	4
Combination Sink -WC with cassette incorporated in the wall	8

**Dimensions of joints**

The internal system of collection of sewage waters is composed of the joints of all sanitary equipment. From the internal network, water is send to the vertical draining column. The flow in one joint is the unit flow of the apparatus that will drain to the joint. Diameter is defined based on the following table:

**Table 2 – Diameter of draining joints ratio to maximal number of unit joints of drains in them (UNI 9183).**

<b>Diameter of branches (mm)</b>	<b>Total load</b>
40	3
50	6
65	12
80	20
100	160
125	360
150	620
200	1400

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**617. Dimensions of draining columns**

A draining column normally counts different joints in different floors.  
The maximal flow in a draining columns increases with the height of the floors where there exist joints.  
The dimensions of the vertical draining column pipes depend on the maximal flow of the column.

**Table 3 – Diameters of the draining columns ratio to maximal number of units per drain, number of floors and loads in the draining units in the busiest floor (UNI 9183)**

<b>Columns Diameter (mm)</b>	<b>Built up to 3 floors</b>	<b>Maximal load per one floor</b>
50	10	6
65	20	9
80	30	16
100	240	90
125	540	200
150	960	350
200	2200	600
250	3800	1000
300	6000	1500

**618.**

**619.**

**620. Ventilation of sewerage network**

The main purpose of ventilation of sewerage system aims to bringing out the gases collected from sewers, as well as encourages the normal function of the installed siphon in each equipment and to keep them under the atmospheric pressure. An efficient ventilation system is also useful in fight against creation of mould.

Ventilation columns are divided into four categories:

Primary ventilation

Direct parallel ventilation

Indirect parallel ventilation

Secondary ventilation

**621.**

**622. Processing of drain waters**

Processing of sewerage waters consists of removal of pollutants in these waters

Processing of sewerages is done through the construction of water treatment plants

These plants are built outside the inhabited centers

After the cleansing these waters are used for communal purposes

### **623. Materials of pipes and main components of sewerage system**

Pipes of internal network feeder and sewerage columns are made of different materials, pressure pipes: geberit piping system with welding.

Pipes without pressure: Politelien and PVC

Collectors pipelines are divided into pipes with loads and pipes without pipes.

When pipes pass through pavements or green spaces, there shall be used junction pipes without loads SN4, PVC SN4.

When pipes pass through a road soil where there are dynamic loads and it is used by high tonnage vehicles, there shall be used junction pipes with loads SN8, PVC SN8. Materials shall be accompanied with manufacturing certificates. Based on **UNI 9183** and **UNI EN 1091** norms.

### **Rain water draining system**

Dimensions of roofs and terraces draining network

Dimensions of ruts.

Dimensions of descending columns.

Dimensions of pipelines collectors

Dimension of superficial drainage

White water draining plants

- Condense waters
- Accidental waters from fire protection plant
- Waters in underground floors, from infiltrations, etc.

Water rain draining networks and main elements

Materials of pipes and main elements of plants

Preservation and use of rain waters



**624.**

**Complete project of fire protection system  
(MKZSH)**

This system includes the total of architectonic, constructive, mechanic and electrical measures for “Prevention, protection and construction of Fire Protection System”.

These measures according to their function and way of application are divided into measures for “Passive Protection” and measures for “Active Protection”.

Passive protection that deals with architectonic and constructive arguments of fire prevention and protection, such as compartmentalization of structures; realization of roads and secure escape exists; reduction of fire load its spreading. Passive protection is subject of architectonic and constructive projects.

Active Protection that deals with manual fire detection and extinguishing system, fire and heat control system. Detection plants will be treated by electrical systems.

Fire protection system shall consist of hydrants. Hydrants shall be designed for the necessary flow and standards and shall be completed with all elements (cassettes, valves, rubber pipe, etc.). They need to be positioned in such a way that every point of the object could be covered by at least two hydrants and shall be placed nearest possible to passages of escape and evacuation (object shall have at least two escape and evacuation passages). If the building is more than story high, in the hydrants of each floor shall be a valve for connection of the fire-fighting teams.

Internal hydrants shall meet the following criteria:

To be installed separately for each compartmentalization;

To be positioned in the vicinity of exits of escape passages without being an obstacle;

To be positioned on both sides of the gate is there exists a REI gate;

To cover every space of the activity;

Every hydrant shall protect a zone up to 1000 m<sup>2</sup>;

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Every point of the protected zone shall be in a maximal distance of 20 m per mural hydrants and 30 m per naspot;

External fire hydrants that consist of the type of columns on the ground with a flow of 350 l/m and output pressure not less than 2.5 bar are composed of a columns coming from underground in which are positioned the connections that enable the water supply. The hydrant consist of columns with two exits respectively DN 70 and DN 100 with me stoppers linked with a chains and maneuver key (optional). The columns hydrants on the ground and underground hydrants shall be installed in order to:

To be not more than 60 m far from each other ;

Outside the building is recommend the use of column hydrants above the ground;

Where possible shall be installed in relation to exits from then building in order to be in a secure position in case of fire;

Distance between them from the external walls of the building is recommend between 5 m and 10 m .

The connection with auto-pump is a mean that helps fire extinguishing linked to the hydric network which can supply water in case of fire emergency. Every connection with the auto-pump shall provide:

- 1 or 2 linkages with a diameter not less than DN 70;

- To be well-fixes in the lateral walls outside the building, easily identified and accessible by fire-fighting vehicle;

- Output pressure not less than 1.2 Mpa.

Water supply system shall be able to provide at any time the necessary flow and pressure required by the plant in case of fire. As a water source shall serve:

- Fixed connection from the water supplying system of the city, uninterrupted;

- Fixed abundant basins with the with the necessary quantity of water anytime.

Wells, fountains or other insecure connections cannot be used as a source or water reserve. Measures shall be taken in order that the water shall contain no :

- Kelps or other blocking materials

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Corrosive Materials

The pumping group shall be positioned in a protected venue, in the same level of the water reserve and shall be composed of :

- 1 or 2 pumps in line with EN733 norm together with the pilot pump (jockey) and diesel.

- Control Panel equipped with buttons in the frontal part and LCD screen.

There shall be taken measures for providing power supply from the normal grid and moro-generator.

The distribution network includes the underground network, visual external network and internal network of the building. It is preferred a ring system equipped with controlling interrupting valves.

The distribution network shall take into consideration:

- To consist of materials according to the norms;
  - To be painted with anti-mould paint;
  - To be protected from fire, damage and freezing;
  - To ensure the mechanical resistance;
- To take measures for seismic zones, passages in the walls or anti-fire division.

The MNZSH project shall also define the positions and necessary equipments for evacuation of fire (space with an automatic opening, ventilators for removal of fire, etc.).

The MNZSH Project shall also include the evacuation signaling system. Signals system enables persons to find the escape ways, emergency exits, fire extinguishing equipments or emergency phone numbers.

The fire alert, dimensions (depending on the sight distance) colors and their dimensions are determined in line with EN ISO 7010 norm. Signals system shall also be realized with other means :

through a sound communication system;

through a different consistency surface;

through chromatic contract on the floor visible in all illumination conditions

## 6. CONSTRUCTION

**625.**

### 6.1 Standards for the construction project

#### STANDARDS OF REFERENCE

##### Eurocodes

- EC0 Basis of structure design
- EC1 Load in structures
- EC2 r/c structures design
- EC7 Geotechnic design
- EC8 Seismic structures design

##### Albanian Designing Terms and in concrete

- Technical Designing Terms KTP -1978
- Technical Terms for designing of anti-seismic constructions KTP-N.2-89

Schools design shall be based on structural design standards and also long as in our country there are still in force 1978 -1979 Technical Conditions of Design, which do not reflect the developments and recent norms drafted in this respect, we recommend that the school design could be done based on Eurocodes norms.

The eurocodes determine in details the types of loads (permanent, temporary, snow and wind, as well as their combination), which shall be taken into analysis during the structural analysis.

In this respect, we also underline that:

Before completing the design there should be carried out a geological and seismic study about the soil where the object will be built.

The school design shall be made with r/c structures and concrete make shall not be smaller than C25/30, whereas the steel to be used shall be from the make S500 (sideron) or its equivalent (e.g. FeB44k).



BASHKIA  
TIRANË

Likewise, we recommend that  
hydroisolated from outside.

foundations of the schools shall consist of r/c slabs,

Slabs of inter-floors of schools shall consist of monolite slabs with deep beams.



**Tirana Municipality**

**GENERAL DIRECTORATE OF PUBLIC WORKS**

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629. DESIGNING TASKS

**FOR REALIZATION OF STUDY AND DESIGN**

“New construction of Type 4 school in Administrative Unit of Dajt  
(Site D2)



• **TABLE OF Contents**

.....	<u>DESIGN</u>
<u>ING TASK</u> .....	45
<u>1.</u> ..... GENERAL DATA AND EXISTING SITUATION OF THE <u>OBJECT</u>	47
<u>2.GENERAL DESIGNING REQUIREMENTS FOR SCHOOL CONSTRUCTION</u>	71

“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

331		<a href="#">2.1</a>
	<a href="#">Main space</a>	72
		<a href="#">2.1.1</a>
	<a href="#">Teaching classes</a>	72
		<a href="#">2.1.2</a>
	<a href="#">Laboratories</a>	<b>Error! Bookmark not defined.</b>
		<a href="#">2.1.3</a>
	<a href="#">Furniture</a>	<b>Error! Bookmark not defined.</b>
		<a href="#">2.1.4</a>
	<a href="#">Laboratories</a>	<b>Error! Bookmark not defined.</b>
		<a href="#">2.1.5</a>
	<a href="#">Working space</a>	83
		<a href="#">2.1.6</a>
	<a href="#">Music and dancing halls</a>	<b>Error! Bookmark not defined.</b>
332		<a href="#">2.2</a>
	<a href="#">Social space</a>	89
		<a href="#">2.2.1</a>
	<a href="#">Libraries</a>	89
		<a href="#">2.2.2</a>
	<a href="#">Multi-purpose space</a>	<b>Error! Bookmark not defined.</b>
		<a href="#">2.2.3</a>
	<a href="#">Space for physical education</a>	97
333		<a href="#">2.3</a>
	<a href="#">Administrative space</a>	98
		<a href="#">2.3.1</a>
	<a href="#">Headmaster’s Office / Deputy Headmaster’s Office</a>	79

“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

.....	<a href="#">2.3.2</a>
<a href="#">Secretariat / administration rooms</a> .....	98
.....	<a href="#">2.3.3</a>
<a href="#">Teachers’ room</a> .....	99
.....	<a href="#">2.3.4</a>
<a href="#">Assisting Staff</a> .....	100
334 .....	<a href="#">2.4</a>
<a href="#">Other facilities</a> .....	100
.....	<a href="#">2.4.1</a>
<a href="#">Hygiene-sanitary venues</a> .....	100
.....	<a href="#">2.4.2</a>
<a href="#">Office of the physician</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.4.3</a>
<a href="#">Office of the psychologist</a> .....	<b>Error! Bookmark not defined.</b>
335 .....	<a href="#">2.5</a>
<a href="#">Communication spaces, entrances, staircase, corridors, halls</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.1</a>
<a href="#">Corridors</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.2</a>
<a href="#">Staircase</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.3</a>
<a href="#">Elevator</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.4</a>
<a href="#">Hall</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">2.5.5</a>
<a href="#">Storeroom, additional corners</a> .....	<b>Error! Bookmark not defined.</b>



.....	<a href="#">2.5.6</a>
<a href="#">Wardrobe</a> .....	<b>Error! Bookmark not defined.</b>
<b>3.</b> .....	<b>FURNITURE AND EQUIPMENT Error!</b>
	<b>Bookmark not defined.</b>
336 .....	<a href="#">3.1</a>
<a href="#">Antropometry and furniture dimensions</a> .....	<b>Error! Bookmark not defined.</b>
<b>4.</b> .....	<a href="#">SPECIAL REQUIREMENTS</a> <b>Error!</b>
	<b>Bookmark not defined.</b>
337 .....	<a href="#">4.1</a>
<a href="#">Design for people with disabilities</a> .....	<b>Error! Bookmark not defined.</b>
338 .....	<a href="#">4.2</a>
<a href="#">School as a Community Center</a> .....	<b>Error! Bookmark not defined.</b>
339 .....	<a href="#">4.3</a>
<a href="#">Thermal Amenity (Temperature)</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.3.1</a>
<a href="#">Definitions and Terminology</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.3.2</a>
<a href="#">Improvement of thermal amenity</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.3.3</a>
<a href="#">Active control of temperature</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.3.4</a>
<a href="#">Temperature and humidity levels</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.3.5</a>
<a href="#">Isolation standard</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.3.6</a>
<a href="#">Thermal bridges</a> .....	<b>Error! Bookmark not defined.</b>

.....	<a href="#">4.3.7</a>
<a href="#">Requirements of U values (W/m<sup>2</sup>K)(thermal transmittance coefficient)</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.3.8</a>
<a href="#">Windows and Doors</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.3.9</a>
<a href="#">Passive control of temperature</a> .....	<b>Error! Bookmark not defined.</b>
340 .....	<a href="#">4.4</a>
<a href="#">Visual Amenity</a> .....	152
341 .....	<a href="#">4.5</a>
<a href="#">Sound Amenity</a> .....	154
342 .....	<a href="#">4.6</a>
<a href="#">Colors and their usage</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.6.1</a>
<a href="#">Meaning of colors</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">4.6.2</a>
<a href="#">Use of colors</a> .....	<b>Error! Bookmark not defined.</b>
<a href="#">5</a> .....	PLANT DESIGN AND INSTALLATIONS <b>Error!</b>
	<b>Bookmark not defined.</b>
343 .....	<a href="#">5.1</a>
<a href="#">Standards for electrical projects</a> .....	<b>Error! Bookmark not defined.</b>
344 .....	<a href="#">5.2</a>
<a href="#">Mechanical plant</a> .....	<b>Error! Bookmark not defined.</b>
345 .....	<a href="#">5.3 Fire</a>
<a href="#">protection installation</a> .....	<b>Error! Bookmark not defined.</b>
346 .....	<a href="#">5.4</a>
<a href="#">Sanitary cold water supply system</a> .....	<b>Error! Bookmark not defined.</b>



347	.....	<a href="#">5.5</a>
	<a href="#">Sanitary hot water system</a> .....	<b>Error! Bookmark not defined.</b>
348	.....	<a href="#">5.6</a>
	<a href="#">Sewerage system</a> .....	<b>Error! Bookmark not defined.</b>
349	.....	<a href="#">5.7</a>
	<a href="#">Plant for draining of rain and waste waters</a> .....	<b>Error! Bookmark not defined.</b>
350	.....	<a href="#">5.8</a>
	<a href="#">Heating, Ventilation and air-conditioning (H.V.A.C)</a> .....	<b>Error! Bookmark not defined.</b>
351	.....	<a href="#">5.9 Fire</a>
	<a href="#">protection plant</a> .....	<b>Error! Bookmark not defined.</b>
	.....	<a href="#">5.9.1</a>
	<a href="#">Passive Protection</a> .....	<b>Error! Bookmark not defined.</b>
	.....	<a href="#">5.9.2</a>
	<a href="#">Active Protection</a> .....	<b>Error! Bookmark not defined.</b>
	.....	<a href="#">5.9.3</a>
	<a href="#">Terms and graphic definitions of signal charts technical symbols</a> .....	<b>Error! Bookmark not defined.</b>
	.....	<a href="#">5.9.4</a>
	<a href="#">Terms and terminology of construction elements, distances, rescue ways, evacuation of smokes and active tools of fire alert-detection and extinguishing</a> .....	<b>Error! Bookmark not defined.</b>
	.....	<a href="#">5.9.5</a>
	<a href="#">Classification of fire dangel level</a> .....	<b>Error! Bookmark not defined.</b>
	.....	<a href="#">5.9.6</a>
	<a href="#">Hand-held (vessels) fire extinguisher</a> .....	<b>Error! Bookmark not defined.</b>
	.....	<a href="#">5.9.7</a>
	<a href="#">Half-portable system (hydrants, naspot) of fire extinguishing</a> .....	<a href="#">61</a>
	.....	<a href="#">5.9.8</a>
	<a href="#">Fire Sprinkler System</a> .....	<b>Error! Bookmark not defined.</b>

.....	<a href="#">5.9.9</a>
<a href="#">Pressured Plants and water reserve for fire extinguishing ...</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.9.10</a>
<a href="#">Distribution network, main installation and design components</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.9.11</a>
<a href="#">Smoke and evacuation control system</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.9.12</a>
<a href="#">Graphic presentation of additional necessary documents in drafting Mechanical Project of Fire Protection</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.9.13</a>
<a href="#">Role and duties of staff in recognizing, maintaining and using fire extinguisher tools and action in case of a fire .....</a>	<b>Error! Bookmark not defined.</b>
	<b>defined.</b>
.....	<a href="#">5.9.14</a>
<a href="#">Standards, norms and international and national normatives</a>	<b>Error! Bookmark not defined.</b>
352 .....	<a href="#">5.10</a>
<a href="#">Cold hydro/sanitary (H/S) water supply plant</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.1</a>
<a href="#">Use of cold sanitary water</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.2</a>
<a href="#">Need for cold hydro/sanitary water</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.3</a>
<a href="#">Methods of primary water supply and provision of reserve water</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.4</a>
<a href="#">Pumping station</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.5</a>
<a href="#">Distribution network and components of design and installation</a>	<b>Error! Bookmark not defined.</b>

.....	<a href="#">5.10.6</a>
<a href="#">Pipes materials and installation and design components of internal network</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.7</a>
<a href="#">Filtration of sanitary water</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.8</a>
<a href="#">Design and installation of hot sanitary water</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.9</a>
<a href="#">Parameters of hot sanitary water</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.10</a>
<a href="#">Needs for hot sanitary water according to standards</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.11</a>
<a href="#">Preparation of hot sanitary water</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.12</a>
<a href="#">Dimensioning of hot sanitary water</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.10.13</a>
<a href="#">Network Distribution, installation components</a> .....	<b>Error! Bookmark not defined.</b>
353.....	<a href="#">5.11</a>
<a href="#">Sewerage and wastewater plant</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.11.1</a>
<a href="#">Classification of drained waters</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.11.2</a>
<a href="#">Dimensioning of draining system, normative values of draining</a>	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.11.3</a>
<a href="#">Values of draining units according to devices</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.11.4</a>
<a href="#">Dimensions of draining columns</a> .....	173

.....	<a href="#">5.11.5</a>
<a href="#">Ventilation of draining networks</a> .....	174
.....	<a href="#">5.11.6</a>
<a href="#">Treatment of drained waters</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.11.7</a>
<a href="#">Materials of pipes and main components of draining</a> .....	<b>Error! Bookmark not defined.</b>
354 .....	<a href="#">5.12</a>
<a href="#">Heating, ventilation and air-conditioning system (H.V.A.C)</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.12.1</a>
<a href="#">Meteorological data and external conditions of the environment</a> .....	<b>Error! Bookmark not defined.</b>
355 .....	<a href="#">5.13</a>
<a href="#">Designing Conditions</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.13.1</a>
<a href="#">Designing Norms and recommended values of temperatures of premises</a> .....	<b>Error! Bookmark not defined.</b>
356 .....	<a href="#">5.14</a>
<a href="#">Air-conditioning plant</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.14.1</a>
<a href="#">Heating</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.14.2</a>
<a href="#">Typology of heating plants</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.14.3</a>
<a href="#">Heating system</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.14.4</a>
<a href="#">Cooling</a> .....	<b>Error! Bookmark not defined.</b>
.....	<a href="#">5.14.5</a>
<a href="#">Ventilation – Fresh air</a> .....	<b>Error! Bookmark not defined.</b>

357	<a href="#">Thermal power station and mechanical equipments</a>	5.15	Error! Bookmark not defined.
	<a href="#">Thermal power stations</a>	5.15.1	Error! Bookmark not defined.
	<a href="#">Mechanical equipments</a>	5.15.2	Error! Bookmark not defined.
6.		CONSTRUCTION	177
358	<a href="#">Standard for the construction project</a>	6.1	177
	<a href="#">ACCESSIBILITY FOR THE DISABLED/ARCHITECTURAL BARRIERS</a>	7.	Error! Bookmark not defined.



## **MATERIALS TO BE PRESENTED BY PROCUREMENT ENTITY**

3. The Designing tasks for each educational object
4. Feasibility Study for pre-university educational infrastructure

## **METHOD OF PROVIDING COMPLETE PROJECT**

- g. *Schematic and conceptual phase of design, which will be completed by companies participating in the competition:*

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Concept of the object
- Genplan of the object and external organization, staircase 1-500
- Distributive scheme, organization of school spaces
- Plan of all proposed floors with furniture, scale 1-200
- At least a A-A elevation scale 1-200
- Facades of the object, scale 1-200
- At least 4 render images of the external venues, 2 render images of internal space
- At least 1 axinometric drawing
- Report on the project
- Complete IPR of construction-installation and furniture of the object
- Methodology of works implementation

***h. Project implementation phase which will be completed by winning companies:***

Project of “New construction of Type 4 school in Administrative Unit of Dajt (Site D2) shall consist of :

- Plan of the structure establishment, which will be compiled in cooperation with General Directorate Territory Planning and Development in Tirana Municipality.
  - Technical Architectonic and Constructive Report.
- Architectonic project: Facades, object plan, furniture plan, terrace plan, etc.
- Object construction project: Plan of structures and details, plan for foundations, etc.



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- The movement plan for the disabled
- Project Implementation of hydrosanitary and sewerage systems
- Project implementation of electrical installation, telephone and internet network accompanied with the certified license of the designer
- Project Implementation of heating system, fire protection approved by Fire and Rescue Directorate of Tirana Region Prefecture
- Project for arrangement and green spaces of the yard, project of sports venues
- Technical Specifications for categories of works and furniture of the project
  - Detailed schedule of works according to categories.
  - Architectural details, layers, door/windows, furniture etc
    - Construction Materials to be used
    - Geological Report
    - Seismicity Report
  - Report of Assessment of Impact on Environment (VNM)

The entire material prepared for the project implementation phase will be submitted in six printed copies and electronically in CD.

Likewise, the designer shall present :

- Licence of the designing company + extract of Trade Registry

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Licences of designing engineers, licence of environmental expert + notarial declaration of the designing engineers
- Plan of settlement of the object at scale 1 : 1000 A3 form (original copy);

### *VERSION 1*

#### **Preparation of the Interim Payment Report**

Total cost of the intervention will be defined in the final IPR of the object that will be prepared based on the implementation project, technical specification, taking into consideration special requirements of the Municipality regarding accepted standards and prices per unit according to the **Technical Manual of Prices in force or Technical Analysis of prices for categories not included in the manual.**

**630.**

### *VERSION 2*

#### **Preparation of the Interim Payment Report**

##### *IPR of the object*

The final IPR of the object that will be prepared based on the implementation project, technical specification, taking into consideration special requirements of the Municipality regarding accepted standards and prices per unit according to the **Technical Manual of Prices in force or Technical Analysis of prices for categories not included in the manual.**

##### *Cost of construction and installations*

The total cost of the construction-installation and furniture will be based on the final IPR of the object providing the implementation company with the prices of every category envisaged in this IPR. This IPR shall be within the limit fund envisaged by the Contracting Authority. This cost will be exactly part of the general bid, thus, the project quality will be compared to the implementation quality within the same limit fund.

**631.**

## **Standards**

### *Design Standards*

The Project will be drafted in line with all norms and standards of designing envisaged by the legislation in force. The design shall take into consideration the respect of standards, even during the implementation. The Designer is responsible for the accuracy and respect of all the respective norms and

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

standards. The Designer may recommend also the introduction of new standards of harmonization with EU norms, as well as the best international practices of design and implementation. Recommendations shall contain feasibility and profitability elements of the Albanian practice and financial limits for the project. During the drafting of the project, there shall be considered all the norms approved for the disabled, eye problem person, etc. The project shall envisage the necessary infrastructure for this category.

Technical infrastructure details for this category will be presented by the Designer in special sheets of the project.

### **Recommendations for the designer**

- The Project will be drafted in close cooperation with the task force in Tirana Municipality for consultations and supervision of designing process.
- The designer shall use and review all the existing information in relation with the zone where the school will be built. Necessary data for the design, such as situation of the existing water supply and sewerage systems, illumination, high voltage cabins, regulatory plan of the zone, etc, shall be provided by the designer through request for information in the respective institutions.
  - The designer shall use preliminary studies and data of Tirana Municipality.
    - Quality of study shall meet the required standard

### **Calculation, technical specifications and IPR**

The technical report accompanying the project shall contain :

- Technical report of the architectonic design
- Technical report of the constructive design including report on calculation of all structures (foundations, staircase, slabs, beams, etc), as well as engineering measures, security in the object during construction works. Attached to the report will be also the respective annexes with all the calculation including computer method of calculations for potential controls by the investor
  - Seismic report of the soil (general description in case of no study)
- Technical Specification for each category of works

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Full IPR of implementation works
- Geological report and physical-mechanical characteristics of the earth including physical-mechanical characteristics of soil and layers in the foundations of the new and existing object
- Recommendations and proposals for special cases

**Presentation of drawings**

Drawings of the project implementation phase will be presented in a A3 version, readable and at the minimum consisting of the following sheets:

73. Topography of the existing situation updated with current constructions (formal and informal) and respective report

74. General plan of the object at Sc. 1:200; 1:500

75. Plan of floors in the object at Sc. 1:100, 1:50

76. New Facades in 2 D and 3D Sc.1:100

77. Elevation of the building (on both sides) Sc.1:100

78. Plan of foundations Scale1:100

79. Elevation of the foundations and details Sc.1:20; 1:10

80. Detailed Plan of Structures Sck.1:100; Shk.1:50

81. Plan of school furniture Sc.1:100

82. Plan of sewerage system Sc. 1: 100

83. Manholes and other details of sewerage system Sc.1:10, 1:20

84. Plan of water supply system Sc. 1: 200, 1:100

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

85. Axonometric schemes of water supply, details of hydrosanitary equipments Sc.1:100
86. Manholes and other details of water supply system Sc.1:20, 1:10
87. Plan, axinometry and heating system details Sc.1:100
88. Plan and details of fire protection system Sc.1:100
89. Plan of boiler room, construction, details Sc.1:100;1:50
90. Plan and details on lighting, installation of lights in the ceiling, installation of main box sc.1:100;1:50
91. Plan of power distribution scheme in the entire object, Sc. 1:100
92. Plan of telephony, internet network Sc.1:100; 1:50
93. Plan of external lighting and its details Sc.1:100; 1:50
94. Plan of sports venues, green spaces and details Sc.1:100; 1:50.
95. Plan of surrounding wall, type and details of placement of benches Sc.1:100; 1:50.
96. Plan of superficial waters draining and respective details sc. 1:100; 1:50.

Each sheet of the object construction drawing shall be provided even the tables of specification for each material, steel, concrete, bricks, etc.

## **REFERENCES**

### **General References**

- Existing Guidelines for Albanian schools that are now used as reference by planners, designers and supervisors of work areas;
- Law on Education of MoES;

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- ISO Norms of Construction;
- Other Albanian Laws, including Law on Protection of Environment, Law on Territory Planning, Regulations on Fire Protection, Law on Construction, Guideline on Technical Conditions of construction objects for movement of the disabled, technical regulation for saving of thermal energy and thermal protection in buildings;
- New curriculum on general education
- Different standard projects for construction of schools in Albania
- Other guidelines prepared in advance from the consultant .

### Specific References

- CoMD no.319, dt 12.04.2017, “On approval of designing standards in schools design”
- CoMD no.98, Dt. 06.02.2013, “On approval of List of Harmonized Albanian Standards of referring character for presumption of conformity for construction product
  - ISO Norms for Constructions
- CoMD No. 68, datë 15.2.2001, “On approval of Standards and Technical Conditions of design and implementation of construction works”.
- CoMD, No. 1503, Dt. 19.11.2008, “On approval of regulation “For exploitation of spaces by the disabled”.
- Order of Ministry of Interior No. 425, Dt. 24.07.2015 “On acceptance, administration of technical and graphic documents of the fire protection and rescue project and issuance of technical acts”
- Order of Ministry of Interior No. 424, Dt. 24.07.2015 “On approval of technical rules for fire protection and rescue in residential buildings”
  - Law No. 152/2015 “On fire protection and rescue service”.
  - Law No.107/2014, Dt. 31.07.2014 “On Territory Planning”

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Law No. 69/2012, Dt.21.06.2012 “On pre-university education system in the Republic of Albania”.
- CoMD No. 408, Dt. 13.05.2015 “On approval of territory development regulation”.
- CoMD. No. 626, Dt. 15.07.2015 “Normative of designing of residences”.
- CoMD No 628, Dt. 15.07.2015 “Technical rules of designing and construction of roads”.
- CoMD No, 691, Dt. 29.07.2015 “Inter-sectorial strategy for decentralization and local government”.
- CoMD. No.38, Dt. 16.01.2003 “On approval of norms, rules and terms of design, construction, production and preservation of heat in buildings”.
- Normative provisions on Pre-University Education System, MoES, Tirana, 2013.
  - Zevi, B. Architectura-Zevi, Il Nuovissimo Manuale Dell Architetto.
    - Neufert, E. & P. Architectural Standard

### *Electrical*

- CEI 0-2 Guideline for definition of documents
- CEI 11-35 Guideline of execution of substations
- CEI 11-1 Electrical systems for alternative voltages higher than 1 kV.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- CEI 11-17 Plants of Production, Transport and Electrical Power Distribution
- CEI 11-20 Plants for Production of Alternative Energy, groups of electrogenerators connected in networks of I and II category.
  - CEI 11-25 Short circuit currents in three-phase alternative systems. Their calculations.
  - CEI 11-26 Short circuit currents, calculation of effects. Definitions and calculation methods
    - CEI 17-13/1 Security of equipment of low voltage use (low voltage boxes)
- CEI 31-30, 31/33, 31/35 Electric constructions of equipment installed in zones risking explosion due to gas presence. Classification of dangerous zones .
- CEI 64-8/1 Use of electrical plants in nominal voltages not higher than 1000 V alternative and 15000 V directt.
  - CEI 81-10/1-4 Protection from atmospheric discharges (lightning).
    - CEI 103-1/1 a 103.1/16 Plant of internal telephony
  - CEI in CT 210 (electromagnetic compatibility) and CT 211 (exposure of man toward electromagnetic fields).
    - UNI EN 12464-I Internal lighting system of labor posts
  - UNI Standard 9795 – Fixed systems of detection and automatic signal and fire alarm.
    - UNI EN 1838 Lighting equipments. Emergency lighting .
- CEI EN 50173-1 Information Technology – General cabling system - Planning and criteria of installations within internal venues .
  - IEC 60076-11 Use of dry three-phase transformers .
    - IEC 103-1 / N PABX central.



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- 60617/1-2 CEI EN Symbols– Graphics used for diagrams, etc.
- CEI 3-8 Abbreviations and symbols for sketches in plans
  - CEI electrical users 64-8/1-2-3-etc.
- CEI / UNI Products applied for design, construction, testing in plants and installation of materials, components and electrical equipments.

### *Mechanics*

- UNI/EN 12845 General Norms of Fire Protection;
- UNI 10779 Hydrants network. Designing, installation and use;
- EN 671 Fixed Systems of Fire Protection. Anti-fire flexible pipes;
  - EN 54-1 System of detection and alert – Introduction;
  - EN 54-3 System of detection and alert – Alert Equipments;
  - EN 12723 Pumps – General Terms of pumps and installations, definitions, quantity, symbols and units;
  - EN 60529 Protection Scale (Code IP) (IEC 60529:1989);
- ISO 65 Steel pipes with threads in line with Standard ISO 7-1;
  - EN 12094 Gas extinguishing systems;
  - EN 1356 Foam extinguishing systems;
    - UNI 9994-1 Portable vessels;
    - UNI EN 12416-2 Dust system;
    - UNI EN 13565-2 Foam System;
  - UNI ISO 15779 Aerosol extinguishing system.

### *Constructive*

- EC0 Bases of structures design
  - EC1 Loads in structures
  - EC2 Design of r/c structures
  - EC7 Geotechnic design
- EC8 Seismic Design of Structures
- Technical Conditions of Design KTP -1978

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- Technical Conditions of Design for anti-seismic constructions KTP-N.2-89

### TERMS

Terms used in this designing tasks are referred to terminology defined in Law No. 69/2012, Dt.21.06.2012 “On pre-university education system in the Republic of Albania”.

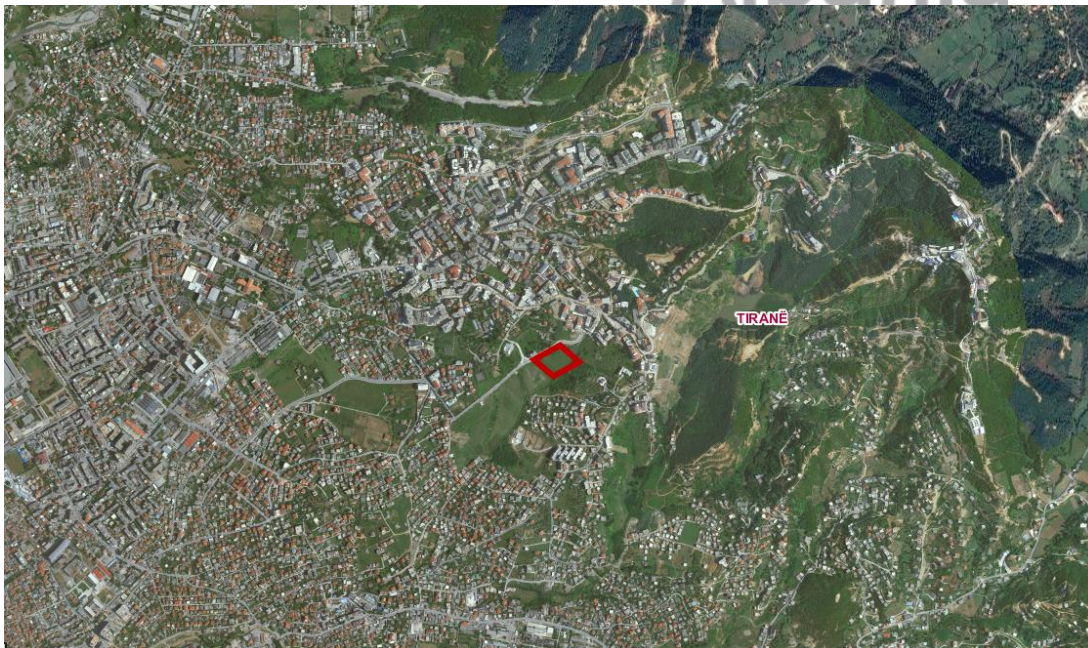
#### Architectural/Engineering Terms

- Acoustic Amenity: Acoustic Conditions in which schools and its users may act in maximal efficiency.
- Administrative spaces: Physical space of school dedicated to administrative activities.
- Movement spaces: Defined space for horizontal and vertical movement inside the building, such as halls, corridors and scales.
- Climate amenity: Environmental conditions in which school and its users may act in maximal efficiency
- Education spaces : Physical space of school dedicated to education activities .
- Hygienic environment: General Conditions of hygiene in school affected by level of comfort and health of users that depend on physical and sanitary conditions of the buildings, water supply and sewerage systems which enables efficient and secure functions of school buildings.
- Orientation: Orientation of school building (part of education spaces) influenced by natural climate factors, such as sun and wind direction .
- Location of school building: Land surface where the education buildings are situated.
- Additional Spaces: Physical spaces in school buildings dedicated to support of educational and administrative activities.

## 7. GENERAL DATA AND EXISTING STATE OF THE OBJECT

**Location:** Proposed site no. D2 for construction of type 4 school is situated near Lana River. Accessible from “Dalip Topi” str. Administrative Unit of Dajt (Referred to Feasibility Study "*Improvement of education infrastructure in Tirana Municipality*" November 2016).

**Description of the site:** Difficult access. The site is located near Kinostudio area. Road infrastructure may be problematic. There is a surface of about 7,748 m<sup>2</sup>.



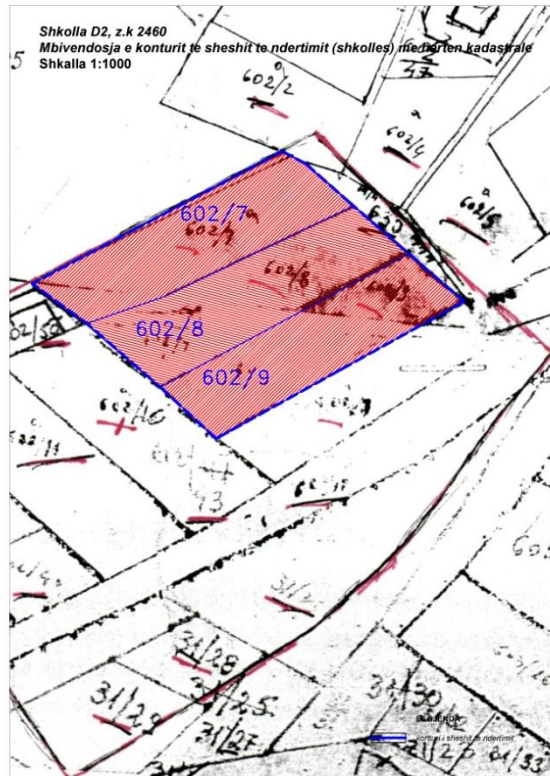
**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

**Picture 4** *Location of site D2 is illustrative*

**Picture 2 – Photo of site D2**



“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”



Picture 3 – Cadastral map of site D2



## 8. GENERAL DESIGN REQUIREMENTS OF SCHOOL CONSTRUCTION

In this territory will be built:

### A. School for urban higher middle education (Type 4)

Construction of these objects will meet the needs for educational objects in this zone, as well as will affect the reduction of students' number in existing schools that are located in the borders of this unit.

The higher middle education school shall be equipped with all the necessary academic venues (teaching classes, including laboratories of physics, chemistry, biology, informatics, etc), gym with supporting spaces, administrative space, social space, etc. The object shall have an installed central heating system and fire protection system. Great attention shall be paid to organization of school yard. The external venues shall be systematized, including respective functional venues, sports premises, green spaces and external lighting.

#### Functionality

During the school building design, there shall be created a balance between functionality and cost efficiency. This balance shall be achieved with different means, such as

Rational dimensions of spaces :

- (xvi) Zones adapted to movement: movement spaces shall not be more than 25% of the fruitful built surface. They shall be adapted according to school users, they must be functional and respect the security demands;
- (xvii) Optimal number of spaces: at first the number of spaces is calculated according to exploitation. In small schools, where the acceptable norm cannot be achieved, in particular for special teaching spaces, shall be considered creation of multi-purpose spaces;
- (xviii) Maximal compatibility: spaces shall have a maximal compatibility that would make them suitable for different subjects and changes, in cases when it meets their functional requirements;
- (xix) Grouping of spaces: spaces shall be grouped in blocks according to function and interface. This would provide an easy identification of their corresponding activities and spaces, an easy communication between different spaces, without obstacles in movement and reception zones, an easy observation of spaces and an optimal exploitation of land at disposal;
- (xx) Integration of needs: establishment of spaces within the school shall follow the fundamental necessities, such as sanitary and hygiene rules, regulations of functional comfort and security, as well as acoustic, visual and climate amenity.

#### Flexibility

Designer shall design sufficient spaces for flexibility in order to enable :

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- (vii) school staff to get used to schools venues and different teaching methods; and
- (viii) to enable planners to adapt the buildings for future needs of the school that correspond with the potential curricula and future program. a) Required flexibility for buildings (and furniture) that enables many teaching methods for normal classes (frontal teaching, work in groups, teaching through seminars, etc), laboratories and specialized halls (practical work in half groups, whereas demonstration in full groups), as well as multi-purpose spaces and sports areas (possibility of grouping several classes).

### 2.1 Main spaces

Referred to Feasibility Study "*Improvement of educational infrastructure in Tirana Municipality*" November 2016, the **Type 4** schools belong to higher middle education for urban zone with 21 classes.

For realization of the project according to typology of school and construction site, referred to "*Guideline for design of school building, norms and standards*", drafted from the Ministry of Education and Sports, there shall be considered the following main parameters :

Higher middle education, classes 10 – 12, age 17- 19 years;

Number of cycles (parallels): 7

Number of classes: 21

Number of students/class 30

Total number of students 630



The abovementioned data are summerized in Table 4.

**Table 4<sup>4</sup>**

Type	Location	Cycle	No. classes	No/Class	No. st. total
Type 4	Urban	Higher middle education	21	30	630

<sup>4</sup>Referred to Table no 2, page 44\_ Feasibility Study "*Improvement of educational infrastructures in Tirana Municipality*" November 2016 and Annex VIII5 for standard schools of higher middle education - urbane areas. *Guideline for design of school buildings, norms and standards*", drafted by Ministry of Education and Science.

**632.**

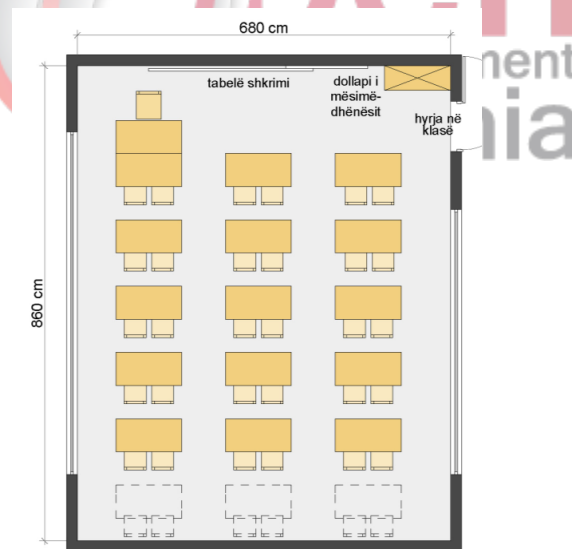
**633.**

**634. 2.1.1 Teaching classes**

The design of teaching classes shall be calculated for a  $1.94 \text{ m}^2$  / students -  $2.18 \text{ m}^2$  /students surface (optimal) for regular teaching rooms and  $1.8 \text{ m}^2$  / students per specialized teaching rooms. Minimal height of classes (floor-ceiling completed) shall be 2.8 m.

Teaching classes are the main venues in a school. They shall be very suitable for the performance of the teaching process. A special care shall be paid to determination of the shape, dimensions, lighting and natural ventilation, as well as furniture. The surface of a class depends on the number of students in a class and is about  $58 \text{ to } 65 \text{ m}^2$  in the zones with high density of population (class with 30-36 students). Number and dimensions of benches in frontal rows (3 double benches) as in length rows .

**Surface of windows:** surface of windows is recommended to be 1/5 to 1/6 of floor surface, according to zones where the school will be built. For wide classes, in order to have a uniform lighting, the height of windows shall go up to the ceiling. The materials shall ensure the fire protection. From the floor up to 90 cm shall not be openable, and over 90 cm windows shall be openable only in vertical side, thus the object can be ventilated and does not allow jumping, i.e. boosting security.



**DHOMË MËSIMI STANDARDE**  
30 dhe 36 nxënës  
Niveli i Mesëm i Ulët dhe i Lartë

Plan of the classes are advisable to be rectangular (with a proportions of sides about 2:3) and almost square  $6.8 \times 8.6 \text{ m}$ .

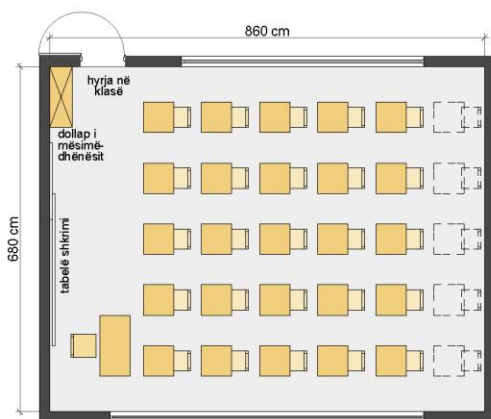


## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

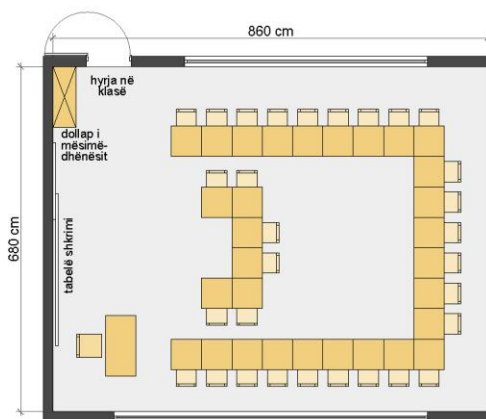
Depth of classes shall not pass 9m, nevertheless is obligatory that the student shall not be further than 6 meters from the window where the light comes. Classes shall minimally have two hours of direct light.

**Flexibility:** Designer shall design sufficient spaces for flexibility in order to enable the school staff to get used to schools venues and different teaching methods and planners shall adapt the buildings for future needs of the school that correspond with the potential curricula and future program.

The required flexibility for buildings (and furniture) enabling numerous teaching methods (see picture below) for normal classes (frontal teaching, work in groups, teaching through seminars, etc), laboratories and specialized halls (practical work in half groups, whereas demonstration in full groups), as well as multi-purpose spaces and sports areas (possibility of grouping several classes).



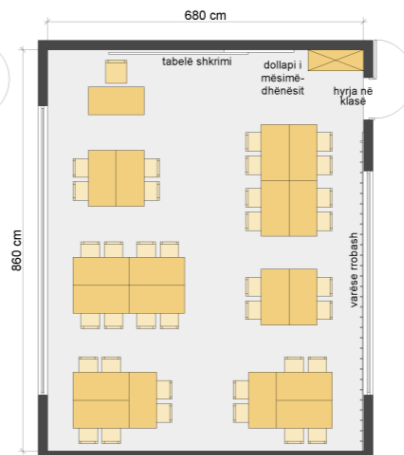
Mësimi frontal, 30 -36 nxënës  
Një tavolinë për një nxënës



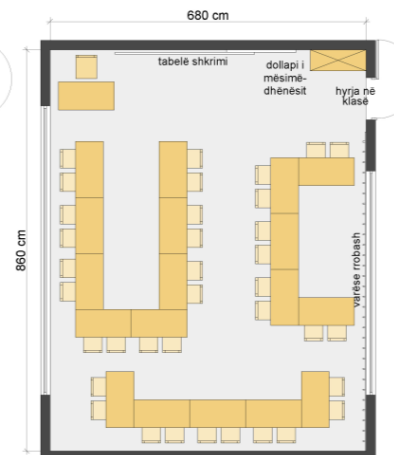
Mësimi punëtori, 30 -36 nxënës  
Një tavolinë për një nxënës



Mësimi frontal, 30 -36 nxënës  
Një tavolinë për dy nxënës

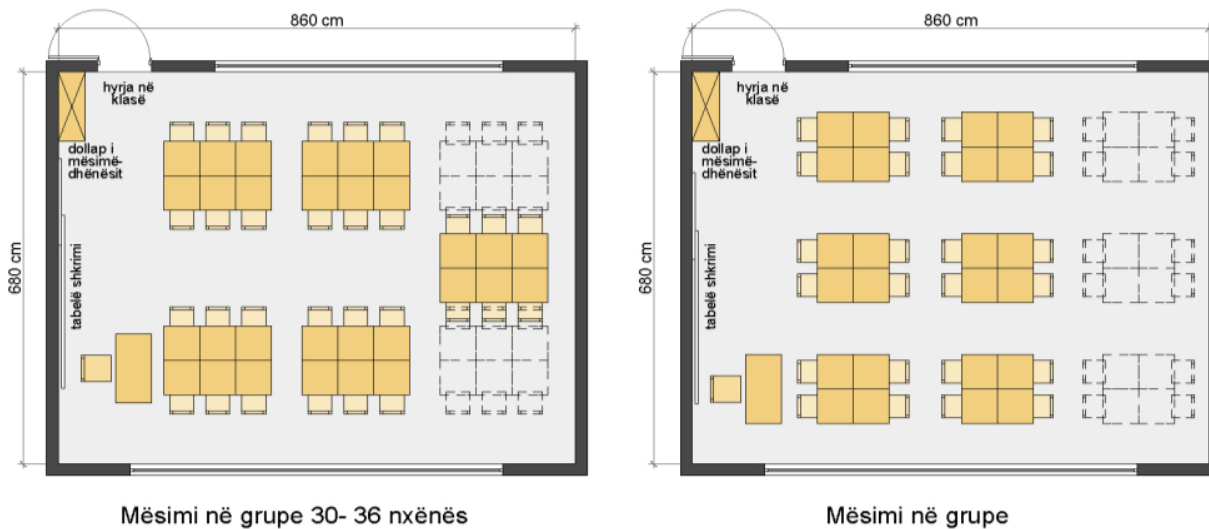


Mësimi në grupe



Mësimi punëtori

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”



Types of separation of spaces in the design program shall be developed in structures that can be easily modified to meet other requests in the future. Flexible planning is essential in the schools design in order to meet the constant evolution in the education thinking and techniques of construction technologies. The same will help the adaptation of school with new exploitations through changes in planning and allow completion of these changes without big costs. In this respect, a flexible plan shall also enable easy adaptations for developments in the future regarding space planning, construction of buildings, artificial lighting, techniques of ventilation and acoustics. A flexible building (for example with a big of movable walls is in general very expensive and can be justified only in case changes are necessary and essential. There are not many reasons to determine several divisions and changes will happen only once a year. **Visual angles and distances:** Often students complain that they are not able to see clearly the visual concretization means such as whiteboards and video-screens. Often the glow can cause difficulties in seeing clearly. Another important factor is the visual angle on which they see. Failure to see clearly may force students to stay in an uncomfortable position and this lack of comfort may cause loss of concentration. This is true for younger age students, whose eye angle distorts the image even in case of now powerful glow.

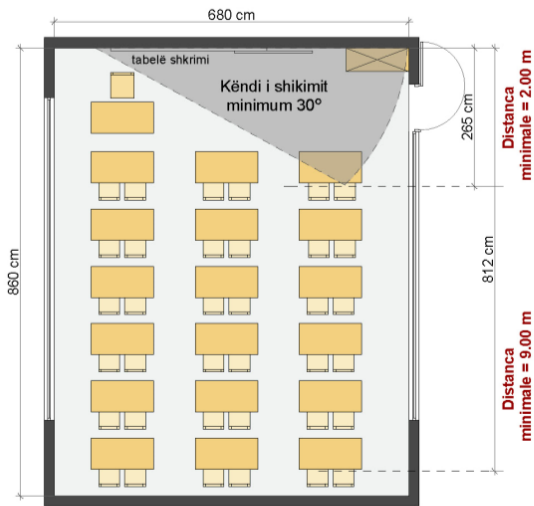
There exists evidence that students who sit where the eye angle is extreme or distance from the concretization mean is too big have lower results. If there exists the principle that students shall all have equal education rights, irrespective where they sit, then the designer shall pay attention to the arrangement of seats in order to :

- Maximal distance between the last row of students and writing board shall be about 9.0 m. Beyond this distance, it is difficult to read what is written and students force themselves to concentrate, to be able to understand the written text;
- Minimal distance between first row and writing board shall be about 2.0 m. Further, the first row students will not be able to see the entire writing board from an acceptable visual angle (see picture below);

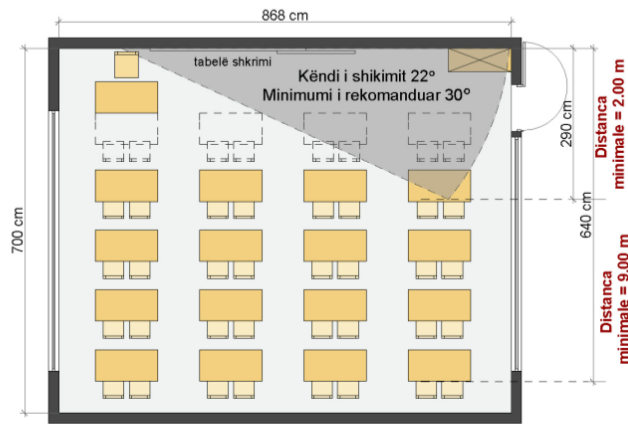
**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

• Minimal visual angel up to the writing board shall be 30° (see picture 1.3.6 below) so that the angle from which the concretization mean is seen does not alienate the understanding of what students see. Less that 30°, reading becomes difficult ;

• Main natural light shall be at maximum, coming from the left side of the students, in order that the shadow of their hand shall not fall on their work .



**KOMODITETI PËR DHOMË MËSIMI  
ME 3 RENDE BANKASH**  
(30-36 dhe 42 nxënës në raste të jashtëzakonshme)



**KOMODITETI PËR DHOMË MËSIMI  
ME 3 RENDE BANKASH**  
(32 dhe 40 nxënës në raste të jashtëzakonshme)



**Space of the table for each student**

*Width of the table for 1 student*

6 to 10 year old	60 cm
10 to 18 year old	65 cm

*Width of table for 1 student*

6 to 10 year old	50 cm
10 to 18 year old	60 cm

*Height of the table for 1 student*

6 to 10 year old	65 cm
10 to 18 year old	74 cm

**Distance between two tables**

*Distance of table on the side :*

Up to the table or maximal height equipment	55 cm
Up to walls, radiators or similar	20 cm
From the wall where the wardrobe is placed	70 cm

*Distance of table from each other*

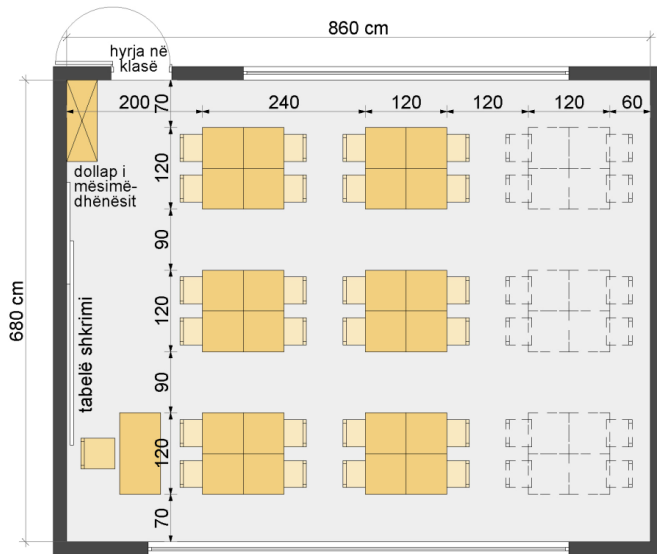
For tables with maximum 2 places close to each other  
10 to 18 year old

60 cm

For more than 2 places close to each other  
10 to 18 year old

65 cm

After the last row shall be envisaged some extra 5 cm .



- *Class furniture and their characteristics*

**General teaching class**

**13. Table for students, 2 students, dimensions: 1200 / 1300**

For tables for 2 students according to group age have the following dimensions:

First group : 1200 mm x 500 mm

Second group: 1300 mm x 600 mm

Material of working surface :

MDF board (Medium Density Fiber board).

Holding Construction :

Pipe skeleton in oval or paralleloiped shape. On both sides, outside of the table, a hook for hanging bags.

Made of plasticized or plated steel with a thickness of 1,5 mm.

#### 14. Piled chairs

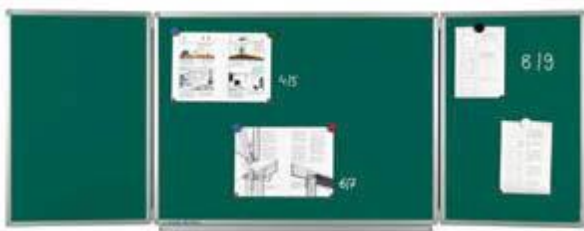
##### Skeleton

Realized in aluminium, molded, plated, combined with a steel pipe and plastic cover, resistant to scratches and blows, vertical model on four legs that are piled, with a sliding base that moves by enabling the piling.

##### Seat and back

Elaborated with plywood 8 – 10 mm thick in an anatomic shape, lacquered surface. The color depends of the interested person.

#### 15. Universal double blackboard



Two-sided table that can be folded, where is possible to use chalk

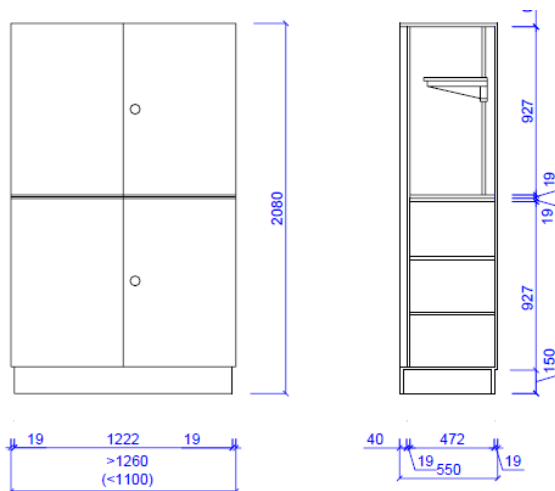
Classical communication over 5 side (after being written on 5 sides)  
 Technical data are as following :

Traditional appearance mode

Chalk writing

Surface painted in green, magnetic

Easy to be wiped, thanks to extreme smooth structure of the surface



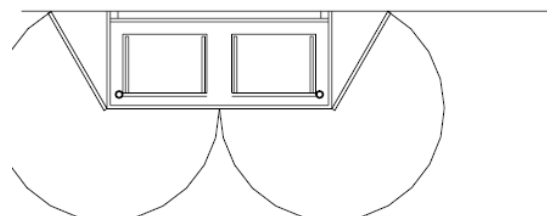
Aluminum frame with PVC gray corners  
 Scratchless surface and acid resistant  
 Matt green color, with a non-reflective surface  
 2 sided table that can be folded, enamelled on both sides

The delivery shall include also the chalk holder and mounting set .

Dimensions: 90 x (2 x 60) x 120 cm

100 x (2 x 75) x 150 cm

100 x (2 x 100) x 200 cm



#### 16. Cupboard for the class

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Dimensions : about 950 x 500 x 2030 mm

Upper part of the cupboard (separations for establishment of equipment):

A double fixed floor (through a **shlice** system same as in the parket floors) which could serve as a separation between the back and lower part of the cupboard.

2 drawers with changeable heights with a screwed floor serving as a holding surface for the projectors or other equipment of the class (weight to be held is about 20-25 kg)

Composed of two cupboard parts.

For both parts of the cupboard two rotating folding roods 270 °, with a protection slat in closure

Removable base – 150 mm high

Made of melamin or MDF.

The body, separations of the drawers and doors are well-attached with the plastic on both sides with 1,0 mm– top base at least 1,5 mm.

All edging of the doors, body and separations of the drawers are coated on all side with a 3 mm plastic stripe.

Skeleton:

2 pieces of cupboard drawers with a changeable height movable in two pipes.

8 pieces of folding bolts made of metal – opening angle 270 degrees

636.

2 rotating supporting pieces of a cylinder at a big size.

### **2.1.2 Laboratories**

The designer shall envisage in the new higher middle school the following :

- 2 (two) laboratories of informatics
- 3 (three) laboratories of physics
- 2 (two) laboratories of chemistry
- 2 (two) laboratories of biology

For the calculation of space of these laboratory classes shall be considered the space for each student, as well as shall be calculated the additional venues for the equipment and pre-preparations.

- ***Furniture of laboratories and their characteristics***

**637.      Laboratory of Chemistry**

**- *Students table for two places with sockets and tap***

Dimensions: total : about 1200 x 700 x 700 mm, out of which

Upper surface : about 1200 x 700 x 40 mm

Skeleton: about 1200 x 700 x 700 mm

Two hooks for bags

Upper surface:

Enamelled ceramic material (without whirligig, as an only plaque) with three raised edges.

Connection to the energy pillar is acid-resistant and from the mechanic point of view

The upper surface is attached to the metallic skeleton by anti-mould screws.

Acid resistant.

Under the upper surface for each student there exists a space for putting books realized with a plated aluminium metallic net with the dimensions : 350 x 350 x 120 mm.

Skeleton:



In the shape of a steel pipe, plasticified or plated, square (30 x 30 mm), with a shim 1,5 – 1,8 mm, realized to be mounted in the floor, composed of a plated frame (not made of pieces but as a whole) with two metallic leg; the metallic legs are equipped with seals of changeable heights to create a horizontal plane, independent from the floor level.

**- *Laboratory table for teachers with socket and acid***

***resistant***

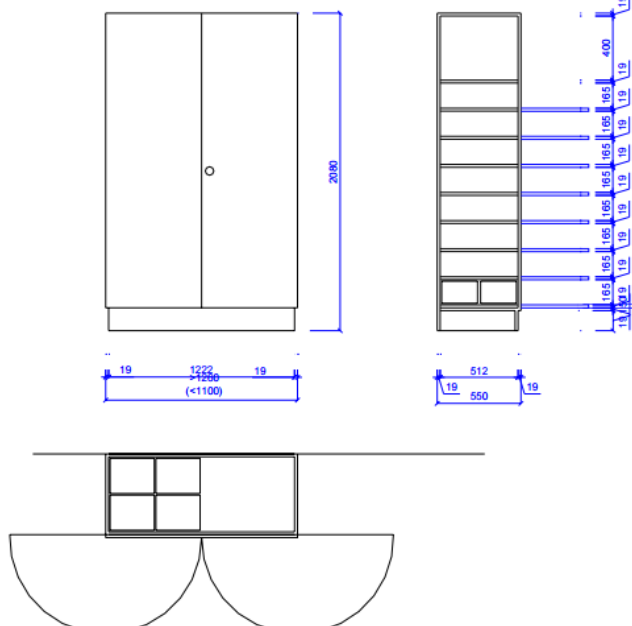
Dimensions: about 1800 x 750 x 900 mm

Upper surface :

Dimensions about 1800 x 750 x 40 mm, made of enamelled ceramic material, large surface with raised edges on all sides of the installed sink inside the upper surface (on the opposite side of the door leading to

the laboratory) with an internal space of at least 510 x 360 x 300 mm, acid resistant with whirligigs resistant to acids.

- **Cupboard for preservation of chemistry lab equipment**



Dimensions: about 1260 x 550 x 2080 mm. Made of melamin coated with plastic and surrounding edges made of plastic stripes in a fixed of MDF manner. 1 melamin sheet or MDF (thickness min. 20 mm), separation of drawers of the cupboard with a changeable height, 8 melamin or MDF layers (thickness min. 20 mm), separation of drawers that can be fully opened with a protection cover of plastic material on all sides, 15 mm wide. 2 rotating doors with a protection slat against clashes. Lock with cylindric rotating with big handle.

**Laboratory table resistant to acids**

Dimensions about 2300 x 1500 x 900 mm

*Upper Surface:*

Dimensions about 2300 x 1500 x 40 mm

With an enameled ceramic material on a large isolated surface and resistant to acids.

In the frontal part a sink (with internal space minimum 600 x 400 x 300 mm), on the left and right of the sink an inclined surface for removal of water drops. In the horizontal axis two sinks in the shape of a funnel (with an internal space at least 210 x 210 x 280 mm)

Skeleton of upper part where are put the chemicals.

Dimensions about 1800 x 350 x 700 mm.

Skeleton with six legs in the shape of a tube with two drawers fixed in the upper surface of the table; the upper edge of first drawer about 550 mm above the upper surface; in the lower part in the entire length and width between the metallic skeleton prepared on an installation edge about 150 mm high. Upper frame of the second drawer about 700 mm on the upper surface; on the side of the sink returned in its position about 300 mm. Both drawers are fixed and immovable with the metallic skeleton.

*Lower tallboy*

General dimensions (including the top base) about 2180 x 1380 x 860 mm

The height of top base 150 mm. Isolated on the ground.

4 tallboys each with 4 drawers and 3 holders for each drawer

4 tallboys each with a drawer division and a rotating door.

1 free space down the upper surface to place the washer of lab tools



## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Down the frontal part of the draining sink a shelter and a rotating door. All metallic bolts shall be resistant to scratches and plastic coated.

### *Water supply*

In the frontal part of the sink a vertical exit about 300 mm high in a good external position, with the draining of cold water in a 200 mm distance from the vertical tube, with 3 draining valves; out of which one is for the hot water with battery of mixture (sink group) connected to hot water supply (central system of hot water with a small boiler -10 liters under the table type)

Sink in the shape of a funnel: with a simple valve in a vertical exit about 300 mm high, draining about 150 mm from the vertical axis; a double valve in a vertical pillar about 300 mm high, draining about 150 mm from the vertical axis,

Distance about 120 mm.

## **Laboratory of physics /biology**

### ***Table for students for 3 positions with sockets***

Dimensions: total – about 1800 x 600 x 760 mm; out of which

Upper Surface : about 1800 x 600 x 25 mm

Skeleton: about 1800 x 450 x 730 mm

Data on height without including screws that serve for its regulation.

Free space: minimum of height 650 mm

Metallic legs are placed on the left (students view)

According to the accompanying plan-sketch

Free space: Minimum height 650 mm

Upper surface:

It is a melamin or MDF layer coming out on the skeleton from its long side; 75 mm

Skeleton: with a profile in the shape of tube or square, suitable to be mounted on the floor and composed of a frame plated construction (compact), without interruptions, with four metallic legs.

Metallic legs are equipped in the end with regulatory screws to create an independent horizontal axis from the floor level; metallic legs in the sector of installation sector with a distance of about 75 mm, covered from all sides with melamin or MDF plaques. The cover of box is movable from internal side in order to carry out the installation.

Six hooks for hanging school bags.

Electrical installations in the installations box:

From the teachers side: double socket 220 V, emergency stop button for power supply in all students tables, 4 sockets with free capacity, earthed socket. All sockets placed inside for 4 mm.

From the students side : a double socket 220 V

Students table is placed according to the plan of arrangements.

### ***Sink with a sub-construction (with tallboy)***

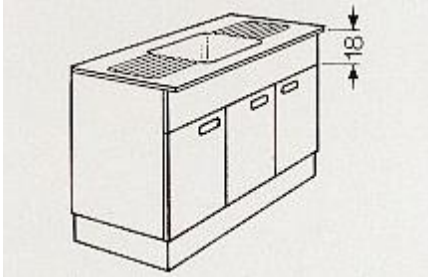
Laboratory sink with sub-construction with three doors (divisions) and an included dustbin.

Dimensions: length 1500 mm; width 560 mm; height 900 mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Upper surface:

Sink with a hole of a light space from inside with a length of 510 mm, width 360, depth 195 mm and with two parts for drying the vessels (left and right) with total dimensions with a length of 1300 mm, width 560 mm. The sink is made of stainless material.



Water supply: A vertical pillar about 300 mm high with a drain of 200 mm, equipped with a draining valve for cold and hot water (with a mixed battery)

Dressr :

Dimensions about 1500 x 500 x 860 mm; top base 150 mm high; divisions are 180 mm lower than the lower level of the upper surface; made of melamin or MDF.

Three rotating doors with protection slat against clashes.

**- *Collection cupboard of biology / physics***

Dimensions about 1050 x 560 x 2050 mm or 1200 x 560 x 2050 mm

Material: melamin or MDF.

2 bases of drawers with a changeable height.



7 bases of drawers that can be withdrawn outside up to half width (steel construction) easily to be removed for demonstration purposes. All bases of drawers with a 15 mm fixing slat on both sides and with a holding force of minimum 600 N  
2 rotating doors in two thirds of the height covered with glass and with rotating slats and three bolts each  
Lock with clip and rotating latch with a big handle.

**638.      Laboratory of informatics**

**- *Students table for informatics with 2 positions (1600 x 800 mm)***

Tables of informatics are separated into tables for Deskops and table for Laptops

Dimensions of table for Deskop:

Total: about 1500 x 800 x 700 mm

Upper surface: about 1500 x 800 x 25 mm

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Skeleton: about 1500 x 640 x 670 mm

Free space : minimum height 630 mm

2 hooks located in the inside for hanging bags of the students

1 channel under the table for passing cables and placing sockets

1 triple socket with a connection cable of minimum 1,5 m

Work upper surface:

Melamin plaque; coated with plastic substance and plastic lateral stripe coming out on the skeleton,

Skeleton:

In the shape of tube, realized to be mounted on the floor, composed of a construction with a plated frame (without interruptions) with metallic legs; the metallic legs are equipped with screws for changing the height in order to provide an horizontal level not depending on the floor level.

Channel for installation of the cable that provides the current and for the network cable on one side of the length, with a cover that can be unscrewed and a separation line in this cable channel.

The entrance of the cable is possible on one of two ending parts of the installation box. The Cable exits through the gap to sensitizing devices placed on the table.

Under the left or right upper surface is the holding construction of central unit made of melamin with dimensions : 500 x 250 x 600 mm.

**- *Students chairs with changeable height***

Skeleton:

Vertical columns with a base of 5 crossed legs made of plated metal and with support on the floor with caps made of PVC (fixed) or with wheels.

Changeable height from 420 mm to 600 mm through an axis coated screw for the PVC cap type and 470 mm up to 670mm for the type with wheels.

The seat and back is made of pressed plywood material.

Color according to the orderer's wish

**- *Movable one-sided table***

Dimensions : about 2000 x 1200 mm,

Steel surface of glueing magnet without glow

**- *UPS 1000VA Specifications***

<b>MINIMAL TECHNICAL CHARACTERISTICS</b>	
<b>“OUTPUT”</b>	
<b>“Power”:</b>	1000 VA
<b>“Power Factor”:</b>	≥0.8
<b>“Wave Form”:</b>	Sinusoidal

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>Nominal Voltage:</b>	220-240 VAC
<b>Frequency:</b>	50 Hz +/- 5%

**“Volt, regul. (On+/-10% battery)”:**

**“Output Connectors”:** ≥ (4) IEC 320 C13 (from the battery)

**“INPUT”**

**“Nominal Voltage”:** 220 - 240 VAC

**Frequency:** 50 Hz

**“Voltage Window :** 170 - 270 VAC

**Automatic Voltage Regulator “AVR”:** Yes

**“Input Connectors”:** (1) IEC 320 C14



**“Shutdown Software”:** Yes

**“Led Indicators”:** For all situations

**“Audible Indicators”:** For all situations

**Data Communication Connector “Data”:** (1) DB9 Serial and USB

**”Protection”:** Overload, Discharge, and Overcharge Protection

**BATTERIES**

**“Transfer time”:** ≤4 ms

**“Back-Up** ≥6 min. full charge

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>Time”:</b>	
<b>“Battery Type”:</b>	12 V DC 7 Ah Lead-acid
<b>ACCESSORIES</b>	
<b>“Power Cord”:</b>	(1) European IEC-C13
<b>“PC Power Cord”:</b>	(2) IEC 320 C13 - IEC 320 C14
<b>“Data Cable”:</b>	(1) DB9 Serial - DB9 Serial ose USB- USB
<b>WARRANTY</b>	
<b>“Warranty” period: 2 years</b>	

*Specification for computers (minimum one computer/student and one computer for the teacher)*

<b>MINIMAL TECHNICAL</b>	
	5400
<b>Min points for processor according to: cpu</b>	
<b>“RAM”:</b>	4 GB, min. DDR3 1600 MHz Non-ECC
<b>“HDD Size”:</b>	500 GB
<b>“Media sizes”:</b>	7200 Rpm SATA 6.0Gb/s
<b>“Disk subsystem controller”:</b>	Serial ATA 6.0 Gb/s
<b>“Graphics”:</b>	≥ 1 GB
<b>“Media Device”:</b>	DVD+/-RE
<b>“Slots”:</b>	Minimum (3) PCI/PCI-E, out of which (1) x16 PCI-
<b>COMMUNICATION &amp; MANAGEMENT</b>	
<b>“Ports”:</b>	Min. (8) USB out of which: g. min (2) USB before h. min (2) USB 3.0 (1) RJ-45, (1) audio in/out, (1) mic. and headphone, (1) VGA.
<b>“Networking”:</b>	(1) 10/100/1000 LAN Integrated Gigabit Ethernet Port.
<b>“Sound”:</b>	Integrated Sound Card
<b>“Speakers”:</b>	Internal or Built-in Monitor
<b>“Security Management”:</b>	Embedded Security TPM
<b>“Preinstalled Licensed O. S.”:</b>	OEM Windows 10 64-bit Professional

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>“Keyboard”:</b>	Standart Keyboard QWERTY
<b>“Mouse”:</b>	Minimum 2 Button scroll Optical
<b>“Power Supply”:</b>	220 V AC, 50 Hz
<b>ACCESSORIES</b>	
<b>“Power Cord”:</b>	European
<b>Recover CD :</b>	Recover CD/DVD ose Recover Partition
<b>MONITOR</b>	
<b>“Type”:</b>	
<b>“Size” :</b>	21”
<b>“Native Resolution”:</b>	1920 x 1080 at 60 Hz
<b>“Constrast Ratio Static”:</b>	1000:1
<b>“Display Port”:</b>	(1) VGA and at least (1) of ports DVI/HDMI/DP
<b>“Response Time”:</b>	≤ 5 ms
<b>“Energy Efficency”:</b>	Energy Star
<b>“Power Supply”:</b>	220V AC, 50 Hz
<b>WARRANTY</b>	
<b>“Warranty” period:</b>	3 years

8. Specifications for Laptop (min. two laptop/ laboratory)

<b>MINIMAL TECHNICAL</b>	
	3400
<b>Min. points for the processor according to:</b> <a href="http://cpubenchmark.net">cpubenchmark.net</a>	
<b>“Chipset”:</b>	Intel ose Ekuivalent
<b>“RAM”:</b>	8 GB shared Dual Channel min. DDR3 1600 MHz
<b>“HDD Size”:</b>	500 GB
<b>“Media sizes”:</b>	7200 Rpm SATA
<b>“Graphics”:</b>	Integrated Graphics with 1 GB video memory
<b>“Media Device”:</b>	DVD+/-RW with DL Memory Card Reader
<b>“Diplay”:</b>	15.6” LED display, Anti Glare
<b>“Battery”:</b>	min 4-cell battery
<b>COMMUNCATION &amp; MANAGEMENT</b>	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>“Ports”:</b>	Min (3) USB ports out of which min. (1) USB 3.0 DisplayPort ose HDMI Out Integrated digital mics Integrated Web Camera Headphone jack/Microphone jack
<b>“Networking”:</b>	10/100/1000 LAN (RJ 45) Wireless 802.11
<b>“Sound”:</b>	High Definition Audio2.0
<b>“Preinstalled Licensed O. S.”:</b>	OEM windows 10 64-bit Professional
<b>“Keyboard”:</b>	QWERTY
<b>“Pointing Device”:</b>	Touch pad & usb mouse
<b>AKSESORËT</b>	
<b>“Power Cord”:</b>	European
<b>“Recharger”:</b>	Yes
<b>Bag:</b>	Yes, from the producer. Suitable for laptops and other accessories
<b>“Recover” and “Drivers”CD/DVD:</b>	“Recover”, “Drivers” CD/DVD or Rec. Partition
<b>GARANCIA</b>	
<b>“Warranty” period:</b>	3 years

9. Specification for Printer/scan/photocopy

<b>MINIMAL TECHNICAL</b>	
<b>"Model":</b>	print/scan/copy
<b>“Print Speed” A4:</b>	≥18 ppm
<b>“Monthly duty cycle”:</b>	8000
<b>“Technology”:</b>	Laser ose LED
<b>“Print Quality”:</b>	600 x 600 dpi
<b>“Input Capacity”:</b>	150 sheets
<b>“Output Capacity”</b>	50 sheets
<b>“Media format”:</b>	A4
<b>“Memory”:</b>	≥32 MB
<b>“Min. optical scan resolution”:</b>	600 x 600 dpi
<b>"OS supported"</b>	Windows 7 and up (32 bit & 64 bit)

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>“Toner”:</b>	Accompanied with Kit
<b>COMMUNICATION &amp; MANAGEMENT</b>	
<b>“Interface”:</b>	High Speed USB 2.0
<b>“Ethernet” Communication Port:</b>	Not specified
<b>ACCESSORIES</b>	
<b>“Power Cord”:</b>	European
<b>Software/Drivers CD:</b>	Yes
<b>USB Cable :</b>	Yes
<b>WARRANTY</b>	
<b>“Warranty”:</b>	1 year

**639.**

**640.**

**641.**

**2.2 Social spaces**

**642. 2.2.1 Library**

The users of the library may be the students and teachers, therefore the calculation of libraries spaces shall take into consideration this fact.

For high schools, the library space shall be calculated based on students number and necessary space for each student must be 0,15 m<sup>2</sup>. Designers shall take into consideration the space for books archive and reading positions for students. Designers shall take into consideration that the reading venue of the library shall have a natural lighting as much as possible. Each reading post shall include sockets.

- ***Library table (1000 mm)***

Square shape

Dimensions: about 1000 x 1000 x 720 mm

Upper surface:

Dimensions: about 1000 x 1000 x 25 mm

Skeleton:

Dimensions: about 1000 x 1000 x 690 mm

Tube shape – coated with plastic or chrome-plated material with 4 plastic sliding basements that regulate the height and frame in the shape of a tube, plated (uninterrupted).



***Cupboard for files***

Dimensions about 940 x 500 x 900 mm

Corpus (body)

A vertical separation in the middle made of melamin or its equivalent, fixed up and down with screws.



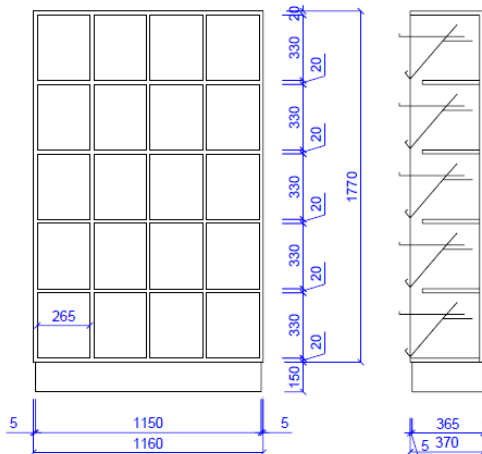
## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

In every vertical sub-division are three drawers, made also of melamin, which will enable the placement of drawers.

16 drawers for about 15.000 kartela that can be easily extracted.

The drawers are made of wood with a place to be attached and removed easily.

Dimensions of drawers: 210 x 210 x 480 mm



### - *Book shelves (depth 30 cm)*

Dimensions: about 900 x 320 x 2080 mm

5 mobile divisions for drawers

According to the accompanying plan-scheme

The heads (main components ) shall be realized by taking into account the possible serial connection according to the space.

Construction with frames composed from main parts located on the sides and a drawer base situated above that is linked and fixed at the height of the top base.

The surface is made of a wooden base coated with rimesso.

4 sliding and movable bases made of plastic to regulate the height.

### - *Drawer for papers and magazines*

- According to the accompanying plan-scheme

Dimensions about 1160 x 370 x 1920 mm

The heads shall be realized by taking into account the possible serial connection according to the space. Frame constructions composed of the main components placed on the sides and a drawer base placed in front and attached and fixed at the height of top base.

1 complete plaque placed from the behind

Open part with 20 units

For each unit there is one mobile drawers separation sliding according to a slip with tap that serves as a stopper of the type PVC and attaching slat PVC 35 mm placed in the frontal position.

## i. Multi-purpose space

The multi-purpose spaces include venues that can be used for several purposes, such as meeting rooms for students and teachers, meeting rooms for teachers and parents, halls for organization of symposiums, display of different film materials, etc. This space shall be designed in the shape of an auditorium and count a seating capacity of at least 100 persons. There shall be a space to serve as a scene or special lectures enabling the school to organize broader activities. The hall shall have an audio system and technics room to control the lights, audio, projector, etc. The hall shall be acoustically functional. This

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space shall have two entrances, one direct entrance from school corridors and one directly connected to the public space of the school in order to be sufficiently flexible also for beyond school hours. Its minimal height shall be same as two floors of the classes, i.e minimum 5.6 m floor – ceiling.

Equipment for such a multi-functional hall :

**- *Overhead projector***

Overhead projector MENTOR 250 basic mode

Technical data

Projektor overhead for daily use

Halogen lamp : 2x 24 V/250 W

Objective with 3 lenses with  $f = 315$  mm

Roboust carcass

Simple use

Rapid inclusive changer of the lamp, scratchless lenses of the make Fresnel, Ventilator, thermal fuse , 5 m network cable.

Weight: 13 kg

Dimensions : L 34 x B 36,5 x H 70 cm

Labor surface 285 x 285 mm

Clearness : about 2.200 ANSI-Lumen

The following picture presents a MENTOR 250 dia film. It is recommended the use of this projectors or a similar make that meets the same criteria



**- *dia film projector***

Followig are presented two types of different projectors with dia film, one is new with a remote control and the other connected to cable.

Technical data of the type: **OPLITE 7**

1 x Projector

ARCHITECTURAL/ENGINEERING SERVICES FOR PROCESSING OF SPECIFICATIONS OF CONSTRUCTION MATERIALS AND SPECIFICATION OF EQUIPEMENT AND FURNITURE OF SCHOOLS

MINISTRY OF EDUCATION AND SCIENCE

SPECIFICATIONS OF FURNITURE AND LAB EQUIPMENT Page -66-

2 x Lamps 400W - 36V

1 x Bag for its transport

1 x 3280 store for dia film

1 x enlargement objective 70-120 mm (1:2,8)

1 x cable for remote control

1 x control panel with 6 functions of the type IFR 8

The following picture presents a SIMDA dia film. It is recommended the use of this projectors or a similar make that meets the same criteria

Technical data of the type: **OPLITE 4**

1 x Projector

2 x Lamps 250W - 24V

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- 1 x Transportation bag
- 1 x 3280 store for dia film
- 1 x enlargement objective 85-150 mm
- 1 x cable for remote control
- Focus regulation + / -

The following picture presents a SIMDA dia film. It is recommended the use of this projectors or a similar make that meets the same criteria

**- Working table for conference room**

Dimensions: rreth 1950 x 975 x 720 mm.

Upper surface : Dimensions : about 1950 x 975 x 30 mm. Made of melamin or equivalent material, with plastic coat and plastic stripe for the edges.

Skeleton: Dimensions: about 1950 x 975 x 685 mm. Metallic tube with four legs based on the floor and equipped with height regulating screws made of PVC.

**9.3 Communication Room (IT Room )**

**- Specification of Network Equipment**

The IT room shall meet the following criteria:

- Dimensions of the room at minimum of 2 m x 2 m (4 m2).
- Note: *If it is planned that school will have a server there shall be an air conditioning system where the standard temperature must register a standard of 21 degrees.*
  - The server room shall have a rack for minimal cabling of 24 HU.
    - Minimally a UPS 1000VA for network devices such as switch, router wireless etc.
- Patch-panel 24 Port per cabinet (rack) depending on connections necessary for each position
  - Switch-e Layer 2 for network distribution
- Router Wireless for spreading of internet signal in places destined for internet acces.
  - Patch-Cord 1 m ose 2 m, Cat6 (for connections between switches and patch panels)
    - Socket Rack 6 with sigurese (rack
- Switch with 5 ports

<b>MINIMAL TECHNICAL</b>	
<b>"Type":</b>	Switch Gigabit unmanageable 5 Ports
<b>"Number of Ethernet Ports" :</b>	5 Ports Gigabit

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<b>"Forwarding modes":</b>	Store-and-forward
<b>"IEEE Network Protocols":</b>	IEEE 802.3 Ethernet IEEE 802.3ab 1000BASE-T
<b>Certifikimi i produktit,</b>	CE mark
<b>"Accessories included":</b>	Power Supply Power Adapter Quick Install
<b>“Warranty”:</b>	1 year

- Switch with 8 Ports

<b>MINIMAL TECHNICAL</b>	
<b>"Type":</b>	Switch Gigabit unmanageable 8 Ports
<b>"Number of Ethernet Ports" :</b>	8 Ports Gigabit
<b>“Fowarding modes”:</b>	Store-and-forward
<b>"IEEE Network Protocols":</b>	IEEE 802.3 Ethernet IEEE 802.3ab 1000BASE-T
<b>"Certification":</b>	CE mark
<b>"Accessories included":</b>	Power Supply Power Adapter Quick Install
	1 year

- Switch with 24 Ports

<b>MINIMAL TECHNICAL CHARACTERISTICS</b>	
<b>Interfaces and HW characteristics</b>	Switch 24 Port L2
<b>Port PoE 10/100/1000Mbps RJ45 (Auto Negotiation /Auto</b>	≥24

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>uplink port (copper/fiber)</b>	min. 2 Combo Optional
<b>100/1000Mbps SFP Slots</b>	
<b>Porta Combo</b>	Optional
<b>Port Consol RJ45/RS232</b>	1
<b>Installation in rack</b>	19” rack mountable
<b>"INPUT"</b>	
<b>Nominal voltage</b>	100~240VAC
<b>Frequency</b>	50/60Hz
<b>PERFORMANCE AND FLEXIBILITY</b>	
<b>Bandwidth/Backplan</b>	≥ 48 Gbps
<b>Throughput</b>	≥35 Mpps
<b>Jumbo Frame</b>	Optional
	16k
<b>Fan</b>	Optional
<b>STANDARDS</b>	
<b>IEEE 802.3 - 10BASE-T</b>	Yes
<b>IEEE 802.3u - 100BASE-T</b>	Yes
<b>IEEE 802.3ab -1000BASE-T</b>	Yes
<b>IEEE802.3z -1000BASE-X</b>	Yes
<b>IEEE 802.3ad –aggregation link</b>	Yes
<b>IEEE 802.3x -full duplex on 10BASE-T, 100BASE-TX, and</b>	Yes
<b>IEEE 802.1d -Spanning Tree Protocol</b>	Yes
<b>IEEE 802.1s- multi STP</b>	Yes
<b>IEEE 802.1ë- RSTP</b>	Yes
<b>IEEE 802.1q -VLAN</b>	Yes
<b>IEEE 802.1x - Port-based Network Access Control</b>	Yes
<b>IEEE 802.1p -QoS classification</b>	Optional
<b>IEEE 802.3at</b>	Yes
<b>IEEE 802.3af- PoE</b>	Yes
<b>OPERATIVE SYSTEM</b>	
<b>Oriented for LAN operations</b>	Yes
<b>Upgrade possibility</b>	Yes
<b>QUALITY OF SERVICE</b>	
<b>Priority queues</b>	Yes
<b>Queue scheduling</b>	SP, WRR

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>Characteristics Layer 2 and 3</b>	
<b>IGMP Snooping</b>	V1/V2/V3
<b>Spanning Tree</b>	STP/RSTP/MSTP
<b>LLDP</b>	Yes
<b>BPDU Filtering/Guard</b>	Yes
<b>Loopback Detection</b>	Yes
<b>802.3x Flow Control</b>	Yes
<b>VLAN</b>	4k, (Voice VLAN Optional)
	802.3ad LACP
<b>Adressing IPv6</b>	Yes
<b>DHCP/BOOTP, DHCP Snooping, DHCP Option82 for clients</b>	Yes
<b>Dynamic ARP inspection (DAI)</b>	Yes
	Port/Flow
<b>Policy-based routing (PBR)</b>	No
<b>Routing</b>	No
<b>SECURITY</b>	
<b>Access Control List</b>	min L2
<b>TCP/UDP Ports</b>	Yes
<b>Protocoll DSCP</b>	Yes
<b>Authentication</b>	TACACS+, RADIUS, IEEE 802.1X, Port/MAC, SSH v1/v2, SSLv2/v3/TLSv1
<b>Storm Control</b>	broadcast, multicast, unicast
<b>MANAGEMENT</b>	
<b>Web-based GUI dhe CLI.</b>	Yes
<b>RS-232 console/ RJ45 Console</b>	Yes
<b>Telnet, SSH</b>	Yes
<b>CPU monitoring</b>	Yes
<b>SNTP</b>	Yes
<b>Upgrade of Firmware</b>	TFTP or Web interface
<b>Led screen</b>	Optional
<b>SNMP v1/v2c/v3</b>	
<b>SYSLOG</b>	Yes
<b>Warranty</b>	1 year

Router Wireless

<b>MINIMAL TECHNICAL</b>	
<b>"Type":</b>	Router Wireless Wi-Fi Gigabit

“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

<b>"Operation Mode":</b>	Wireless router mode Access point mode Media bridge
<b>Rating:</b>	Min AC 1900
<b>"WiFi standards":</b>	IEEE 802.11a/b/g/n/ac
<b>"Network Standart":</b>	IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11ac, IPv4, IPv6
<b>"Ports":</b>	(1) Gigabit WAN Port (4) Gigabit LAN Ports (1) USB
<b>"WAN Connection Type":</b>	Automatic IP, Static IP, PPPoE, MPLS
<b>"Transfer rate" :</b>	up to 1.3 Gbps
<b>"Routing protocols":</b>	IPSec, L2TP or PPTP
<b>"Band":</b>	Dual band: 2.4 GHz & 5 GHz
<b>"Antennas":</b>	Build-in or external
<b>"Security features":</b>	WEP 64/128-bit WPA2-Personal & Enterprise
<b>"LED indicators":</b>	Yes
<b>"Buttons":</b>	WPS Button Reset Button Power
<b>"System requirements":</b>	Windows 7, 8 ose 10
<b>"Power Supply":</b>	AC Input: 110V ~ 240 V (50 ~ 60Hz)
<b>"Accessories included":</b>	Quick start guide ROM with documentation External Antennas (optional) Ethernet cable
	4 year

**643. 2.2.3 Hall for physical education**

**High schools**

The high schools must have a special closed premise (gym) for physical education and venues in its extranatal yard.

The minimal dimensions of the gym shall enable playing of basketball and volleyball, i.e 18 m x 26 m. Its minimal height shall be equal to two floors, at minimum 5.6 m floor–ceiling.

In this respect, the physical education hall shall include the following additional venues:

- two wardrobes at minimum 20 m<sup>2</sup> each.
- two toilets – showers at minimum 20 m<sup>2</sup>
- a depot for tools at minimum 20 – 30 m<sup>2</sup>
  
- venue for teachers with toilet-shower and wardrobe minimum 16 m<sup>2</sup>

The gym shall envisage the paving with wood parket and lined for organization of volleyball/ basketball in it.

The gym shall also have the supports for placing volleyball nets and baskets and tables for basketball.

***Necessary elements for the gym:***

- Portmanto for teachers room
- Clothes hangers (for the gym)
  - Long benches
- Baskets for internal venues



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Swedish double stairs 2x (1mx220 m)
- Gymnastics mattress
- Volleyball net

**644.**

**2.3 Administrative Space**

645. For each type of planned school following are made evident the number of academic and administrative staff :

Numri i stafit te nevojshem											
Shkolla sipas numrit te klasave	Nr. Nx	Nr Klasave	Mesues	Drejtor	Nendrejtor	Sekretar	Psikolog	Punjes Social	Roje	Punetore pastrimi	Mje k/Infermier
Shkolle 9-vjecare me 20 klasa, me 30nx/klase	600	20	26	1	1	0	1	1	1	3	1
Shkolle 9-vjecare me 30 klasa, me 30nx/klase	900	30	40	1	2	0	1	1	1	3	1
Shkolle 9-vjecare me 20 klasa, me 24nx/klase	480	20	26	1	1	0	1	1	1	3	1
Shkolle e mesme e larte me 21 klasa, me 30nx/klase	630	21	32	1	1	1	1	1	1	3	1

**646. 2.3.1 Office of headmaster /Office of deputy headmaster**

The office of headmaster and deputy headmasters shall be distributed in each floor in order to cover the school territory.

The office of headmaster for high schools shall be at minimum 25 m<sup>2</sup>

The office of deputy headmaster for high schools shall be at minimum 16 m<sup>2</sup>

Table: Dimensions about 3700 x 1020 x 720 mm

Surface about 1950 x 975 x 50 mm Melamin made of natural wood slat

Skeleton

Upper surface is based on two legs with a diameter of 500 mm, made of mass wood painted with natural lacquer.

647.

**648. 2.3.2 Secretariat /room for the administration**

These schools need a secretary office. The space for secretary office shall be at minimum 16 m<sup>2</sup>. It is preferable to be located on ground zero.

- Cupboard for registries

Dimensions about 1260 x 450 x 2080 mm

Material of the corpus and sub-divisions : Melamin plaque – with a plastic coat with plastic coating stripe of the edges.

Divisions are realized by taking into account the serial potential connection according to space and its better exploitation.

1 vertical uninterrupted division

2 fixed drawers separations, in half width

2 drawers separations whose height can be regulated, in half width

1 frame in the telescopic slide (guideline) that can be removed by additions (small case) for inventory sheets and accounting – vertical (size of sheet 380 x 260 mm) in half width.

4 framews to be withdrawn in telescope slides (guideline) for the archive of registries with the dimensions A4 – in half width

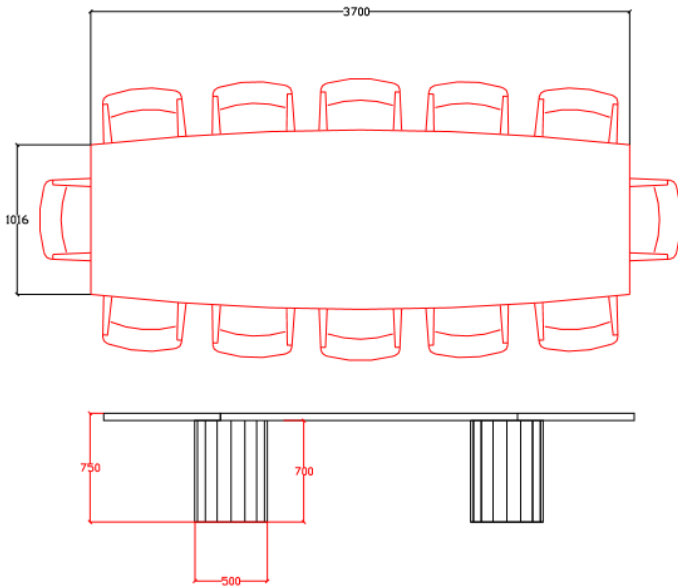
2 rotating doors with a lock and rotating stick with a cylindric handle and big cylinder suitable for the general closing system.

649.

**650. 2.3.3 Teachers room**

The space for teachers room in high schools shall be 2,5 m<sup>2</sup> per each teacher. If there are several teachers rooms, then it is preferable to have them in different floors.

- Meeting table

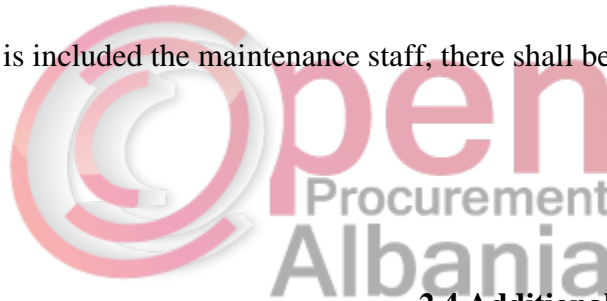


Dimensions about 3700 x 1020 x 720 mm  
Upper surface about 1950 x 975 x 50 mm.  
Melamin with natural wooden slat

**Skeleton**  
The upper surface is based on two legs with a 500 mm diameter, made of mass wood painted in natural lacquer.

**651. 2.3.4 Supporting staff**

For the supporting staff, where is included the maintenance staff, there shall be envisaged a venue of 2 m<sup>2</sup> per each person.



**652.**

**2.4 Additional venues**

**653. 2.4.1 Hygiene-sanitary**

Sanitaries, teachers, students, male/female

Sanitary block including toilets shall be in every floor.

**Location**

Teaching and recreation classes shall not be further than 50 m from the sanitaries.

**Number**

The determination of number of WC, it is based on norms indicated in the following table, which is valid for all school categories.

	No. students / Teachers	WC cabins	Pissoirs	Sinks
Male				
Students (boys)	About 100	2	4	2

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Teachers	About 20	2	2	1
Females				
Students (girls)	About 100	4	One WC with bidet	2
Teachers	About 20	2	One WC with bidet	1
Maintenance room	2 m <sup>2</sup> for each floor			

It is not recommendable to have separated toilets for teachers and students. Thus, it is envisaged that they shall share the same service space, corridor, sink, etc.

A continuous care shall be paid to sanitary equipment to avoid concerning odors.

*Furthermore, it is recommended:*

Walls shall be resistant to scratches, if possible, not able to write on them, i.e. to pave them with majolica tiles up to the minimal height of 1,6 m.

Doors of the toilets shall be about 70 cm and possible to open from outside.

The pissoir shall have plenty of water to avoid concerning odors.

Minimum dimensions of a WC linkage shall be not less than 1,3 m x 0,9 with a minimal height of 2 m

Sanitations shall be hydro-isolated and with a good ventilation

For washing the WC venues, designers shall envisage a tap that can be connected with an elastic pipe and a drain for collection of waters. The pre-rooms of bigger sanitation groups shall be envisaged also a drain for removal of waters on the floor.

***Sanitations for the disabled***

All categories of schools shall have a minimum of a toilet for these persons. For further information refer to CoMD No. 1503, dated 19.11.2008, “For people with disabilities”.

**655. 2.4.2 Office of the physician**

The office of the physician is located in the ground floor of the building and counts a surface of 17-18m<sup>2</sup>, with recommendable dimensions of 6x3m. The 6m length is necessary for a regular performance of examinations for students visibility and hearing.

The office shall have a sink.

Natural illumination shall be provided by a window with a size equal to 1/6 of the office's surface. The artificial illumination shall be 100 lux.

**Cupboard for medical instruments**

Dimensions about 1260 x 550 x 2080 mm

Material of the corpus and subdivisions :

Melamine plaque – with a plastic coating layer and a plastic stripe coating the edges.

Divisions shall be realized taking into account the potential serial connection according to the space and best exploitation.

1 drawers division that may be totally removed with a minimal holding force of 600 N (free illuminated space 250 mm)

2 drawers division that may be totally removed with a minimal holding force of 400 N each (free and illuminated space of 250 mm)

3 drawers divisions moving according to the height: one according to depth of cupboard, whereas the other two up to the depth of about 320 mm.

Divisions located in a depth of about 320 mm are movable according to the entire height, therefore an extra row is necessary for the drawers holder. All the divisions that may be fully removed are equipped on all sides with a holder 15 mm high.

Two rotating doors with a clash-protection slat. Cylindric lock and rotating lever with a big handle where it can be kept and a big cylinder.

**656. 2.4.3 Office of the psychologist**

Office of the psychologist is located in the ground floor of the buildings and counts a surface of 17-18m<sup>2</sup>, with recommendable dimensions of 6x3m. The 6m length is necessary for duly performance of students' examinations.

The office shall envisage a sink

The natural illumination shall be provided by a window with a size equal to 1/6 of the office's surface.

Artificial illumination shall be 100 lux.

The space of psychologist and physician can be integrated together.

657.

658.

**2.5 Communicative venues, entrances, staircase, corridor, halls**

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

All the categories of schools required communicative venues, entrance, hall, corridors, staircase, ramps, handrails for the stairs.

School entrances shall enable free entries-exits of students. The dimensions of entry-exist doors shall depend on the number of students in the school. For each school entrance, the designer shall envisage a shelter.

There should be an emergency exit in each floor, in further possible distances from the main entrance. The maximal distance between each door and emergency exit of the floor shall be 30 m. The width of the emergency exit shall be 0,55 m for each 60 persons.

The ground floor shall have at least two entrances.

### **659. 2.5.1 Corridors**

*They must meet the following criteria:*

The width of the corridor when it serves for classes only from one side shall be at minimum 2m.

The width of the corridor when it serves for classes from both sides shall be at minimum 3 m.

The height of the corridor shall be at minimum 2,8 m floor - ceiling.

Corridors shall provide a natural illumination

Furniture to be placed in the corridors:

#### ***Metallic drawers that can be closed by key***

Dimensions: Depending on the number of divisions per width of the division 300 mm / 400 mm, we have: Drawers with a width : width per drawer with 1 division = 300 mm / 400 mm width per drawer with two divisions = 600 mm / 800 mm width for drawer with three divisions = 900 mm / 1200 mm width per drawer with 4 divisions = 1200 mm / 1600 mm width per drawer with 5 divisions = 1500 mm

The height of drawers depends on the way of organization and is :

For drawer with upper base: 1750 mm For drawers supported on legs: 1850 mm For drawers with a class A bench: 1950 mm. For drawers with class B bench: 2100 mm

Their priorities are:

Optimal self-ventilation

Long-lasting and robust metallic construction

Lateral holes that enable the simple joining of several drawers

Zinc-coated and painted legs

Elaborated round-edges metallic material

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Sustainability and protection against physical damage  
Metallic stable hook welded in the internal side of the door  
Sustainable anti rust paint  
Door with a ventilation gap and locking system with an individual key

In the internal part: 1 drawer in the upper part, 250 mm high

Metallic drawers shall be calculated in order to have a division at the disposal of each student.

**660.**

**661. 2.5.2 Staircase**

*It shall meet the following criteria :*

The width of stairs: minimum 1,2 m /100 students + 0,2 cm for every 100 students.

There shall not be designed or implemented a spiral staircase

The height of the stairs handrail shall be 1,10 m

For stairs with a width up to 1,5 m, handrail is placed only on one side.

For stairs with a width up to 2 m, handrail is placed on both sides

For stairs wider than 2 m, there should be a handrail even in the middle.

Walking space shall be treated with anti slippery material

Staircase shall have a natural illumination

Staircase shall not have more than 18 threads in a ramp

For other elements of staircase design refer to CoMD No. 626, Dt. 15.07.2015 “Normative of dwellings design”.

For the disabled refer to CoMD No.1503, Dt. 19.11.2008 in approval of regulation “Exploitation of facilities by persons with disabilities”.

**662.**

**663. 2.5.3 Lift**

***It shall meet the following criteria:***

The lift shall serve for the vertical movement of the disabled or in other necessary cases, if there is no other technical solution.

Minimal width of the lift door: 85 cm

Holding pipes and control panel of the lift not higher than 90 cm

Dimension of the internal space of the lift not less than 1 m x 1.4 m

**664. 2.5.4 Hall**

The hall is a very important and necessary element for schools. Halls on the ground floor enable quick movement of students from main entrance to classes and vice versa, as well as consist of the first visual contact of students with internal venues of the school. In other floors, the halls, beside function of distribution of students to classes, play also the role of venues where students stand during the breaks between teaching hours. Halls serve also as venues where are displayed different boards necessary for performance of the teaching process.

Halls as necessary parts of school organization shall enable the completion of the above-mentioned functions. Their size depends on the number of students, floors and organization of classes.

**665. 2.5.5 Storeroom and additional corners**

The storerooms are venues serving for inventory and other materials. The storeroom surface may vary from 18 m<sup>2</sup> - 40 m<sup>2</sup>.

Technical rooms for installation of the boiler, sanitary water tanks, water pumps and pumps of fire protection system shall have a surface and geometric size that could enable the installation of all equipment and systems according to technical specifications of the producers, by calculating necessary space for repair and maintenance works.

- **2.5.6 External space**

External spaces are divided into three categories:

Spaces determined for recreation zones (fields) and sports premises;

Movement zones include vehicles (streets and parking) and pedestrians (pavement and alleys);



## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Green spaces and zones planted with trees, bushes, as well as valley.

Entrance to the school shall be clearly noticeable and easily to be found.

Billboard with the name of the school is placed in a noticeable position from far and in the vicinity of the main entrance.

If a bus stop for students is not situated within a reasonable distance, then there should be taken into consideration the projection of a bus stop near the school. This stop should not be in the school territory and should be defined with the understanding of the local power.

Parking for bicycles, if suitable, shall be easily accessible from the students entrance.

The installation of illumination system in school's territory shall be taken into consideration, because it will be used even beyond the school timetable. The designing level shall reflect also the location of the school and take into account the use of building beyond the normal school timetable.

Landscape elements: The background must be simple and easy to be maintained. It is encouraged the use of local plants and calculation of spaces where can be carried out garden activities by students. The designing team shall take into account the inclusion of landscape elements to promote a surface that could help the teaching process, as well as spaces for sowing different plant. Large background spaces with solid materials must be avoided.

The perimetrical space of the school shall be surrounded with low walls and fence, or only iron fence at a minimal height of 2m.

The vicinity of streets and vehicles to the schools shall be at minimum. not be near the school, nevertheless there should be an access to school parking space. Where this can be inevitable, it shall have a clear physical distinction (pavement) between the pedestrian and vehicles streets.

If possible, there shall be projected a parking space for about 20% of the staff and at least a parking space for the disabled.

For sports premises, according to normative of designing and construction, there shall be used materials for layers and surroundings that meet the conditions of physical security. Such as absorbing tartan layer, protection materials in the baskets columns or surrounding of fields and wherever will be held physical activities.

**Two school objects shall have separated yards.**

In the schools yard shall be envisaged and designed the installation of an art work that could serve as an identifying and orientating element of the school in the community.

In each yard, it is necessary the creation of a volleyball field and basketball field, integrated or in a separated space, as well as the gymnastics corner. In cases, when the territory's surface enables creation of other sports venues, there can be projected mini-football fields, tennis courts, etc.

### 3.3 Didactic materials

Based on a document issued from the Institute for Development of Education, No. 340 prot., dated 29.05.2017, protocolled by Tirana Municipality under no. 16532/1 prot., dated 08.06.2017, didactic materials that will be put at disposal from the winning economic operator shall have the following specifications :

- For Laboratory of Informatics

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

No.	DESCRIPTION OF DEVICE	UNIT/QUANTITY	TECHNICAL SPECIFICATIONS
52	TABLETS PRESTIGIA	40 pieces	PRESTIGIO MULTIPAD Internal Memory Size 25GB, RAM 2GB
53	COMPUTERS	40 pieces	HDD 160 GB/250 GB  Procesor Core 2 Duo 30GH <sub>2</sub>  Ram (2-4) GB  Monitor 19
54	SOFTWARE OF PACKAGES	40 pieces	Office 2013, WINDOWS 7
55	CLIENT FOR ELECTRICAL TEXT	40 pieces	
56	LAPTOP LENARE LENOVO	1 piece	Lenovo - 15.6" Laptop - Intel Core i3 - 6GB Memory - 1TB Hard Drive  PROCESSOR I5, 8GB RAM, GRAPHIC CARD INTEL 4000
57	CUPBOARD FOR TABLETS	1 pieces	
58	UPS INTERNET	1 piece	650V FOR EACH
59	PROJECTO	1 piece	EPSON 673595
60	RENTER	1 piece	FG-60 D
61	WEB CHANGE SERVER APLIANSYUS		HP Server G5 or G6
62	CACHEBOX	1 piece	170
63	WIRELESS		HPMSM 430

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

64	RACK	1 piece	22U DIMENSIONS 600X1000
65	CABLE GRID	1 piece	
66	SWITCH 24 PORT		24 PORT POE GIGABIT
67	HP	1 piece	2530-24G-POEE+SWTCH
68	PRESENTATION WHITEBOARD	2 pieces	

- For Laboratories of Biology

No.	Description	Duration in the course of years	Unit	Quantity	Technical specifications
1	Apparatus for photosynthesis	10	Piece	1	Glass Ballon, scaled test tube with caps, with instructions
2	Retroprojector	20	Piece	1	Current: AC110/220 V 60/50Hz, Power 350W dimensions 285 x 285 mm, distance of projection 1.5-3.5 m, height ~300 mmm, halogen lamp of 24V 300W
3	Stripe Meter	10	Piece	5	1-2 m
4	Compass	15	Piece	10	ø 40-50 mm
5	Entomological net	5	Piece	10	Metallic circle, polyester net, plastic stick
6	Entomological neddle	1	Piece	200	Metallic, enamelled, coloured, 40mm
7	Chemical cup of different sizes	5	Set	5	glass, scalable with mouth, degrees, 50ml up to 500ml
8	Glass Cylinders of different sizes	5	Set	5	glass, scalable with mouth, degrees, 10ml up to 250ml
9	Test tube clip	15	Piece	10	Wood-made
10	Plastic vessel with loupe cap for collection of insects, etc	15	Piece	10	Organic glass cap with loupe ø40mm-60mm, 3x ose 5x
11	Alcohol lamp	10	Piece	10	Standard glass, with plastic cap

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

12	Hand magnifying glass	10	Piece	10	enlargement 2x ,3x
13	Test tube holder	15	Piece	10	standard, wood or plastic material ø18-20mm
14	Dropper	5	Piece	10	Glass + rubber
15	Scalable pipette	5	set	10	Glass with ø 900mm
16	Petri Dishes	5	Piece	10	Glass, no lips
17	Test tubes 12 x 100mm	5	Piece	100	Glass, no lips
18	Test tubes 16 x 150mm	5	Piece	200	Glass , enamel cap
20	Air Thermometer	10	Piece	5	With alcohol 0-40 °C
21	Laboratory Thermometer 0-50°C dhe -10-110°C	10	Piece	10	With alcohol
22	Glass mixer	5	Piece	10	Glass, length 200mm
23	Clock glass	5	Piece	10	Glass. ø70mm
24	Set of preparation tools (with 7 accessories)	10	set	10	With accessories: scalpel, scissors, preparation needle, tweezers
25	Lama	2	Box	5	Dimensions:: 25,4mm x 76,2mm
26	Lamela	2	Box	5	20mm x 20mm
27	Biological microscope	10	Box	10	Magnifying 600 x, ocular, three objectives
28	Alcohol per djegie	1	bottle	5L	Denaturalized, technical 92-96 Degrees
29	Dropper bottle 60 ml no color	1	Piece	10	Enamel
30	Dropper bottle 60 ml no color	2	Piece	10	Enamel
19	Glass bottle for colorless liquids 60 ml	1	Piece	20	Enamel cap
	Glass bottle for colorless liquids 60 ml	5	Piece	20	Enamel cap
31	Conical bulbs of different sizes	5	Piece	20	glass,with mouth,50ml deri 500ml
32	Funnels	5	Piece	10	glass, ø75mm
33	Box for lama	5	Piece	5	Plastic box with 25 separated places
34	Holder	2	Piece	10	Metallic with three legs
35	Ceramic net	15	Piece	10	Metallic net with ceramic
36	Filter letter	1	box	3	ø 120 mm, boxes with 100 piece
37	Dissection plates	10	Piece	10	Metallic pan with wax or parafin
38	Half analytical scales with weighting stones	10	Piece	2	Maximal Capacity 1000g, Sensitivity 50mg, error margin 1.5, ø120mm
39	Washing Pisetta	10	Piece	10	Plastic with glass gyp
40	Laboratory Stative with Accessories	15	set	5	Basement + rods+metallic circle+pressing+fixing
41	Brush for washing vessels	1	Piece	10	Plastic threads
42	Spatula spoon	10	Piece	10	Porcelain
43	Pezafilters	5	Piece	10	glass, low shape, 50mm x 30mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

44	Vessel for aquariums and incubators	5	Piece	2	glass, square
45	Porcelain bowl	10	Piece	3	With supressor ø 90 mm
	<b>Chemical Reagents</b>				<b>For all the list of reagents shall be meet the following specifications :</b>
46	Ascorbic Acid	1	bottle	100g	
47	Etaoic Acid (Acetic Acid)	1	bottle	100ml	Reagent of "p" classification . Packaged according to rules of technical security
48	Soluble Amidon	1	bottle	200g	The label shall contain : Description, chemical formula, expiry date
49	Ethanol 96°	1	bottle	500ml	Molar mass, quantity, signs of risks
50	Formaline	1	bottle	1000 ml	
51	Natrium Hydrogen Carbonate	1	bottle	100g	
52	Amon Hydroxide	1	bottle	250ml	
53	Calcium Hydroxide	1	bottle	100g	
54	Violet Metil	1	bottle	25g	
55	Chlorophorm	1	bottle	250ml	
56	Calcium Chlorur	1	bottle	100g	
57	Calium Chlorur	1	bottle	100g	
58	Parafin	1	plastic	200g	
59	Fehling A Solution	1	bottle	250 ml	
60	Fehling B Solution	1	bottle	250 ml	
61	Biuret reaction	1	bottle	250 ml	
62	Potassium Sodium Tartrate	1	bottle	100g	
63	NatriumTetraborat (Borax)	1	bottle	200g	
64	Iod-iodine of Calium solution	1	bottle	250ml	
65	Fenolftaleine	1	bottle	100ml	
66	Sodium Citrate	1	bottle	100g	
67	Indication letter pH	1	box	2	pH 0-14
	<b>Microscopic Preparations</b>				
68	Kelps – (Chlamydomonasi – one-cell)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
69	Kelps - (Spirogyra with chloroplasts in a cell)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

70	Amphioxus – roundmouther (Matured Individual)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
71	Bacteria - (types of bacteria)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
72	Tiglia. Vertical cut of the stem of two-cotyledons.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
73	Frogs – Larval Development (10mm)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
74	Frogs – Larval Development (3mm)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
75	Epithelium of human mouth	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
76	Euglena	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
77	Ganglion nerve (with nerve fibres and nerve cells)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
78	Human Blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
79	Adipose Tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
80	Epithelial tissue – (simple, with one layer)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
81	Bone Tissue. Vertical Cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
82	Smooth muscle tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
83	Layer muscle tissue	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
84	Nerve tissue – vertical cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
85	Different legs of insects	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
86	Sunflower (Heliantus). Cut of matured root of two-cotyledons.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
87	Maize (Zea mays). Vertical cut typical of one-cotyledon stem	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
88	Human Lungs. General View	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
89	Mosquito – Mouth Apparatus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
90	Medullary Bone	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
91	Paramecium – General Construction	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
92	Paramecium – Reproduction	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
93	Pines (Pinus) – Leaf cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
94	Planctons (Cyclopus)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
95	Planctons (Daphnia)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>96</b>	Allium. Longitudinal cut, epiderma, cell and nucleus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>97</b>	Allium. Type of roots of different levels of one-cotyledons	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>98</b>	Tapeworm in cattles (head)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>99</b>	Tapeworm in cattles (matured proglottid)	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>100</b>	Stitch (Vertical cut )	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>101</b>	Different types of pollen. Middle multi-purpose cut.	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>102</b>	Human Kidney - cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>103</b>	Lilium. Vertical cut typical of monocotyledons leaves .	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>104</b>	Small Intestine. Vertical cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>105</b>	Artery, blood vessels	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>106</b>	Nucleus of cell	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>107</b>	Esophagus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>108</b>	Womb of gall	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>109</b>	Frog	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>110</b>	Rabbit blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>111</b>	Pigeon blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>112</b>	Fish blood	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>113</b>	Hypophysis gland	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>114</b>	Lymphatic gland, section	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>115</b>	Tiroide Gland	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>116</b>	Milk glands	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>117</b>	Chloroplasts	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>118</b>	Chromosomes	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>119</b>	Human skin with sweat glans	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>120</b>	Human Liver	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>121</b>	Mitosis	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>122</b>	Pancreatic islets of Langerhans	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>123</b>	Medullary bone	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>124</b>	Human spermatosoid, sperm stain	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>125</b>	Human Tests	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>126</b>	Trachea, longitudinal cut	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>127</b>	Rabbit Uterus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
<b>128</b>	Human Uterus	2	piece	5	Coloured. Dimensions:: 25,4mm x 76,2mm
			piece		
	<b>Liquid preparations</b>		piece		
<b>129</b>	Lizard Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
<b>130</b>	Chicken Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
<b>131</b>	Rabbit Dissection	10	piece	1	Dissection in formalin closed in a glassware , 200 x 70 x40 mm
<b>132</b>	Frog Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
<b>133</b>	Fish Dissection	10	piece	1	Dissection in formalin closed in a glassware, 200 x 70 x40 mm
	<b>Biological models (Plastic)</b>		piece		
<b>134</b>	Archeopterix (model of fossil)	15	piece	1	Relief PVC, 400 x 300 mm
<b>135</b>	Archeopterix (model of poultry )	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>136</b>	Anatomic bust of man with removable head and other parts 85 cm	15	piece	1	3D model made of PVC and colorant, not toxic, length 850 mm, with removable parts, PVC support
<b>137</b>	Glomerules	15	piece	1	3D model made of PVC and colorant, not toxic,250 x 350 mm
<b>138</b>	Comparison of limbs in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, enlarged, limbs of 5 types of vertebrates
<b>139</b>	Larynx	15	piece	1	3D model made of PVC and colorant, not toxic,magnified
<b>140</b>	ADN Model (helicoidal)	15	piece	1	PVC, not toxical colorant, with removable parts
<b>141</b>	Vertical cut of leaf	15	piece	1	3D model made of PVC and colorant, not toxic,, 300x 400 mm
<b>142</b>	Vertical cut of stem	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>143</b>	Model of dicotyledon flower	15	piece	1	3D model made of PVC and colorant, not toxic,180x 300 x 60 mm
<b>144</b>	Model of monocotyledon flower	15	piece	1	3D model made of PVC and colorant, not toxic, 250 x 350 mm



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>145</b>	Cross-section of the root	15	piece	1	3D model made of PVC and colorant, not toxic, 300x 400 mm
<b>146</b>	Eye Anatomy	15	piece	1	3D model made of PVC and colorant, not toxic, external, middle ear, magnified 6 x, hearing bones, pipe, canals etc
<b>147</b>	Brain anatomy	15	piece	1	3D model made of PVC and colorant, not toxic, with two separated hemispheres, 2 movable lenses and removable components, magnified 3 x
<b>148</b>	Ear anatomy	15	piece	1	Model in basorelief made of PVC and non toxic colorants,70 x magnified, hair, epiderm, sweat-fat glands, etc.
<b>149</b>	Heart Construction	15	piece	1	3D model made of PVC and colorant, not toxic, with 3 removable parts, magnified 3-4 x
<b>150</b>	Nephrons	15	piece	1	3D model made of PVC and colorant, not toxic, magnified
<b>151</b>	Jaws, teeth	15	piece	1	3D model made of PVC and colorant, not toxic, magnified, lower jaw with mobile teeth
<b>152</b>	Vertical cut of head	15	piece	1	3D model made of PVC and colorant, not toxic, 250 x 350 mm
<b>153</b>	Vertical cut of skin	15	piece	1	Model in basorelief made of PVC and non toxic colorants,70 x magnified, hair, epidermis, sweat-fat glands, etc.
<b>154</b>	Urinary system	15	piece	1	3D model made of PVC and colorant, not toxic magnified,
<b>155</b>	Human Skeleton 85cm	15	piece	1	3D model made of PVC and colorant, not toxic, lenght 850 mm, metal base
<b>156</b>	Model of plant cell	15	piece	1	3D model made of PVC and colorant, not toxic, 180x 300 x 60 mm
<b>157</b>	Kidney	15	piece	1	3D model made of PVC and colorant, not toxic, with removable parts, where are noted: hull,pyramids,cups,waterflow, 3-4 x
<b>158</b>	Model of animal cell	15	piece	1	3D model made of PVC and colorant, not toxic,, 180x 300 x 60 mm
<b>159</b>	Superstructure of cell (with cell organs)	15	piece	1	3D model made of PVC and colorant, not toxic,, 700 x400 x500 mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>160</b>	Digestion apparatus	15	piece	1	3D model made of PVC and colorant, not toxic, with removable parts , 3-4 x
<b>161</b>	Model of protein	15	piece	1	PVC, non-toxic colorant, with removable parts
<b>162</b>	Models of simplified nucleotides for students	15	box	10	PVC, non-toxic colorant, with removable parts
<b>163</b>	Comparison of brain in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, magnified , brain of 5 types of vertebrates
<b>164</b>	Comparison of heart in vertebrates	15	piece	1	3D model made of PVC and colorant, not toxic, magnified , heart of 5 types of vertebrates
<b>165</b>	Model of liver, with spleen, gall, pancreas and duoden	15	piece	1	3D model made of PVC and colorant, not toxic, magnified,
<b>166</b>	Neuron Model	15	piece	1	3D model made of PVC and colorant, not toxic, magnified
			piece		
	<b>Teaching tables on the wall</b>		piece		Content of tables in line with program requirements. In Albanian Language
<b>167</b>	Hearing Apparatus	10	piece	1	One or two sided material, plasticized or banner
<b>168</b>	Excretory Apparatus	10	piece	1	With plastic slide and movable hanger
<b>169</b>	Respiratory apparatus	10	piece	1	70cm x 100cm
<b>170</b>	Eye Apparatus	10	piece	1	
<b>171</b>	digestion apparatus	10	piece	1	
<b>172</b>	Human Teeth	10	piece	1	
<b>173</b>	ADN structure	10	piece	1	
<b>174</b>	Evolution of animal world	10	piece	1	
<b>175</b>	Birth of conditioned reflexes	10	piece	1	
<b>176</b>	Liver- supporting organ of digestion apparatus	10	piece	1	
<b>177</b>	Human Muscles	10	piece	1	
<b>178</b>	Anatomic Construction of bone	10	piece	1	
<b>179</b>	Construction of flower in enclosed plants (Angiosperms)	10	piece	1	
<b>180</b>	Female Genital Organs	10	piece	1	
<b>181</b>	Male Genital Organs	10	piece	1	
<b>182</b>	External View of Heart	10	piece	1	
<b>183</b>	Blood Composition	10	piece	1	
<b>184</b>	Ecological Pyramide	10	piece	1	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

<b>185</b>	Components parts of skin	10	piece	1	
<b>186</b>	Positions of fetus before birth	10	piece	1	
<b>187</b>	Reproduction of cells - Mytosis	10	piece	1	
<b>188</b>	Reproduction of sexual cells - Meyosa	10	piece	1	
<b>189</b>	Blood Circulatory System	10	piece	1	
<b>190</b>	Nervous System	10	piece	1	
<b>191</b>	Vegetative Nervous System	10	piece	1	
<b>192</b>	Human skeleton	10	piece	1	
<b>193</b>	Plant cell structure	10	piece	1	
<b>194</b>	Animal cell structure	10	piece	1	
<b>195</b>	Mendel Legacy (1 <sup>st</sup> Law of Mendel)	10	piece	1	
<b>196</b>	Mendel Legacy (1 <sup>2nd</sup> Law of Mendel)	10	piece	1	
<b>197</b>	Mendel Legacy (3 <sup>rd</sup> Law of Mendel)	10	piece	1	
<b>198</b>	AIDS Virus	10	piece	1	
<b>199</b>	Drugs	10	piece	1	
<b>200</b>	Risks from alcohol	10	piece	1	
<b>201</b>	Risks from smoking	10	piece	1	
<b>202</b>	Biosynthesis of proteins	10	Piece	1	
<b>203</b>	Earth's Terrestrial Biomes	10	Piece	1	
<b>204</b>	Air pollution : Smog	10	Piece	1	
<b>205</b>	Air pollution : Carbon monoxide and sulphur dioxide	10	Piece	1	
<b>206</b>	Sea pollution	10	Piece	1	
<b>207</b>	Devastration of tropical forests	10	Piece	1	
<b>208</b>	Food chain in the sea	10	Piece	1	
<b>209</b>	Food Pyramide in the lake (Ecological Pyramide)	10	Piece	1	
<b>210</b>	Forests echosystems	10	Piece	1	
<b>211</b>	Environment Protection from Wastes	10	Piece	1	

- For Chemistry Laboratories

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

	<b>CHEMICAL REAGENTS</b>				<b>Technical Specifications</b>
	<b>Description</b>	<b>Duration</b>	<b>Unit</b>	<b>Quantity</b>	<b>For all reagents, the list must meet these specifications:</b>
1	Salicylic Acid	1	bottle	100g	Clasificated reagent "p" . Packaged as technical safety rules. Label shall have: Description, chemical formula, expiry date, molar mass, quantity,risks signs
2	Benzoic Acid	1	bottle	100g	
3	Oleic Acid	1	bottle	250ml	
4	Ethanoic Anhydrite	1	bottle	250ml	
5	Ethanoic Acid glacial	1	bottle	500ml	
6	Ethandoic Acid	1	bottle	200g	
7	Phosphoric Acid 85%	1	bottle	250ml	
8	Chlorhydric Acid 36%	1	bottle	2000ml	
9	Methanoic Acid	1	bottle	250ml	
10	Nitric Acid 63%	1	bottle	500ml	
11	Silicic Acid	1	bottle	100g	
12	Sulfuric Acid 98%	1	bottle	1000ml	
13	Sulfanilic Acid	1	bottle	50g	
14	Perchloric Acid 65%	1	bottle	100ml	
15	Aluminium (powder)	1	bottle	50g	
16	Soluble starch	1	bottle	100g	
17	Aniline	1	bottle	100ml	
18	Copper (pieces)	1	bottle	100g	
19	Copper – powder	1	bottle	100g	
20	Benzene	1	bottle	250ml	
21	Bromothymol blue	1	bottle	25g	
22	Brom (brom water)	1	bottle	100ml	
23	Potassium bromide	1	bottle	200g	
24	Butanool- 1	1	bottle	100ml	
25	Cyclohexane	1	bottle	100ml	
26	Dextrine	1	bottle	100g	
27	Natrium dihydrogen phosphate	1	bottle	100g	
28	Ammonium Dichromate	1	bottle	200g	
29	Potassium dichromate	1	bottle	100g	
30	Natrium dichromate	1	bottle	100g	
31	Dchloroethane	1	bottle	100ml	
32	Ethanol 96% (ethyl alcohol)	1	bottle	500ml	
33	Denatured ethanol	1	bottle	5 L	
34	Ethanoate ethyl	1	bottle	250ml	
35	Diethyl ether	1	bottle	250ml	
36	Ethanoat sodium	1	bottle	200g	
37	Lead ethanoate	1	bottle	200g	
38	Calcium ethanoate	1	bottle	200g	
39	Calcium phosphate	1	bottle	200g	
40	Calcium fluor	1	bottle	100g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

41	Phenol	1	bottle	100g	
42	Phenolphthalein	1	bottle	250ml	
43	Potassium Ferricyanide	1	bottle	100g	
44	Potassium Ferrocyanide	1	bottle	100g	
45	Formaldehyde (formic aldehyde )40%	1	bottle	250ml	
46	Red phosphorus	1	bottle	50g	
47	Sodium phosphate	1	bottle	100g	
48	Iron powder	1	bottle	200g	
49	n – Hexane	1	bottle	100ml	
50	Hydrogen phosphate sodium	1	bottle	100g	
51	Hydroxide amides (ammonia in water 25%)	1	bottle	500ml	
52	Hydroxide Calcium	1	bottle	200g	
53	Hydroxide Potassium	1	bottle	200g	
54	Hydroxide sodium	1	bottle	500g	
55	Universal indicator pH: 0-14 (Indicator)	1	Kuti	3	
56	Iod (crystals)	1	bottle	50g	
57	Potassium iodines	1	bottle	100g	
58	Potassium iodide	1	bottle	100g	
59	Calcium (metallic)	1	bottle	50g	
60	Potassium (metallic)	1	bottle	25g	
61	Carbamide (urea)	1	bottle	100g	
62	Activ Carbon	1	bottle	25g	
63	Ammonium carbonate	1	bottle	100g	
64	Sodium carbonate	1	bottle	200g	
65	Calcium Carbonate (granuls)	1	bottle	200g	
66	Calcium Carbonate (powder)	1	bottle	200g	
67	Calcium Carbide	1	bottle	200g	
68	Tin- grain (granuls)	1	bottle	100g	
69	Chlorates of potassium	1	bottle	500g	
70	Ammonium chloride	1	bottle	200g	
71	Copper chloride (II)	1	bottle	100g	
72	Barium chloride	1	bottle	200g	
73	Chlorine iron (III)	1	bottle	200g	
74	Hydrate calcium chloride	1	bottle	200g	
75	Potassium chloride	1	bottle	100g	
76	Magnesium chloride	1	bottle	100g	
77	Natrium chloride	1	bottle	200g	
78	Copper chloride	1	bottle	100g	
79	Nickel chloride	1	bottle	100g	
80	Tin chloride (II)	1	bottle	100g	
81	Cadmium chloride	1	bottle	100g	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

82	Lithium chloride	1	bottle	100g	
83	Strontium chloride	1	bottle	100g	
84	Aluminium chloride	1	bottle	100g	
85	Zinc chloride	1	bottle	200g	
86	Mohr’s salt	1	bottle	100g	
87	Potassium chromium sulfate	1	bottle	100g	
88	Sodium chromate	1	bottle	100g	
89	Xylene	1	bottle	250ml	
90	Blue reagent paper	1	Kuti	3	
91	Red reagent paper	1	Kuti	3	
92	Filter paper 120mm	1	pako	3	
93	Magnesium (powder)	1	bottle	50g	
94	Magnesium (stripe)	1	m	5	
95	Metanol ( metilic alcoho)	1	bottle	250ml	
96	Metilorange (indicator)	1	bottle	25g	
97	Red metil (indicator)	1	bottle	25g	
98	Natrium (metallic)	1	bottle	50g	
99	Ammonium nitrate	1	bottle	200g	
100	Aluminium Nitrate	1	bottle	100g	
101	Silver Nitrate (crystals)	1	bottle	25g	
102	Copper Nitrate	1	bottle	100g	
103	Barium Nitrate	1	bottle	100g	
104	Cobalt Nitrate	1	bottle	100g	
105	Potassium Nitrate	1	bottle	200g	
106	Natrium Nitrate	1	bottle	200g	
107	Lead Nitrate	1	bottle	200g	
108	Sodium Nitrite	1	bottle	100g	
109	Nitrobenzene	1	bottle	250ml	
110	Octanol – 1	1	bottle	100ml	
111	Aluminium oxide	1	bottle	200g	
112	Lead oxide (II)	1	bottle	200g	
113	Iron oxide (III)	1	bottle	200g	
114	Calciumi Oxide (granuls)	1	bottle	200g	
115	Chromium Oxide (VI)	1	bottle	100g	
116	Phosforus Oxide (V)	1	bottle	100g	
117	Manganese Oxide IV. (manganese dioxide)	1	bottle	200g	
118	Magnesium Oxide	1	bottle	200g	
119	Lead Oxide (IV)	1	bottle	100g	
120	Zinc Oxide	1	bottle	200g	
121	Paraffin	1	bottle	200g	
122	Potassium permaganate	1	bottle	500g	
123	Propaentriol 1,2,3, (Gliyerine)	1	bottle	250ml	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

124	Propanone	1	bottle	250ml	
125	Natriumi Peroxide	1	bottle	100g	
126	Sulfur (powder)	1	bottle	100g	
127	Ammonium sulphate	1	bottle	200g	
128	Aluminium sulphate	1	bottle	200g	
129	Carbon Sulfur	1	bottle	100ml	
130	Ammonium Sulfur	1	bottle	100ml	
131	Natrium Sulfur	1	bottle	100g	
132	Chromium Sulphate	1	bottle	100g	
133	Sodium Sulphite	1	bottle	200g	
134	Hydrated copper Sulphate	1	bottle	500g	
135	Iron Sulphate (II)	1	bottle	100g	
136	Calcium Sulphate	1	bottle	100g	
137	Potassium Sulphate	1	bottle	100g	
138	Nickeli Sulphate	1	bottle	100g	
139	Magnesium Sulphate	1	bottle	100g	
140	Sodium Sulphate	1	bottle	100g	
141	Zinc Sulphate	1	bottle	100g	
142	Sulfocianuro ammonia	1	bottle	100g	
143	Sulfocianuro potassium	1	bottle	100g	
144	Iron Sulfur	1	bottle	100 g	
145	Potassium Sulfur	1	bottle	100g	
146	Aluminium shape	1	bottle	100g	
147	Chrome Shape	1	bottle	100g	
148	Potassium and sodium tartrate	1	bottle	100g	
149	Tetraclorometano (carbon tetrachloride)	1	bottle	100ml	
150	Turpentine	1	bottle	100ml	
151	Sodium thiosulfate	1	bottle	100g	
152	Triclormetan (Chloroform)	1	bottle	100ml	
153	Toluene	1	bottle	100ml	
154	Granular zinc (granuls)	1	bottle	200g	
155	Zinc powder	1	bottle	100g	
	<b>Didactic devices and measuring devices</b>				
	<b>Description</b>		<b>Unit</b>	<b>Quantity</b>	
156	Kipp´s apparatus	10	piece	2	classic type with security tubing 125ml
157	Simple Kipp´s apparatus	5	piece	5	with buckle insurance
158	Electrolytic electrical conductivity devices	5	piece	5	with carbon electrodes
159	Vacuum filtering equipment	5	piece	2	erlenmayer bunsen, porcelain funnels, glass pumps
160	Liquid distillation apparatus	5	piece	3	Insurance funnel
161	Apparatus for electrolysis of water (Hoffman´s Voltameter)	10	piece	3	With two electrods , continued current 6-12V

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

162	Device for water synthesis (Eudiometer)	10	piece	1	With escalation, glass
163	Simple device for studying the properties of gases	5	piece	10	refractory glass
164	Simple apparatus for gases that are not dissolved in water	5	piece	10	refractory glass
165	Simple apparatus for gas preparation heavier than air	5	piece	10	refractory glass
166	Simple apparatus for gas preparation lighter than air	5	piece	10	refractory glass
167	Pajisje te thjeshta per djegien e gazeve	5	piece	10	refractory glass
168	Pajisje me spekter te gjere perdorimi	5	piece	10	refractory glass
169	Apparatus for electrolysis of salt	5	piece	5	Glass funnel U, carbon electrodes
170	Apparatus for the preparation of chlorine, hydrogen chloride	5	piece	1	Glass ballon 500 ml, glass funnel, funnel Z
171	Apparatus for the preparation of hydrocarbons	5	piece	1	Erlenmayer 800 ml, glass funnels separator,
172	Apparatus for demonstrating the galvanic element (with Galvanometer)	5	piece	3	Glasses 100 ml, elektodat zinc and copper
173	Metallic Barometer	15	piece	1	standart type
174	Higrometer or Psikrometer (with termometer)	15	piece	1	standart type
175	Calorimeter	15	piece	10	400mm , ø20mm,aluminium
176	Areometer (density measure for liquids with $d < 1$ )	15	piece	5	With alcohol
177	Areometer (density measure for liquids with $d > 1$ )	15	piece	5	With alcohol
178	Laborator thermometer -10-100°C	5	piece	10	With alcohol
179	Laborator thermometer 0-200°C	5	piece	5	With alcohol
180	PH-meter	15	piece	1	pH 0-14.0pH with resolution pH:0.1ph
	<b>Glasses</b>				
181	Adaptors (Alunge)	5	piece	2	refractory glass
182	Burets for acides 25 ml or 50 ml	5	piece	10	Glass water tap
183	Burets for bases 25 ml or 50 ml	5	piece	10	With glass and rubber pipe
184	Measuring cylinder 10 ml	5	piece	10	Scalable with mouth
185	Measuring cylinder 25 ml	5	piece	10	Scalable with mouth
186	Measuring cylinder 50 ml	5	piece	10	Scalable with mouth
187	Measuring cylinder 100 ml	5	piece	10	Scalable with mouth
188	Measuring cylinder 250 ml	5	piece	2	Scalable with mouth
189	Measuring cylinder 500 ml	5	piece	2	Scalable with mouth
190	Measuring cylinder 1000 ml	5	piece	2	Scalable with mouth
191	Eksikator	5	piece	2	glass, sanded
192	Vertical Cooling	5	piece	2	type Liebih
193	Chemical glasses (Bekera) 50	5	piece	10	High form, scalable, with mouth



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

	ml				
194	Chemical glasses (Bekera) 100 ml	5	piece	10	High form, scalable, with mouth
195	Chemical glasses (Bekera) 250 ml	5	piece	10	High form, scalable, with mouth
196	Chemical glasses (Bekera) 500 ml	5	piece	5	High form, scalable, with mouth
197	Chemical glasses (Bekera) 800 ml	5	piece	2	High form, scalable, with mouth
198	Chemical glasses (Bekera) 1000 ml	5	piece	2	High form, scalable, with mouth
199	Glasses pipes with different diameter	5	kg	1	glass, with different diameter
200	Glasses pipes with T form	5	piece	10	glass, with different diameter
201	Glasses pipes with Y form	5	piece	10	glass, with different diameter
202	Drying pipes	5	piece	5	glass, with different diameter
203	Safety pipes with bule	5	piece	5	with 1 bule
204	Glasses funnel Ø 75 mm	5	piece	10	Short tail
205	Glasses funnel Ø 90 mm	5	piece	5	Short tail
206	Dividing funnels (separatore) 125 ml	5	piece	10	Sanded cup
207	Dividing funnels (separatore) 250 ml	5	piece	5	Sanded cup
208	Dividing funnels (separatore) 500 ml	5	piece	2	Sanded cup
209	Glass bell with cap	5	piece	2	Sanded cup
210	Crystallisator Ø=180mm, h=90 mm	5	piece	10	With mouth
211	Crystallisator Ø=90mm, h=40 mm	5	piece	10	With mouth
212	Drying column	5	piece	2	Sanded neck
213	Alcohol lumps	5	piece	15	Plastic cup
214	Microburette	5	piece	2	With tap
215	Pjata Petri# plates (sett)	5	piece	10	ø 90mm
216	Escalating Pipets (cannuls) 1ml or 2 ml	5	piece	10	glass, standard type
217	Escalating Pipets (cannuls) 5ml	5	piece	10	glass, standard type
218	Escalating Pipets (cannuls) 10ml	5	piece	5	glass, standard type
219	Escalating Pipets (cannuls) 25ml	5	piece	5	glass, standard type
220	Regulated Pipets 1ml or 2ml	5	piece	10	glass, standard type
221	Regulated Pipets 5ml	5	piece	10	glass, standard type
222	Regulated Pipets 15ml ose 20ml	5	piece	5	glass, standard type
223	Bulb (sphere ballonns ) 100 ml	5	piece	10	Tight neck
224	Bulb (sphere ballonns ) 250 ml	5	piece	10	Tight neck
225	Bulb (sphere ballonns ) 500 ml	5	piece	2	Tight neck

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

226	Bulb (sphere ballonns) 1000 ml	5	piece	2	Tight neck
227	Distillation bulbs with side pipes	5	piece	2	Tight neck
228	Bulbs with flat bottom (Balloons with flat bottom) 100ml	5	piece	10	Tight neck
229	Bulbs with flat bottom (Balloons with flat bottom)250ml	5	piece	10	Tight neck
230	Bulbs with flat bottom (Balloons with flat bottom) 500ml	5	piece	2	Tight neck
231	Bulbs with flat bottom (Balloons with flat bottom) 1000ml	5	piece	2	Tight neck
232	Conic bulbs (Erlenmajer) 50 ml	5	piece	10	Scalable, Tight neck
233	Conic bulbs (Erlenmajer) 100 ml	5	piece	10	Scalable,, Tight neck
234	Conic bulbs (Erlenmajer) 250 ml	5	piece	10	Scalable,, Tight neck
235	Conic bulbs (Erlenmajer) 500 ml	5	piece	5	Scalable,, Tight neck
236	Conic bulbs (Erlenmajer) 1000 ml	5	piece	2	Scalable,, Tight neck
237	Conic bulbs (Erlenmajer) with sanded cup	5	piece	10	Scalable, Tight neck
238	Poça konike me gyp anesor (Erlenmajer Bunsen)	5	piece	2	Scalable,, Tight neck
239	Test tube 12 x 120 mm	5	piece	100	refractory glass, with borders
240	Test tube 16 x 150 mm	5	piece	200	refractory glass, with borders
241	Test tube 18 x 100 mm	5	piece	200	refractory glass, with borders
242	Test tube 24 x 200 mm	5	piece	50	refractory glass, with borders
243	Signed bulbs (tarated) 100 ml	5	piece	10	Glass, standart type
244	Signed bulbs (tarated) 250 ml	5	piece	10	Sanded neck
245	Signed bulbs (tarated)500 ml	5	piece	5	Sanded neck
246	Signed bulbs (tarated)1000 ml	5	piece	2	Sanded neck
247	Pesafilters	5	piece	10	Sanded cup
248	Glass taps	5	piece	2	sanded
249	Agitable glass (agitator)	5	piece	10	200 mm
250	Glass Bottle with sand dropper without colour 60 ml	5	piece	20	Specifications as nominations
251	Glass Bottle with sand dropper with colour 60 ml	5	piece	20	Specifications as nominations
252	Glass Bottle, for liquid reagents with sand without colour 60 ml	5	piece	20	Specifications as nominations
253	Glass Bottle, for liquid reagents with sand with colour 60 ml	5	piece	20	Specifications as nominations
254	Glass Bottle, with neck with sand without colour 60 ml	5	piece	20	Specifications as nominations

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

255	Glass Bottle, with wide neck with sand with colour 60 ml	5	piece	20	Specifications as nominations
256	Bottle Mariot (for distilled water) 2,5 l	5	piece	2	Specifications as nominations
257	Clock glasses	5	piece	10	Specifications as nominations
	<b>Molecular models or crystalline</b>				
258	Set of molecular models	20	piece	1	suitcase, rubber models and metallic bars
259	Micromolecular models	20	piece	10	box, rubber models and metallic bars
260	Orbital atomic model px	20	piece	1	Plastic model with metallic elements
261	Orbital atomic model py	20	piece	1	Plastic model with metallic elements
262	Orbital atomic model pz	20	piece	1	Plastic model with metallic elements
263	Orbital hybridization model sp <sup>2</sup>	20	piece	1	Plastic model with metallic elements
264	Orbital hybridization model sp <sup>3</sup>	20	piece	1	Plastic model with metallic elements
	<b>Wood, rubber plastic instruments</b>				
265	Rubber pipes (laborator) with diameter 6 ÷ 8 mm	20	m	10	Specifications as nominations
266	Test tube holder	20	piece	20	Wood material
267	Pipes holder	20	piece	10	Plastic material
268	Test tube holder	20	piece	10	Wood material
269	Washable plastic Bottle (pisets)	20	piece	10	plastic with glass pipe
270	Rubber cups with different diameter with hole	20	piece	50	nr 00,01,1,2,3
271	Rubber cups with different diameter without hole	20	piece	50	nr 00,01,1,2,3
	<b>Metallic instruments</b>				h=150 mm, ø16 mm
272	Bek Bunsen	20	piece	1	standart
273	Cames (pirosti)	20	piece	10	metallic
274	Laboratory Jack screw	20	piece	2	standard
275	Spoon incineration	20	piece	10	standard
276	Spoon for substances	20	piece	10	standard
277	Magnet in horseshoe form	20	piece	1	standard
278	Tongs per pots	20	piece	10	
279	Laboratory tenter	20	piece	10	bar,antimorsete, metallic circles,Metallic fixing
280	Weighter, teknich-chimical with stone weight box	20	piece	10	Maximal capacity 200g, sensitivity 0.1g, tolerance mistake 1.5, pan diameter ø90mm
281	Weighter, half analytic with stone weight box	20	piece	1	Maximal capacity 1000g, sensitivity 50mg,tolerance mistake 1.5, pan diameter ø120mm
282	Ceramic mesh	20	piece	10	Ceramic and metallic mesh
283	Puncture cups	20	piece	2	With 3 dimensions
284	Constriction for burets with fixing	20	piece	10	metallic
285	Constriction for pipes with screw (Hoffman staple)	20	piece	5	metallic
286	Elastic Constriction for rubber	20	piece	5	metallic

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

	pipes (Mohr staples)				
	<b>Porcelain instruments</b>				
287	Porcelani bowl		piece	5	porcelain
288	Funnel for filtration in space (Buhner funnel)	10	piece	2	porcelain
289	Spoon - spatula	10	piece	10	porcelain
290	Kapsuls (cupshore) porcelain	10	piece	10	porcelain
291	Kroogiola (pote) porcelain	10	piece	10	porcelain
292	triangular for pos post	10	piece	10	porcelain and metallic
	<b>Instruments and different materials</b>				
293	Laboratory distiller for distilated water	10	piece	1	2-3 liter in hour, monofase
294	Instrument for cutting glass pipes	10	piece	2	Metallic with screw
295	Brush for washing instruments	1	piece	10	metallic with plastic cord
296	gloves - protection	1	piece	10	anti acid, anti alcal, anti corrosive
297	Protection masks	5	piece	10	anti acid, anti alcal, anti corrosive
298	Protection glass	5	piece	10	anti acid, anti alcal, anti corrosive
299	Universal Current feeding universal or current leader	10	piece	1	0-24V / 6A
300	Keeper for infiltration instruments	15	piece	2	Metallic with me rubber pins
301	Fast help box	2	set	1	With 7 accessory, as technical safety instructions
302	Fire extinguishing (exintore)	20	piece	1	With powder
303	Dynamic model for demonstration of atomic orbital	15	piece	1	500 x 350 mm current 24V
304	Chemical-physical characteristics and methods for using chemical reagents in school	20	piece	1	In albanian language
305	Instructions for technical safety	20	piece	1	In albanian language
	<b>Instructional signs</b>				
306	Danger signs of chemical substances	15	piece	1	70cm x 100cm
307	Safety rules in laboratory	15	piece	1	70cm x 100cm
308	Method of separationof substances	15	piece	1	500 x 350 mm 24V
309	Ambience of acid -base of solution	15	piece	1	70cm x 100cm
310	Electrolitic dissolution	15	piece	1	70cm x 100cm
311	Alcanes	15	piece	1	70cm x 100cm
312	Isomery	15	piece	1	70cm x 100cm
313	Chemical Substances dissolubility in water	15	piece	1	140cm x 100cm
314	Chemical elements table (long version)	15	piece	1	140cm x 100cm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

315	Base unit of SI	15	piece	1	70cm x 100cm
316	Ionisation energy of elements as group A of periodic system	15	piece	1	70cm x 100cm
317	Electronegativity	15	piece	1	70cm x 100cm
318	Molecules geometry	15	piece	1	70cm x 100cm
319	Elementary reactions and velocity equation	15	piece	1	70cm x 100cm
320	Thermodynamic information for some substances	15	piece	1	70cm x 100cm
321	Constans of jonice equilibrium	15	piece	1	70cm x 100cm
322	Solubility product	15	piece	1	70cm x 100cm
323	Potenciale te reduktimit	15	piece	1	70cm x 100cm
324	Value relation of quantice numbers for n=4	15	piece	1	70cm x 100cm
325	Moles relation	15	piece	1	70cm x 100cm
326	Table of chemical elements (long variants) for personal use	15	piece	300	150mm x 300mm folding

- For Laboratory of Physics

No.	Definition of the device	Unit/quantity	Technical specifications
1	<b>MECHANICS</b>		
2	Simple apparatus for demonstration of free fall	1 piece	Metallic or plastic spheres with $\phi$ (20-30)mm
3	Tube of Newton	1 piece	Used for demonstrating independence of free fall from mass and shape of a body. Composed of a vacuum tube, with a feather and a metallic piece inside. Dimensions 5x105 cm, pesha 0,7 kg
4	Apparatus for inertia	1 piece	
5	Apparatus for rotating motion in vertical plane	1 piece	Demonstrates transformation of Ek in Ep. Composed of a metallic rut, mounted on a wood basement and a metallic sphere with a $\phi$ (12-15)mm
6	Tribometer	1 piece	Axis with dimensions ( 81.5 x 10 x 2) cm, coach with dimensions 10 x 8 x 4cm, 200g, a roll with a small friction fixed on one edge. The axis is supported on different angles ( 0-45) degrees on a metallic protractor metalik, fixing sticks
7	Dinamometer , force measuring , (0-5) N	3 pieces	Measuring scale (0-5) (500g) ,
8	Dinamometer , force measuring (0-10) N	3pieces	Measuring scale (0-10) (1000g)
9	Disc for moment equilibrium	1 piece	Diameter not smaller than 245mm, scale 4x10-80
10	Communication vessels	1 set	4 glass pipe with different dimensions and shapes mounted on a plastic or wood support
11	Halfspheres of Magdeburg	1 set	Composed of two halp-spheres with me diameter

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			Ø (100 – 110)mm, made of metal or plastic, with vacuum pipe
12	Scales stone with hooks	1 set	Box with 10 metallic stone with weight from 10g up to 500 g
13	Caliber	2 pieces	Metallic equipment for measuring lengths in mm
14	Lab coach	4 pieces	Dimensions 290x140x90mm; 0.87kg. Coach line (1.5x0.3m), 10 springs (50x15)mm 10 springs holder, 10 elastic cords with rings in the end 150mm long, wheels with bearings with spheres, with small friction
15	Set of capillary pipes	1 set	Series of glass pipe of different diameters
16	Set of rolls	1 set	Maximal allowed weight 2kg
17	Chronometer	3 pieces	Chronometer for determination of time per second (Classical type – mechanic or digital)
18	Micrometer	1 piece	Metal made for measuring lengths in mm
19	Equipement for demonstration of parallel forces (Lever)	1 piece	Composed of a metallic linear (40-50)cm long, with a hole and diameter (3,5-4,5)mm, scalable. Used to study relations between force and its direction and moment and serves to hang weight stones with hooks
20	Equipment for demonstration of Archimedes force (Double cylinder of Archimedes)	1 piece	Diameter ø 28mm, height 55mm, dimensions of cylinder 35 g, plastic material
21	Equipment for demonstration of principle of preservation of mechanical energy	1 piece	Height ~ 250 mm, dimensions of the set ~380x130x150mm, rroll ø 110mm.
22	Equipment for demonstration of distribution of pressure in fluids (Law of Pascal)	1 piece	Steel spheres, size ~350 mm, weight ~300 gram
23	Hand vacuum pump	1 piece	Vacuum pressure shall be less than 6700 Pa
24	Equipment for measuring pressure in fluids	1 piece	General scale, not less than 24 cm, with center of scale 0
25	Thread-Level Indicator	1 piece	Hanging string
26	Physical scales-technical with weight stones	1 piece	Maximal capacity (200 – 300)g, sensitivity 0.1g, error tolerance not more than 1.5, diameter of pan ø(90-110) mm
27	Spheres of different sizes	1 set	Diameter (10-20)mm, steel metal
28	Sensor of gas pressure	1 piece	Requires a signal in proportion with gas pressure
29	Motion Sensor	1 piece	Serves to calculate distances crossed by a body when time and signal output and input is given. Frequency is 50 measures per second and measurement scale from (0.15 -6) m. Connected to smartboard E46. Touchscreen control
30	Force Sensor	1 piece	Force sensor measures withdrawing and submersive forces of about -50N +50N. Connected smartboard. Touchscreen control
31	Tribometer	1 piece	Wooden
32	Hydraulic pressure	1 piece	

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

33	Stripe-meter	1 piece	Plastic, metallic, 1,5m, 2m,
34	Metallic tripod with accessories	1 piece	Diameter of rod $\varnothing$ 10-13 mm, basement of triangle iron, height 700-900mm, 1 rod with isolation head, 1 rod with hooks, 2 morsette
35	Unscalable Springs	10 pieces	Maximal allowed weight of 500gram
36	Bodies with same density and different volumes	6 pieces	Bodies with the same shape and dimensions and different materials, such as: wood, plastic, bronze, aluminum, iron, lead etc.
<b>TERMODINAMICS</b>			
37	Apparatus for change of thermal conductivity	1 piece	Composed of three metallic rods, different metals, equipped with a metallic ring, movable, with dimensions (300 x 150) mm
38	Pyrometer	1 piece	
39	Apparatus for demonstration of bulge of fluids and gases	1 piece	Indicates changes during fluids bulge. Composed of 5 glass pipes with a spheral ending, height 400 mm, mounted on a plastic basement and scaled in mm.
40	Apparatus for demonstration of bulge of rigid bodies	1 piece	Diameter of sphere s $\varnothing$ 20 mm, weight 0.2kg, length 300 mm
41	Apparatus for transformation of thermal energy B29	1 piece	Composed of :copper pipe, holed clips, plastic corks and friction strings. Height about 470 mm, weight about 600 gram,
42	Apparatus for demonstration of Boil-Mariot Law	1 piece	Dimensions 300 x 200 mm, rubber cover, cylindric pipe, volume measurement, measurer of pressure, scale 0.5,1,1.5,2.
43	Apparatus for demonstration of adiabatic process	1 piece	Cylindric vessel with glass valve, with dimensions (64x65x200)mm, diameter (25x130)mm
44	Teaching Barometer	1 piece	Analogue metallic body diameter 10cm
45	Aneroid Barometer	1 piece	Measures air pressure, values (690-790) mm Hg, and scale 1 mm Hg
46	Communication vessels	1 set	4 glass pipes with plastic support
47	Equipment for demonstration of convection B51		Diameter of the pipe $\varnothing$ 12mm, dimensions: 300mm x 200 mm. Numeric values of technical specifications are flexible up to 15%.
48	Calorimeter	1 piece	Copper made, nicke-plated, with dimensions 54x34 m For the determination of specific heat in fluits with electrical method.It is composed of a calorimeter, copper plated with dimensions (54 x 34 )mm, placed inside an external vessel with dimensions 70x45 mm.Voltage of electrical feeder U = 6V, Resistance of the heater R=2-6 Om, Current : I=0.5--2 A.
49	Bimetallic sheet	1 piece	Material: copper, iron, length about 200 mm.
50	Temperature Sensor	1 piece	Shkalla: -30/+1350C Resolution: 0.10C Frequency: over 10 matje/s

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			Connected to smartboard. Touchscreen Control. E109 .
51	Gas Pressure Sensor	1 piece	Requires proportional signal in proportion with gas pressure. The required values is 156.050 kPa. Measuring unit may be Bar, kPa, atm. Frequency is 100 measures per second and scale 0-200 kPa. Connected to smartboard. Touchscreen control. Collection and preservation of data on USB. Permanent connection with cord.
52	Combustible Engine	1 piece	
53	Thermometer (0-50) Celsius degrees	10 pieces	Scale (0-50) degres with mercury
54	Thermometers (0-200) Celsius degrees	10 pieces	Scale (0-200) degres with mercury
55	Thermometers (-10-110) Celsius	10 pieces	Scale (-10-110) degres with mercury
<b>ELECTRICITY AND MAGNETISM</b>			
56	Laboratory Ampermeter	4 pieces	Measure scale -0,2~0~0,6A / -1~0~3A,sensitivity 75 mV, Dimensions about (133 x 97 x 100 )mm
57	Ampermeter-voltmeter for demonstrations	1 set	DC direct current,1mA,100mA,1A,10A, DC voltage (0-10)V,(0-30)V AC/alternative 10mA,100ma,1A,5A AC voltage 10V,30V,250V
58	Apparatus for distribution of current	1 piece	Metallic sphere mounted on an isolating handle
59	Apparatus for action of magnetic force on current conductor	1 piece	Dimensions: about (500x250x270) mm I=2A
60	Apparatus for demonstration of Kulon Law	1 piece	Metallic basement, thread made of medullary wood
61	Apparatus for demonstration of line in a magnetic field	1 piece	Box with dimensions (98x55x55)mm, with a tunnel, internal diameter 10mm and length 70mm and magnetic rod with dimensions (50x7)mm long.
62	Light source (battery)	5 pieces	3 V, 4,5V
63	School teaching compass	1 piece	Diameter not less than (50) mm
64	Rumkorff coil	1 piece	220V/50Hz,dalja (20-100)Kv,distance 100mm
65	Couple of induction coils	3 sets	Primary coil ø35mm, length 120mm and 380 wire secondary coil ø65mm,481 wire, as well as iron nucleus
66	Switch with cassette	1 piece	Voltage 36V and direct current 6A
67	Switch for electrical circuit	5 pieces	U= 36V with direct current 0-3A
68	Conductive thread	10 pieces	50cm length with terminal two-sided pin
69	Electroscope with sheets	1 piece	Diameter not less than 200mm, with a support of plastic or glass material
70	Horseshoe-shaped electromagnet	1 piece	Composed of two rolls, one with a nucleus with iron rod in U shape, and a closing metallic armour with a hook and voltage 6V and current 1A.
71	Magnetic needles with support	3 pieces	Lenght of needle not less than 40mm
72	Small magnetic needles	3 pieces	Length not less than 30 mm
73	Plastic pipes	6 pieces	Plastic material
74	Faraday Cage	1 piece	Dimensions (600x300x150)mm
75	Conducting cables with terminal plug	10 pieces	With a length 50cm and two-sided terminal plug



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

76	Condensator with discs	10 pieces	Plastic discs with a diameter (200-300)mm
77	Resistence box mounted in the cassette	1 set	10x0,1Ω; 10 x 1 Ω; 10x10 Ω; 10x100 Ω; 10x1000 Ω
78	Small lamps	25 pieces	Standard type, 6V
79	Lamp holder	1 set	Plastic basement with lamp holder U= (0-30)V, I=(0-3) A
80	Model of three-phase generator	1 piece	Output > ose = 8V when rotating velocity is about 1600 rot/minute
81	Model of an electromotor	1 piece	Dimensions 50cmx50cm
82	Electrifying Pendolini	1 piece	Plastic support with silk threads
83	Horseshoe-shaped magnet	2 pieces	80mmx200mm, 0,05T80mm x 200mm <sup>2</sup> , 0,05T.
84	Simple magnet	4 pieces	5x25cm
85	Equipment for density of loads	1 piece	Dimensions (600x300x150)mm
86	Voltaic pile	3 pieces	Carbon rod, copper plaque, lead plaque, zinc plaque
87	Rectangular conductor with plastic plaque	1 piece	Composed of three different conductions, plastic basements
88	Record for Winston bridge	1 piece	(1000x100x50)mm, tel Ni-Cr
89	Rheostat 50U with cursor (sliding)	1 piece	Resistenca (0-50) om, current 5A
90	Electrostatic Net	1 piece	
91	Catode Rays	1 piece	(640x440x590)mmm with plastic support
92	Alternative sources systems B46	1 piece	Used in different experiments for study of renewable energy, such as solar, hydric, wind. It is composed of a solar panel, wind turbine, hydraulic turbine, cell with hydrogen, ventilator, rotor. Dimensions 50x45x15 cm. Weight 5.5 kg
93	Series of metallic threads mounted on a plaque	1 set	Material of threads : iron, copper, nickel-chrome
94	Sphere with an isolating handle	1 piece	Plastic handles or metallic spheres with a diameter not less than ø50mm
95	Glass rod	2 pieces	Length not shorter than 300 mm
96	Ebonite rod	1 piece	Length not shorter than 300 mm
97	Discharging rod	10 pieces	Plastic end – Metallic rod (500-700)mm
98	Magnetic rod	2 pieces	With colored poles 160mm, 0,06 T (160 x 200) mm, 0.06T.
99	Magnetic spectres	1 piece	(500x330x250 )mm
100	Power security incentive		Simulates technical problems of the electrical system: short circuit, current leak, over load and fuse. Places in aluminum case filled with foam. Dimensions about: 30x35x10 cm.
101	Sensor for voltage and current	1 piece	Combined Sensor. Measure Frequency 50000 measuring /s. Connected to smartboard. Touchscreen Control.
102	Transformer	1 piece	
103	Geisler pipes (light source with different gases)	1 set	Pipes with hydrogen, oxigen, helium,carbon dioxide, neon, argon.
104	Universal feeder (0-24)V, 6A	1 piece	Outputs of alternative and direct current (2-24)V with 12 scales. Maximal current of work up to 6A. Dimensions about (270 x 120 x 210) mm, 6,5 kg

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

105	Laboratory Voltmeter	3 pieces	Measuring scale -5~15V, sensitivity 1mA. Dimensions (133 x 97 x 100)mm
<b>ACUSTICS, VIBRATIONS, WAVES</b>			
106	Apparatus for demonstration of wave-spreading phenomenon	1 piece	Voltage (0-6)V; number of vibrations 13; $\phi$ of vibrator 15,6mm, dimensions (450mmx200mmx300mm)
107	Diapason 440Hz	1 piece	Composed of : two forks with the same frequency 440 Hz, with vertical session (6,5 x 16)mm, length of wings 109 mm, distance between 17mm,
108	Mathematic pendulum	1 piece	Sphere hanged in an unextendable thread, fixed on a basement
109	Pendulum for resonance	5 pieces	5 pendulums of different lengths, metallic frames (400 x 300) mm.
110	Resonance Box	1 box	Suitable for diapason 440 Hz; about 145x88x53 mm
111	Springs set	1 set	Used for demonstration of horizontal and vertical waves . Springs with a diameter of 8 cm, unextendable length 13 cm,it may reach up to 5 m, weight 0.6 kg. Spring 2 with a 2 cm diameter, not extended 1 m long, weight 0.5 kg.
112	Sonometer with cords		Used for study of sound dependence from length, pressure and thickness of vibrating cord. It is composed of a resonance box made of wood 60 cm long, scalable. Completed with a dynamometer, two steel cords, diameter, $\Phi$ 0,4 mm, one steel cord with a diameter, $\Phi$ 0,8 mm and three immovable bridges for fitting the length of cords.
113	Kundt Pipe	1 piece	Glass pipe with a length of 1,5 m and diameter 35mm, wooden rod 390mm long,basement of wood 1,5 m long and diameter 13mm.
114	Equipment for study of electromagnetic waves		Waves transmitter: diode Gunn 10.7GHz ( $\lambda=2.8$ cm), power 30W voltage (10-12)V në (2 - 3.5)V. Cylindric case with a diameter 83mm and length 70mm. The general length 25 mm. Waves receiver : Similar to transmitter. Sond Detector: silicon microwave diode , same with the receiver but mounted in a shorter rod, Vertical, not metallic. 4 sockets with external circulation, dimensions (75x50x135)m.
115	Stroboscope		Used to observe phenomena than happen very soon. Dimensions (20x12x14) cm, weight 1.8 kg. Frequency (1-300) Hz.
<b>OPTICS</b>			
116	He-Ne Lazer		Used for experiments of defraction and interference. Dimensions 35x10x14 cm, pesha 1.5 kg, coherent red light, wave length 633 nm
117	Accesories for analogue optical experiments		Reflecting surface (200x300)mm,

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

			(60x300)mm, glass plaque with parallel sides (200x300)mm, polarization net (200x200)mm, convec-plane lenses with a hole that during work is filled with paraffin oil; prism with gap filled with paraffin oil (45x90x45) degrees ;
118	Photocamera	1 piece	Digital, cyber shot, mbi 10 Mega pixel.
119	Optical disc	1 piece	Disc with colors and rotating rope. Used for fragmentation of white light. It is composed of the disc with a diameter of 200 mm, two sets of spectres of colors, a rotor with handle. Axis of the handle coincides with the axis of the disc. It is placed on a plastic base with dimensions about (120x120) mm, with rubber legs, general height about 32 cm.
120	Concave mirror	2 pieces	Glass F' = 65mm, $\phi=100$ mm
121	Convex mirror	2 pieces	Glass F' = 65mm, $\phi=100$ mm
122	Flat mirror	1 piece	Distance f=65mm, $\phi = 100$ mm
123	Filters with different colors	1 set	Plastic, 40x20 mm <sup>7</sup> with basic colors of spectrum, with dimensions about 535x310 mm each filter
124	Eye Model		Physical view of eye functioning, including sight impair and their correction. Mounted on a wooden or plastic basement. Dimensions not less than (320 x 180)mm
125	Caleidoscope		Diameter (180 x 35 )mm
126	Summarizing lenses	2 pieces	Made of glass
127	Distribution lenses	2 pieces	Made of glass
128	Convex lenses	2 pieces	Made of glass
129	Glass prism	1 pieces	Point of view 85°, 25mm-75mm / 50mm-15mm
130	Glass plaque with parallel sides	1 pieces	Dimensions (50x20)mm
131	Ceramic net	1 copë	1235x125 mm dhe 150x150mm
132	Magnifying glass	2 copë	Magnifying not less than 4 x
133	Light sensor		Scale: (0 -2 000 )lux / (0 -30 000) lux Resolution: 0.5 lux/10 lux Frequency : over 1000 measures/s Connection to smartboard. Touchscreen control.
	<b>MODERN PHYSICS</b>		
134	Radiation Monitor ( $\alpha$ , $\beta$ , $\gamma$ )		Composed of Geiger-Myler pipe and measurer of frequency mounted in a small plastic box, made of rubber and with an analogue meter. The unit works with battery and can be used without a PC for measuring radiation $\alpha$ , $\beta$ , $\gamma$ . It can be used for measuring radiation statistics, to measure frequency of nucleus fragmentation and to monitor radon transformations
135	<b>GENERAL</b>		
136	Alcohol	1 bottle	1kg alcohol in glass bottle
137	Sulphur Acid	1 bottle	250 gram in glass bottle
138	Glass Beaker	10 pieces	100ml, 250ml,500ml, glass
139	Scalable cylinders	10 pieces	25ml, 100ml,500ml, glass

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

140	Colors disc	1 piece	Colorful Disc with a rotating rope, diameter 200mm
141	Wind measurer	1 piece	Plastic ose inox
142	Glass vessels with different shapes but same volume	5 pieces	100ml, 250ml,500ml, glass
143	Glass vessels with different shapes and volume	5 pieces	100ml, 250ml,500ml, glass
144	Weighting stones with hooks	1 set	Box with 10 metallic stones, 50gr.each
<b>145</b>	Chemical cup	5 pieces	Chemical cup 50 ml 100 ml 250 ml
146	Plastic pipe with different diameters	5 pieces	Transparent, $\phi = 6-8$ mm
147	Small glass pipe U-shape	5 pieces	$\phi = 16$ mm, h= 150mm
148	Scissors	1 pieces	Iron-made, plastic handle, 10cm long
<b>149</b>	Glass funnel	3 pieces	Glass
<b>150</b>	Test tupe clip	1 piece	Wood
<b>151</b>	Alcohol Lamps	4 pieces	Made of glass with alcohol, with a cover and wick
<b>152</b>	Color pencils	2 packages	Box with color pencils wood and water
<b>153</b>	Color marker	5 pieces	Color markers
<b>154</b>	Rubber	10 m	Thin rubber
<b>155</b>	Spoon for substances	2 pieces	Glass, inox, plastic
<b>156</b>	Test tubes holder	2 set	Wooden
<b>157</b>	Microscope	1 piece	Simple microscope
<b>158</b>	Nafthalene	200 gr.	Pure chemical reagent
159	Level indicator	1 piece	Wood or plastic material with an air bubble
160	Adhesive	2 piece	Small and big adhesives
161	Paraffin	250 gr.	Pure chemical Reagent
162	Dropper	3 piece	Made of glass with rubber clips, about 10cm
163	Plasteline	1 package	In colors 70x150mm
164	Iron powder	200 gr.	Pure chemical Reagent
165	Technical scales with weighting stones	1 piece	Simple scales with dishes
166	Test tubes	6 pieces	Glass, 12x100mm
167	Bulbs of different volumes	3 pieces	Volume100 ml 250 ml 500ml
168	Lead-thread	1 piece	Lead hanged in a thread
169	Petri dishes	4 pieces	Material prej petri
170	Spheral bulbs of different volumes	4 pieces	Volume100 ml 250 ml 500ml
171	Plastic Protactor	1 pieces	Standard type, basement 50cm
172	String	10 m	Non-extendable thread
173	Different size spheres	10 pieces	Dimensions with diameter (50-100) mm
174	Plastic Support of silk threads	1 piece	Dimensions (500x300x250)mm
175	Spring	1 set	Diameter 8 cm, length 13 cm, weight 0,6 kg
176	Glass mixer	2 pieces	Glass-made, 30-50 cm
177	Ballons	10 pieces	In different colors
178	Balls for ping-pong, tennis, football	3 pieces	Balls for ping-pong, tennis, football
179	Ceramic Net	1 piece	125x125mm ose 150x150mm
180	Copper sulphat	1 bottle	250gram
181	Glass bottle for liquids	5 pieces	Volume 60ml, 100ml
182	Plastic syringe	3 pieces	big, plastic
183	Rainmeter	1 piece	Plastic or inox , classic PVC
184	Sulphuric Acid	1 bottle	250gram
185	Long plastic linear	1 piece	Dimensions 100 cm
186	Triangle linear	1 piece	Dimensions (30x40x50) cm
187	Clock glasses	2 pieces	Glass made
188	<b>TEACHING TABLE</b>		

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

189	International System of SI units	1 piece	Dimensions (70x100)cm
190	Fundamental Physics Dimensions	1 piece	Dimensions (70x100)cm
191	Thermodynamic processes	1 piece	Dimensions (70x100)cm
192	Karnoy Cycle	1 piece	Dimensions (70x100)cm
193	Fundamental Constants in nature	1 piece	Dimensions (70x100)cm
194	Lorence Transformations	1 piece	Dimensions (70x100)cm
195	Mendeleev Table	1 piece	Dimensions (70x100)cm
196	Work Principle of Refridgerator	1 piece	Dimensions (70x100)cm
197	Gravity center and equilibrium conditions	1 piece	Dimensions (70x100)cm
198	Shell movement	1 piece	Dimensions (70x100)cm
199	Thermodynamic processes	1 piece	Dimensions (70x100)cm
200	Transformations of substance states	1 piece	Dimensions (70x100)cm
201	Magnetic field	1 piece	Dimensions (70x100)cm
202	Earth as a magnet	1 piece	Dimensions (70x100)cm
203	Phase Transformations of liquids	1 piece	Dimensions (70x100)cm
204	Bulge of rigid bodies	1 piece	Dimensions (70x100)cm
205	Electromotor	1 piece	Dimensions (70x100)cm
206	Transformer	1 piece	Dimensions (70x100)cm
207	Model of three-phase generator	1 piece	Dimensions (70x100)cm
208	Model of electrical bell	1 piece	Dimensions (70x100)cm
209	Principle of Generators	1 piece	Dimensions (70x100)cm
210	Electromagnetic Induction	1 piece	Dimensions (70x100)cm
211	Electrical voltage	1 piece	Dimensions (70x100)cm
212	Ohm Law	1 piece	Dimensions (70x100)cm
213	Electromagnet	1 piece	Dimensions (70x100)cm
214	Magnetic field of solenoid with current	1 piece	Dimensions (70x100)cm
215	Connection of conductors in parallel	1 piece	Dimensions (70x100)cm
216	Left hand rule	1 piece	Dimensions (70x100)cm
217	Moon eclipse	1 piece	Dimensions (70x100)cm
<b>218</b>	Globe (physical and political)	1 piece	With a basement on the table or ground
219	Dark room	1 piece	Dimensions (70x100)cm
220	Elecstroscope	1 piece	Dimensions (70x100)cm
221	Serial connection circuit	1 piece	Dimensions (70x100)cm
222	Parallel connection circuit	1 piece	Dimensions (70x100)cm
223	Integrated circuit with mixed connection	1 piece	Dimensions (70x100)cm
224	Short circuit connection	1 piece	Dimensions (70x100)cm
225	Amper Force	1 piece	Dimensions (70x100)cm
226	Crystal Diode	1 piece	Dimensions (70x100)cm
227	Transistor	1 piece	Dimensions (70x100)cm
228	Magnetic Spectres of gases	1 piece	Dimensions (70x100)cm
229	Atom’s Construction	1 piece	Dimensions (70x100)cm
230	Galvanometer	1 piece	Dimensions (70x100)cm
231	Experiment of Thomson on cathode rays	1 piece	Dimensions (70x100)cm
232	Scheme of energy generation from HPP to houses	1 piece	Dimensions (70x100)cm
233	Hydraulic system of breaks	1 piece	Dimensions (70x100)cm
234	Solar systems and planets	1 piece	Dimensions (70x100)cm
235	Refraction of light rays from glass prism	1 piece	Dimensions (70x100)cm
236	Law of reflection and refraction	1 piece	Dimensions (70x100)cm
237	Full internal reflection	1 piece	Dimensions (70x100)cm
238	Interface Experiment of Jungs’ splits	1 piece	Dimensions (70x100)cm
239	Light Polarization	1 piece	Dimensions (70x100)cm
240	Light Dispersion	1 piece	Dimensions (70x100)cm
241	Spectres (with stripes, continuos, absorbaton)	1 piece	Dimensions (70x100)cm
242	Fragmentation of white light and unification of colors	1 piece	Dimensions (70x100)cm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

243	Hydraulic and electrical circuit	1 piece	Dimensions (70x100)cm
244	Electronic Microscope	1 piece	Dimensions (70x100)cm
245	Electronic Microscope	1 piece	Dimensions (70x100)cm
246	Diagram of energy levels of atom and hydrogen	1 piece	Dimensions (70x100)cm
247	Lazer Diagrama	1 piece	Dimensions (70x100)cm
248	Series of nucleuses fragmentation	1 piece	Dimensions (70x100)cm
249	Nuclear reaction	1 piece	Dimensions (70x100)cm
250	Chain reaction	1 piece	Dimensions (70x100)cm
251	Magnetic Resonance	1 piece	Dimensions (70x100)cm
252	Diagram of cyclotron	1 piece	Dimensions (70x100)cm
253	Work principle of steam engine	1 piece	Dimensions (70x100)cm
	<b>SECURITY TOOLS</b>	1 piece	
254	Plastic protection glasses	1 piece	Children syze
<b>255</b>	First aid box (security means during work in laboratory)	1 set	Classical first aid box

**666.**

**4.1 Design for persons with special needs**

The design of school buildings shall provide a free approach for movement, stay and learning process of students with special needs, referred to special respective legislation for this category. Therefore, designers shall take into account these legislation, as well in this guideline where are presented the most specific technical conditions for school buildings. Types of special needs that can be addressed in a standard school will be limited, due to practical reasons, into those with special needs for the movement, loss of hearing that can be regulated with hearing devices, partial or total loss of sight. The latest category of persons cannot participate in all school activities.

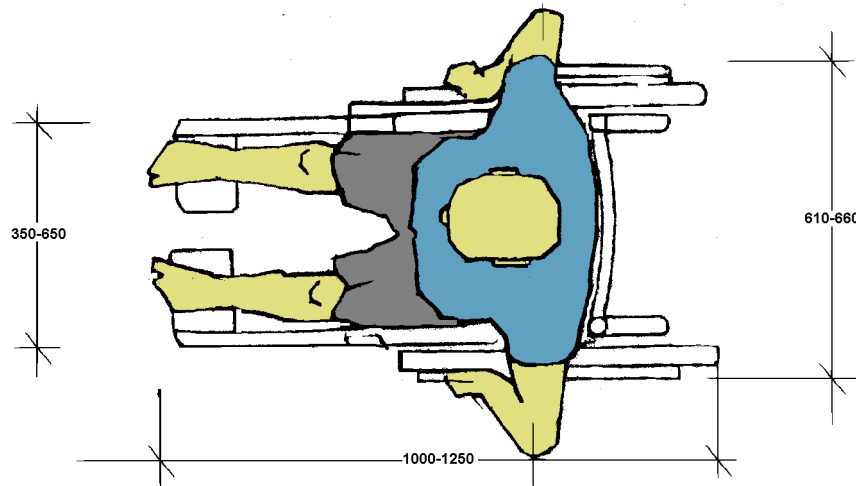
Persons with special needs may be students, teachers, guests or staff. Their main problem is the mobility due to the use of wheelchairs, canes and crutches. This problem requires special determination of movement areas, door space, sanitary equipment, evacuation passages and spaces of classes to accommodate the persons with special needs.

Dimensions of wheelchairs shall be taken into account by the designers in determination of school space and movement. The wheelchairs have different dimensions according to the age of students and type of item. Nevertheless, following dimensions coincide with the average dimensions of adults and shall be taken into consideration. (see picture 1.3.13 and 3.14) :

- Width of chair in general is between 600 and 700 mm
- Length is between 1000 and 1250 mm

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- The external range is between 1300 and 1500 mm

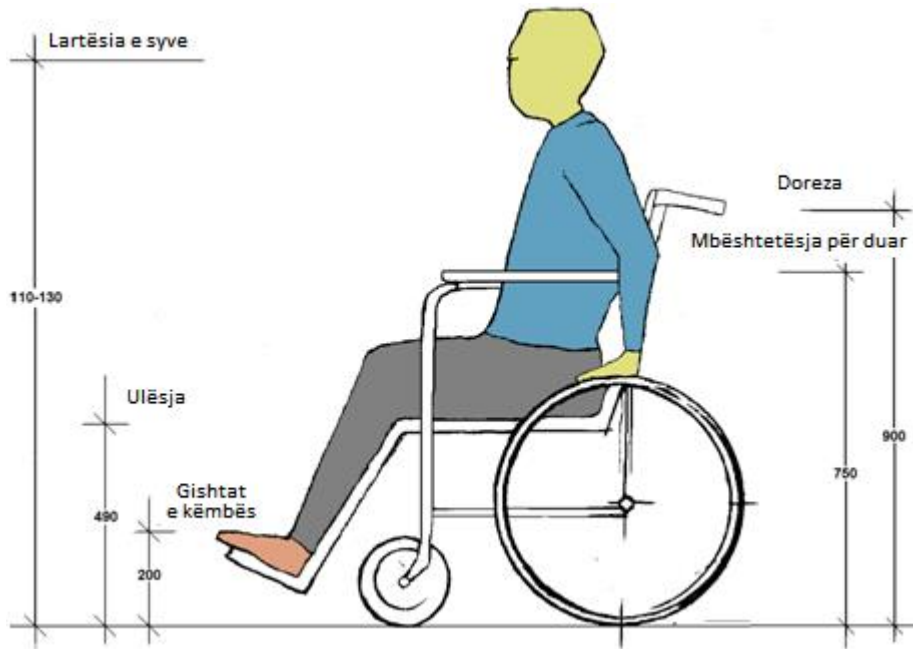


Picture 1.3.13



Space where persons with special needs in wheelchairs arrive shall be defined :

- Between 230 and 300 mm above the floor level;
- Between 1100 and 1300 in height;
- Between 300 and 400 mm from lateral sides of the chair ;



Picture. 3.14

### Approach in external spaces and buildings



Special parking for vehicles shall consist of a big space on one side (3.80 m instead of 2.5 m wide);

Borders of pedestrian alleys shall always have interrupted edges and pedestrian space shall be separated from vehicles traffic with pavement stones (blocks) ;

Alleys shall respect the minimum required width of about 1.5 m for a wheelchair, return surface and floor layer shall be composed of anti-slippery material and free of any obstacles;

Inclination of the walking path shall not be more inclined than 1:12 or 5% and long inclinations shall be divided into phases;

Pavements shall have a minimal widths of about 0.90 m if they have been projected on one side and 1.80 m on both sides;



## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Alarming shall be visible and rationally continuous;

The approach to entire building shall be accessible from persons with special needs, if possible with platforms, whose inclination be over 1:12 (5%) with flat rests every 9 m along the entire length of the platform;

All other passages to sports premises shall be designed with platforms, if necessary. The final part of these platforms shall be composed a anti-slippery materials such as concrete blocks, stones or asphalt;

Platforms shall be equipped with a lateral handrail and/or pavement block along the length of the platform;

### **Internal space**

Main entrances of the buildings shall be clearly noticeable, easy to open and simple to pass through them;

Thresholds of the doors shall be avoid or not higher than 20 mm;

In the teaching rooms, working space with a diameter of about 1.5 m shall be kept free and with no obstacles, so that the wheelchair can return and positioned before the table;

Blackboard shall be reachable also from the sitting position. A changeable blackboard can be an option;

Small changes of the level shall be avoided. If inevitable, small platforms are more preferable than stairs;

In order to help students with eye problems, the design shall avoid fully glazed doors, different colors shall be used in the staircase for the rests and stairs, windows at the end of the corridor shall be avoided (exaggerated contrast in illumination);

Lift (s) shall be placed near the building entrance, lift space shall be big enough for wheelchairs, whereas the control signs shall be accessible for persons with special needs. Lift cabin shall contain also signs, such as Braille alphabet, acoustic and visual call and voice explanations for each floor.

The initiative “Schools as a Community Center” means that the school is put at the disposal of the community, without hampering the teaching process, completing it beyond the official working hours.

In this respect, it is necessary that the designer shall think about the school functions program and access by the community beyond the official working hours of the school. The architectural solutions shall offer flexibility and at the same time guaranteeing school security and easily accessible venue after school hours.

Schools, including their territory shall be divided into three privacy categories. A. Totally school, students and staff function. B. Spaces for school, but also the community. C. Total space for community.

A. Functions totally dedicated to school are those function that will be used only by students and staff of the schools, such as classes, laboratories, staff venues, etc. There shall be enabled such entrance that could provide necessary security of the venues, limitation of entries and exits, easy to be monitored.

B. Spaces for the school and community are those that serve the teaching timetable for students and staff and after the official timetable it is dedicated to the community. These functions can be related to the gym, multi-purpose spaces (auditory, concert hall, exhibition, parents meeting, etc), library. In such cases, they shall be accessible. The designer shall design these spaces by offering easy access for the community, if possible directly from outside, without using spaces such as corridors or classes. These venues shall have separated toilets to be used by the community. The designer shall think also about these specific spaces of how they can be function integrated with the schools, but also separately.

Likewise, the school yard shall be flexible taking into account the school security, but at the same time, it shall be easily transformable into public space with a potential use from the entire community after teaching timetable. In this respect, the access shall be easy, transparent surrounding, big entrance gate. It shall have green spaces and trees to make enough shadow, benches, as well as urban illumination also during the night.

C. Spaces dedicated totally to the community are those places that during school hours are always accessible by the community. The designer shall take into consideration that one part of the school yard, coinciding also with the entrance to this yard, could consist of a public space, serving as a public space for the community, used by students after the teaching timetable, where parents bring and wait for children, etc. It shall have green spaces and trees to make enough shadow, benches, as well as urban illumination also during the night.

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**4.3 Thermal Amenity (Temperature)**

**670. 4.3.1 Definitions and terminology**

*Thermal amenity* is usually attributed to two key parameters : (1) feeling of thermal amenity as a result of the balance between calories accumulated and lost in the body, and (2) control of thermal conditions, including sun position and radiation, temperature, humidity and odors. Designers of the school buildings shall take into account thermal conditions of the school location. In these instructions are presented also the thermal conditions in Albania, but detailed and additional data shall be collected for exact conditions of respective zones, such as: (1) minimum and maximal average monthly temperature, (2) local hygrometry, and (3) dominating winds for each climate season and frequency of strong winds and storms.

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**672. 4.3.2 Improvement of thermal amenity**

To improve the thermal amenity of the school spaces, the potential measures for monitoring the temperature are classified into two categories:

**Natural** or passive measures, including orientation of building, position and opening dimensions, quality of materials, thermal isolation, planting of trees in the vicinity of buildings, etc.

**Artificial** or active measures, including mechanical means, such as heating, ventilation.

Regarding heating system, it shall be envisaged a boiler using wood pellets.

Regarding cooling system, school shall be designed to guarantee an air temperature of 26°C which is the limit for a normal activity in schools, where with the proper movement of air, natural air stream from the open windows and air circulation means, such levels can be achieved in all class all year long.

Ventilation of the object is designed to guarantee the air quality through natural ventilation. In venues where natural ventilation is not possible, then it is considered a solution through artificial ventilation systems.

For the control of thermal effects in school spaces, the designer shall undertake some simple measures at the beginning of the designing process. These measures consist of :

**Orientation of buildings:** It recommended that orientation of classes spaces shall be toward the east and west, because this orientation offers protection from direct sun rays. This preferable orientation may be changed for about minus or plus 30° (due to location requirements or due to orientation of dominating odors) without any great impact on convenience of teaching classes (see the picture below):

**Establishment of buildings:** distance between buildings shall be in proportion with the height of the buildings to allow circulation of fresh air and natural light also in the lowest levels. For the same reason, a minimal distance of about 4m shall be kept between the main sides and surrounding wall. Likewise, the southern facade of the school shall not be closer than 10m from the nearest building.

**Shape and design** of buildings, such as possibility of indirect air circulation for regeneration of fresh air with natural ventilation during the hot season or option of the culmination with four inclination levels in zones with heavy snowfalls;

**Planted surface** : planting of herbs may play a fundamental role in creation of micro-climate, whenever necessary. The plating of herbs efficiently contributes in protection of dust, winds and sun rays. Nevertheless, planting of bushes enables protection of sun rays reflection from the ground;

**Proper elements of the building:** this includes draining from the roof and draining around the buildings, creation of shadows with regulated window shutters, sun tents, sun curtains, umbrellas and/or gallery that could provide additional protection from sun rays, especially when building orientation is not favorable.

- **Proper construction materials**, including materials of facades with potential sun reflection, isolating materials for increase of thermal action of the walls and culmination, with anti-allergic materials or not harmful for students health.

### 673. 4.3.3 Active Control of Temperature

**Low temperatures:** amenity level of low temperatures may considered the one between 19°C, for countries where are exercised activities of work that do not include movement and 15°C for movement zones. Efforts to provide heating in order to achieve such levels of temperature in internal venues shall not be very high. Nevertheless, a much lower minimum can happen in each of the months of heating season, where the heating system may have a capacity of reaction against these low temperatures.

**High temperatures:** Albania climate is mainly dry and hot from May to September, where majority of this period is sunny. The hottest months are July and August with regional variations due to high level. Nevertheless, air temperature of 26°C is the limit for normal activity in schools, where with the right movement of air from natural air stream, from open windows and air circulators, these levels can be normally achieved in classes all year long.

### 674. 4.3.5 Isolation Standard

The better the thermo-isolation of an external constructive element against external air, the smaller the possibility of warm air to go outside.

The badly isolated constructive elements have a low temperature of internal surfaces; the worse the isolation, the greater the risk that on surfaces under the influence of a relatively healthy humidity of air of about 40-60%, the minimal critical temperature reaches below 12,6 °C.

Special attention shall be paid to the so-called thermal bridges zones, such as ceilings of external walls, because the temperature of the surface here may be lower than the one of constructive elements in regular zones.

### **675. 4.3.6 Thermal bridges**

#### **676.**

Thermal bridges are weak thermal points localized in the thermal transmittance cover of the building. In comparison to untroubled constructive elements, in these points there occurs a huge thermal loss from in out. The higher the energetic standard of a building the more important is the elimination of thermal waters.

#### **Types of thermal bridges**

Conditioned geometrical thermal bridges are created if size of thermal absorbing and emitting surfaces change, e.g. external angles of the building, different thickness of constructive element or columns.

Thermal bridges conditioned from the type of material are created during use of materials with different thermal conductivity and with such different isolating characteristics, which may be placed on the side or one over the other. Therefore, in the place of the construction material with the highest thermal conductivity is created a higher thermal stream. A typical example is the concrete constructive elements inside an external brick wall.

Thermal convective bridges are created when thermal energy of an air stream is transported through the thermal transmission cover of the building. They are caused from the failure to isolate the surface. Open connections of the isolation layer in the roof area or non-isolation of the window spaces are examples for creation of these thermal waters.

A big number of thermal waters may be avoided with the help of a good designing work, careful supervision and through selection of the right materials.

#### **Advices during designing**

- To avoid structures with many branches;

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

- To establish thermal divisions of constructive consol elements (concrete slabs of the balcony, columns, holding consols) with structures in the edge;
- Undivided layers of the isolation material, e.g. thermo-isolation systems of external walls and passages of special isolation levels without affecting the insulation values.

### **677. 4.3.7 Requirements of U-values $U(W/m^2K)$ (thermal transmittance coefficient)**

According to legislation in force (Law No. 8937 dt. 12.09.2002 “On preservation of heat in buildings” and respective by-legal acts, CoMD No. 38 dt. 16.01.2003 “On approval of norms, rules and terms of design, construction, generation and preservation of heat in buildings”) for climate zone A where Tirana is situated (not less than 1500 heating degree days per year) The loss coefficient  $G_v$  for buildings is between  $0.54 - 1.03 W/m^3C$ . The lowest value for buildings with a S/V ratio (external surface/warmed volume) lower than 0.3 and highest value for buildings with a S/V ratio higher than 0.9. For buildings with S/V between these values, the  $G_v$  coefficient is calculated in proportion. In order to have a loss coefficient that meets the law requirements by respecting at the same time even the economic criterion cost-gain, it is calculated that buildings in Tirana shall have an external insulation layer (cavity wall) of polysterol EPS 5 cm ( $U = 0.35 W/m^0K$ ) or with mineral fiber with the same transmittance parameters of heat and double-glass windows (6 x 12 x 6 mm) with a plastic or aluminum insulation profile. **Thermo-isolation (insulation) layer shall be installed from outside** and rigorously respect the requirements of producers about the way of fixing (beside glueing material also installation system with plastic screws) as well as the obstacle layer of water steam. Every other installation method may cause condensation in the internal walls, mold and damage of insulation layers.

### **678. 4.3.8 Windows and Doors**

Penetration of natural light in internal venues from inside and outside the window and free bird-view within the entire building are very important elements for students premises.

Windows shall be places in the walls separating the classes from external venues, classes from classes and classes with internal corridors.

To meet these requirements, design shall take into account the students and teachers. Attention shall be paid. to elements such as height and window frames, type of glass, clearness of the view (not to be blocked horizontally neither from adults nor students) light control and risk assessment impact, as well as security factors. The evaluation of security may recommend that guard place shall be positioned within the center in order to monitor entries and exits can be monitored from the guards of the buildings. Or may be recommended any alternative way in this respect. The designer shall try to plan at least one window per class. If this cannot be realized and the internal space must be occupied by students, the designer shall envisage the best penetration of light and view from the windows, lateral windows, glass windows and doors (secure). Students' spaces in new constructions shall have a total surface with windows of at least:

8 % of the floor surface if windows are from south and directly connected to external venues.

(Note: glass surface viewing south is smaller because quality of light coming from south is better);

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

10% of room surface if windows are oriented from east of west;

15% of room floor surface if windows view north;

20% of room surface if windows are on an external wall

Surfaces that do not need windows are toilets, conference rooms, halls and storeroom.

The placement of metallic bars is not allowed.

External doors and windows shall have a case made of PVC material with thermal divisions or aluminum case with thermal divisions. Technical specification of windows shall be detailed and take into consideration at least the following points:

Coefficient U - 1.2 (W/m<sup>2</sup>K)

Thermal division –

Resistance against the atmospheric factors –

Isolation ability – (class 4)

The glass coating can demonstrate a higher value of sun rays isolation (g). This value does not specify the sun radiation. In today's glasses of thermo-isolated windows, this value is recommended to be about g = 60%.

To avoid thermal bridges, the window shall be placed under the thermo-isolation level or at least installed in the external corner of the wall. Thus, the isolation is placed on the window frame. It is essential to realize a continuous hermetical unification of the window during the installation. Foam fixing is not enough, because during the drying phase it shrinks, and therefore does not guaranty a hermetical isolation.

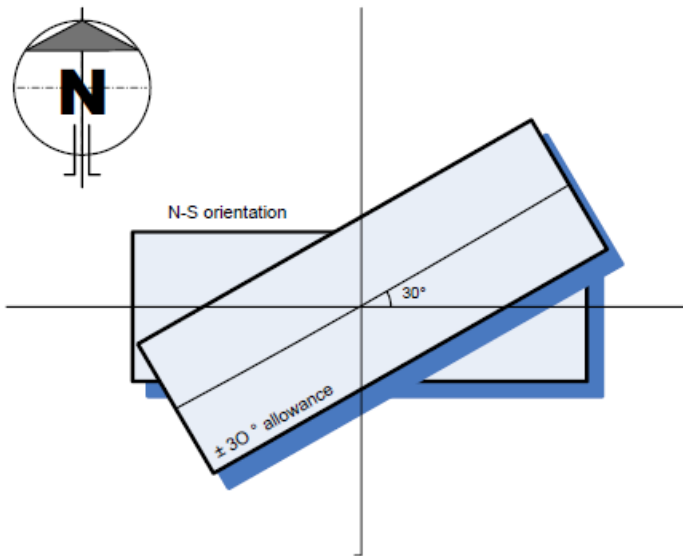
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### 680. 4.3.9 Passive control of temperature

Monitoring of penetration and creation of heat may be naturally minimized by a duly design of walls and plastering of the building. The main source of heat is sun, therefore elimination of the direct sun light from the internal side of the building is essential. As mentioned above, the external walls can be excluded from the important sources for creation of heating during the day in schools. This means that windows are elements that require attention. This is achieved with the help of two methods: orientation and sun reflection. Means for creation of shadows from the sun inside the glass are not efficient because the material gets hots and creates reflections inside. It is essential to prevent the sun hit on the glass, heating is not reflected outside through the glass, because the wave length changes and the venue gets warm. Use of double glazing is inefficient for prevention of sun penetration, this is efficient in prevention of the external heating loss.

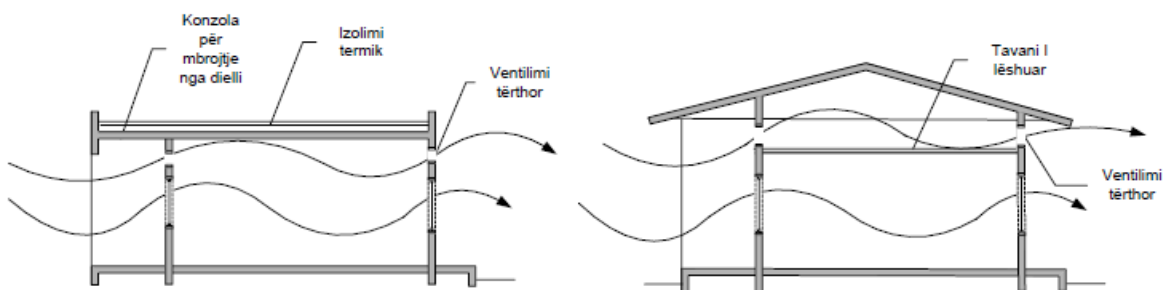
**Sun orientation:** orientation or the best orientation to have natural light during the day on the window is north-south (see picture below):

Orientation from North in Albania does not directly reflect the sunlight on the window, whereas orientation from south reflects minimal rays, on the window under the smallest and narrowest corner during the day: in the hottest part of the day, the sun will be on zenith and radiation corner of windows from South will be the narrowest.



*Recommended orientation of school*

- **Ventilation (indirect ventilation)** will be a natural factor of comfort for the hottest periods of the year (see picture below) but also in the highest is more necessary to bring out the warm air passing through warm and dry land. Nevertheless, the buildings with spaces and option of openness on both sides are not economic, even though this method is recommended as the most optimal. School, as any other construction group shall have an inclination of suppression in different wind conditions and directions, in order to enable the air movement within the building from the positive and negative suppression, as much as it is allowed by divisions and internal spaces. Hence, potential fresh air during the night is enabled, which will be helped from the external lights entering from external windows of upper level.



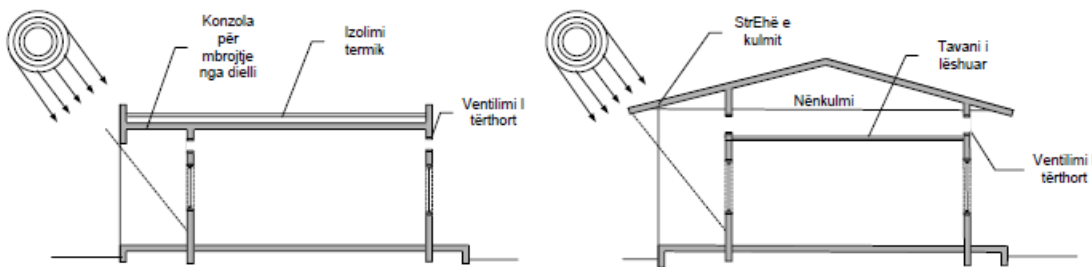
*Thermal amenity / Indirect ventilation*

**Sun reflection:** efficient equipment for sun reflection may be designed to function for every orientation, as long as the sun angle is fully predictable. Nevertheless, due to seasonal change in height, exclusion of sun rays during the year will require movable elements. In practice, reflection is normally a compromise, and if an optimal reflection has been designed, then reflection after realization would be effective. Taking as an example the south orientation, the window shall be reflected from an external



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horizontal axis in the level of window peak, with a design that depends on the desired duration of time for prevention of sun rays coming into the hall or falling on the window. During winter, there shall be benefits from sun reflection, therefore the angle of sun reflection to be excluded is the one from May to October. It is essential to avoid sun rays falling on the window, because heat is very efficient when the environment and glass itself gets warm, by increasing the heat effect. The use of double glass is inefficient for prevention of the sun and it is efficient only in prevention of loss of sun from outside. Construction of a major peak coming out of windows with shutters are part of the normal solutions of sun protection (see picture below), but the project can not envisage other measures than enable reduction of radiation on the window, such as bri-slab, external tents, etc. The proposed solution shall not obstacle the entrance of light but only direct radiation on the glass, (not shutters).



*Thermal Amenity /Sun protection*

**681.**

**4.4 Visual Amenity**

*Defintions and terminology*

Need for high standards and a well-designed lighting for school buildings is based on :

- **natural lighting** resulting from the direct or reflected sun light from earth and other external or internal surfaces:
  - **artificial lighting** from sources of electrical current (lamps, fluorescent pipes);
  - **shine** or intensity of light either from natural or artificial source or from another surface or inpenetrating object which is not transparent;
  - **contrast** of shine or color.

*Average factors of light reflection*

Materials	%
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Plaster	85
White letter	84
White paint	75
Cement	55
Gray stones	50
Natural wood material (light color)	33
Red bricks	20

Lightening is very important for each zone of activities because is a key element to create a warm possible venue.

The quality of light shall create a positive feeling to students.

Powerful lightening is suitable for spaces where is carried out moving activity; whereas lighting with focus on a specific task is needed for manipulative activity; weaker lighting is necessary for calm areas. Quantity and orientation of natural light shall be taken into account in the design and variety of light level.

In the rooms with poor natural lighting, it is allowed a maximum of about 500 lx. Rooms that do not have windows on the ceiling or external windows shall be equipped with conveying tubes of natural light. Spaces of lights that transfer the light deeper inside can be used in the entire sides from south. The designer can refer to the table about minimal values of light for different functions.

In this respect, designers shall take into consideration that: with the reflective light children cannot directly see the light source, a fact causing blinding shine and eye fatigue. Lights with focus, such as the hanging types for residences shall be used only when reading, painting or carrying out a delicate work. Design of variety in lighting with means as light level control, special switches, cables with regulating orientation and hanging cables shall be placed in working areas. There shall be tried the use of specific lighting to display works of art, several lamps to create a joyful atmosphere and high levels of lights to encourage physical activity.

The external light shall be controlled through curtains or other types of windows shades. The external light shall be sufficient to enable movement and security. All the lamps shall have lenses or covers to be resistant to refraction

*Recommended Lux in school spaces*

<b>SPACE</b>	<b>LIGHTING</b>	<b>LIGHTING LUX</b>
Classes	Natural light	300
Classes (near the black board)	Natural light	500
Laboratories	Natural light	400 - 500
Labor room	Natural light	400 - 500
Music/drawing room	Natural light	400 - 500
Storehouse		300 - 500
Library		300 - 500
Multi-purpose space		300 – 400
Physical education hall	Natural light	300 – 400
Office of headmaster/deputy headmaster	Natural light	500
Secretariat	Natural light	250 - 350

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Teachers room	Natural light	500
Space for additional staff	Natural light	250 - 350
Toilet		150 – 250
Office of the physician	Natural light	500
Office of the psychologist	Natural light	500
Depot		250 – 350
Hall	Natural light	300 – 400
Stairs	Natural light	359– 400

**682.**

**683.**

**684.**

**4.5 Acoustic Amenity**

In school buildings, a special attention shall be paid to acoustic isolation. In urban level, the school position, as mentioned above, shall be situated in quiet areas far from important road axis. It is preferred a location inside the residential areas.

If this is not possible then there exist different solutions, either physical barriers, such as walls, or green physical barriers, such as high plants.

Inside the school, structures shall guarantee a specified acoustic isolation according to the following table:

<b>Construction elements</b>	<b>Requirements in Rw in dB</b>
Walls between the classes venues and similar spaces	47
Walls between classes venues and corridors	47
Walls between classes venues or similar spaces and staircase of the building	52
Walls between the classes venues or similar venues “particularly noisy” (e.g. administration space)	55

During the design of systems and other structures shall be taken into consideration the following recommendations:

all pipelines (air conditioning, hydric supply) crossing the walls that transfer noises shall be covered with material for acoustic protection;

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in venues where will be created high acoustic levels, there shall be placed furniture elements that would reduce the acoustic noise, such as linoleums, carpets, etc;

to reduce acoustic levels, during design shall be used materials that could decrease the level of noise inside the kindergarten;

glass of doors and windows shall be acoustically laminated glass with an acoustic isolation ability 35dB, with an air space from 50mm to 100 mm;

doors opened from noisy zones shall secure a high acoustic isolation

it is advisable to use textile materials to reduce the acoustic level;

for a better isolation of the rooms zone from the external space or administration space shall be used double doors or tamboura system. The same is recommended also for the selection of double windows. This solution helps also in achievement of a better thermal isolation taking into account that doors and windows are the most delicate zones in relation to acoustic and thermal meaning;

boxes of electrical sockets shall not be installed on the back

Noises protection inside an object does not depend only on amount of voice transmission into the division construction elements but also from the amount of longitudinal voice-isolation of the related construction elements. Even though, this practice is often subject of lack of attention. The voice-isolation of an object achieved only with the special value of division construction elements is not sufficient because long voice-isolation of construction elements defines the limit of performance in voice-isolation. Only one weak point in the isolation of elements (e.g. uninterrupted plaques of the floor layer, light elements of the facade, walls with hollow bricks) reduces the voice-isolation amount, turning irrelevant the changes in the amount of voice-isolation of construction elements.

Responsible planning is first of all related to achievement of clearness of voice-isolation mass of construction elements and in this field are met the necessary conditions for positive results of longitudinal voice-isolation in the building. Later on, there shall be selected the division walls in harmony with circumstances.

**685.**

## **4.6 Colors and their usage**

### **686. 4.6.1 Meaning of colors**

Colors influence students in different ways by making them feel happy, sad, calm or meditative. Colors influence in the perception of the size, amenity of the venue, etc.

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Colors may change our perception for dimensions and distances. A wall painted in a darker or warmer color may make it look nearer than it is. This is helpful when walls at the end of narrow corridors are painted with dark colors.

In case when the venues are small there shall be used light colors with cold tonality .

In this respect, their use in schools is necessary, but there shall be taken into consideration also their influence to children.

**Red** is related to the sun and increases the heart beats. It is a very stimulating color and symbolizes activity and desire to live life, as well as transmits warmth.

**Orange** is a less strong version than red. It is compared to joy that encourages yellow. Offers joy and helps get through traumas. It represents the sunny and beautiful nature.

**Blue** in therapy of colors is known as the color of transition. Blue offers support and protection and is the color of peace, calmness and wisdom

**Pink** same as blue has relaxation effects and suggest warmth and calmness.

**Green** is the color of youth, growth, hope, joy, life and freshness. It is also the color of harmony and equilibrium.

**Yellow** is the color of optimism and is efficient, a solar stimulating color. It provides clearness.

In particular, students need a dynamic and stimulating environment to improve and shape their intellect. Rooms painted in orange, green or blue go along with a didactic dimensions, stimulate their sensorial activities and make them feel calm.

In the general theory of colors, their division is made between warm and cold tonalities.

Warm tonalities are characterized by yellow, red, orange and all the intermediate tonalities. These colors are active, positive and are related to action, high sounds and continuous movement. An experiment shows that heart beats faster in a red painted room than in a light blue room.

Cold tonalities are light blue, blue, purple, which are calm colors, passive that stimulate meditation and calm.

In spaces used for games and active work is recommended the use of warm colors, between light yellow, orange yellow or light orange because they stimulate production of adrenaline and as a result affect the creativity and capacity

- In calm zones are preferred cold colors and tonalities because in the philosophical point of view, an environment with green-blue-light blue tonalities affects the reduction of heart beats offering a feeling of calmness.

687.

688. 4.6.2 Use of colors

Before thinking of specific colors, it is important to determine the natural light of the venue and identify the small and difficult areas. To define the function of the rooms and classes and later on define the atmosphere that is needed, i.e. if it is necessary a cold, harmonic or warm, welcoming or cosy.

Colors shall be chosen attentively to create an emotional equilibrium. If the activities performed in these zones would require different color schemes by keeping the main scheme soft, there shall be used strong and brighter colors in some zones, such as windows, doors, corners and frames. As a solution to maintain the equilibrium, one of the simplest and most successful ways is the use of two, three or more colors that suit each other in the point of view of colors, such as peach, apricot and orange, or green, blue green, aquamarine and light blue.

Use of these schemes is called mixture or harmony, because all the colors are combines, balanced without clash of two colors.

If it is required a calm and fresh atmosphere, then there shall be chosen green colors, such as green blue or blue green. If the atmosphere shall be warm then this is achieved with red, pink, orange or yellow colors.

- **5.PLANTS AND INSTALLATION SYSTEMS**

**General**

The plants and installation system projects shall refer to the technical terms of design and standards in the Republic of Albania (K.T.P - STASH) and for special elements not envisaged in these norms, the designers shall before the Euronorms (EN) and Eurostandards (EN,HD) as well as recommendations of CEI, CENELC, DIN, VDI/VDE, or local norms and European Community standards.

Installation projects shall include :

Full project of heating and ventilation accompanied with respective details, list of materials and technical specifications of materials.

Full project of electrical system (including telephony and computer system) accompanied with respective details and table of materials and technical specifications of materials.

Full project of water supply system accompanied with respective details and table of materials and technical specifications of materials.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Full project of sewerage network accompanied with respective details and table of materials and technical specifications of materials.

Full project of fire protection accompanied with respective details and table of materials and technical specifications of materials.

Final specifications of materials and equipment.

Full schedule of works.

Methodology of works implementation specifying the manner of preservation of environment from pollution (environmental project)

Detailed IPR of construction costs in the budget agreed by parties for each object conditioned by the geographical zone where is built. For the key categories shall be presented the respective construction analyses.

- 
- 689.**
- 690.** Full project of heating and ventilation
- 691.** Meteorological data and external conditions of the environment

During the initial phase of design of mechanical plants, shall be taken into consideration the geographical position of the object which conditions the way of design due to external meteorological conditions of the areas, as well as the internal factors affecting the venue’s temperature, such as lighting, equipment transmitting heat, etc. Among many factors influencing the thermal amenity can be listed the following:

Temperaturee

Air Humidity

Solar radiation

Winds

The following table shows the external designing temperatures for winter period and geographical data according to cities in the Republic of Albania.

**Table No.4. Table of external designing temperatures**

No.	City	Height above sea level (m)	Geographical width (grad,min)	tlog
35	Tirana	110	41 20	-1.0

\* In these cities, the climatology series is less than 30 years

**692. Designing norms and recommended values of temperatures in venues**

Thermal conditions within the education buildings shall be in harmony for the activity performed in them. It is necessary for the designer to take into consideration the function of activities and the activity to be performed. The following table offers the recommended values of internal temperature, relative humidity, quantity of fresh air, level of noise and speed of air movement that shall be taken into consideration during design phase of school venues.

**Table No.2. Table with recommended values of internal climate parameters**

Destination of the venue	Winter	Summer	Humidity	Quantity of fresh air	Volumes of air per hour	Noise level	Air speed m/s
Classes	22	26	35-60%	8 (L/s*person)	6	35-40 dB(A)	0.15
Auditors	22	26	35-60%	8-10 (L/s*person)	12	30-35 dB(A)	0.15
Laboratories	22	26	-	10 (L/s*person)	10	40 dB(A)	0.13-0.15
Reading room	20	25	55% +/-5%	8 (L/s*person)	-	45 dB(A)	0.07-0.15
Offices	22	26	55% +/-10%	8 (L/s*person)	6	45 dB(A)	0.07-0.15
Library	22	26	45-50%	8 (L/s*person)	-	40 dB(A)	0.13
Dressing rooms	24	-	-	2.5 (L/s*m2)	10	55 dB(A)	0.15
Corridor, staircase	20	27	-	0.5 (L/s*m2)	4	50 dB(A)	0.15



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Storehouse	18	-	-	-	4	55 dB(A)	0.15
Technical venues	16	-	-	-	-	55 dB(A)	0.15
Bars, refectory	21-23	23-26	20-30% / 55-60%	10 (L/s*person)	12	50 dB(A)	0.13-0.15
Gym	20-22	25-26	30-70%	8 (L/s*person)	6	45 dB(A)	0.12-0.15
Swimming pool	26	30	50-60%	-	4-6	45 dB(A)	0.13
Hostels	20	25	50%	15 l/s/ dhome	4	30 dB(A)	0.15
Sanitary system	24	-	-	2.5 (L/s*m2)	6-10	55 dB(A)	0.15
Services, shops	22	26	50%	1-1.5 (L/s*m2)	-	47-56 dB(A)	0.015-0.2
Museum	20	25	55% +/-5%	10 (L/s*person)	-	40-50 dB(A)	0.13
Cooking facilities	20-23	28-30	-	508-762 l/s/m2	12	55 dB(A)	0.15-0.25

Mechanical plants are very important for functioning of a building and normal development of activity destined to be used by users.

Irrespective of the function and use of buildings, mechanical system shall meet the basic necessary criteria toward design, implementation of works in the object and exploitation from users that are :

Harmonization and comfort in use,

Function reliability,

Full technical control,

To guarantee hygienic conditions and technical security,

To enable a partial dedicated use,

To guarantee saving of used energy,

To respect environmental conditions,

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

To guarantee low maintenance costs,

To construct with standard components.

Projects, implementation works and exploitation from uses are based on legal framework and Decision of Council of Ministers of the Republic of Albania, and in cases when this framework does not envisage special terms or arguments, they are based on Italian standards, norms and instructions (UNI, UNIEN) and European (ISO, EN).

Heating system shall be boiler operating with pellet, with panel radiators equipped with thermostatic valves, The sending-return network of water shall be:

For pipes with a diameter smaller or equal to 28 mm, with Pex-Al-Pex material or copper with a insulation coat according to the standards

For pipes with a diameter bigger than 28 mm shall be with black steel pipes without dart or with any other material, thermo-isolated according to necessary standards for pipe dimensions

For gyms may be applied heating systems on the floor or heating systems with hot air (aero-therms type).

Inverter circulation pumps

The designer together with the project shall present also the calculation of thermal losses

The design of heating system with pellet shall meet the following criteria :

To have a pellet tank with a considerable autonomy (up to two months based on thermal calculations of the object)

The pellet tank of deposit shall guarantee the filling without the need of extra labor forces, but directly from the standard self-emptying machineries

The pellet tank of deposit shall guarantee protection of pellet from atmospheric factors

The system shall be automatic, equipped with respective mechanisms of pellet transport from the pellet depot in the intermediate deposit (if necessary even at the boiler) without the need for extra labor force.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

The pellet deposit, tank of intermediate sillos, as all as the boiler shall be placed in venues by respecting all the necessary norms of fire protection, ventilation, necessary spaces for maintenance and repair works, etc.

The boiler shall be monoblock or several pellet boilers with pellet placed in the position to generate the required thermal power. In any case, the efficiency is of each boiler shall at least be 89% calculated according to BS 845-2:1987 norm or any equivalent norm.

It should be taken into consideration the light discharge of ashes from burning and removal of wastes in determined places as suitable waste deposit place.

### Ventilation

As long as school venues are high density zones and considering also the immunity system of students to attend these premises is relatively low, the ventilation system of venues is of great importance and requires a special care in calculation and selection of typology that will be used according the each case. The ventilation system in school venues shall enable to meet the main purposes of its application, such as :

*To meet the requirement for ventilation and fresh air supply for breathing needs of persons to use these venues.*

*To enable the elimination of pollutants and bad odors from the venues and enable improvement of air quality.*

*Possibly to regulate the air humidity in these venues*

*Improvement of thermal amenity by preserving thermal regime of heating/cooling systems.*

Value of air exchange in school venues and schools depends on the destination of use of the venue.

**Table no 2** presents the recommend quantity of air change according to the venue´s destination of use.

All the classes, gym, library, laboratories and other venues of mass use shall have mechanical ventilation systems with recovery of heat (at least 60%) and shall be equipped with a filter of minimum F7 class. Air pipes and grills shall be positioned in order to guarantee a good distribution of air and level of noises shall be within then allowed norms for each venues. The air pipe values shall be insulated. Ventilation system shall take into consideration that in case of fire it shall go off automatically and in case of a design as central units (serving to more than one venue), shall include also the fire dampers.

### Ventilation of sanitary system

During ventilation of sanitary system, it shall be considered that:

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Air speed shall not pass 6m/s.

Flexible piles shall not pass the length of 3000 mm.

Points of air absorption shall be placed in every closed venue.

**693. Thermal Power Station**

During the design phase, special attention shall be paid to the right concept of thermal power station. In order to have a well-functioning thermo power station, it is necessary to avoid at maximum problems during operation time, the designers shall take into account:

There should be space of at least about 10% of gross surface of the building for mechanical systems.

Technical venue shall be completed with stairs and in some cases even some elevating means for necessary maintenance and to enable the replacement of equipments.

The doors of technical venues shall at minimum have the dimensions of 230x180. External doors shall be possible to open and removable in case of replacement of large equipment which do not come in pieces.

The underground technical room shall be equipped with special spaces and dimensions that allow replacement of large equipment in the technical venue.

Ventilation points of technical premise shall be positioned at least 50 cm above land level

All the outputs of lines or channels shall be accompanied with collars for fire protection.

Technical venues shall not be used as an area for output and input of air from machineries.

A condensation pipe shall be placed in every part of equipment using steam. Condensation pipe shall discharge with self-flow which will later on end up in the drain or drainage pumps.

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There should have suitable spaces for passages around the equipments in the technical venue in order to allow the maintenance, to bring the repaired equipment, temporary equipments, replacement of old equipments and security of high voltage.

There should be sufficient lighting inside the technical venue to facilitate the work of maintenance workers.

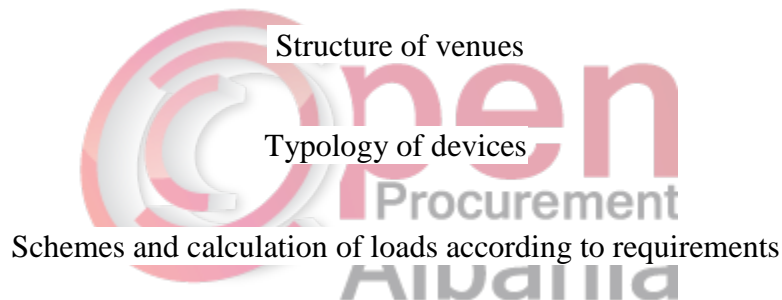
**694.**

**Complete project of electrical network:**

The electrical project shall consist of the following systems:

Middle voltage TM supply system.

Electrical transformation cabin TM/TU.



System of emergency energy supply - Generators

Structure of venues

Typology of equipment

UPS security system of energy supply

Main energy supply lines of electrical panels from electrical substation

Functional characteristics of main distribution network

Secondary Distribution network

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Electrical box

Electrical box of the floor, zone ....

Secondary Distribution network

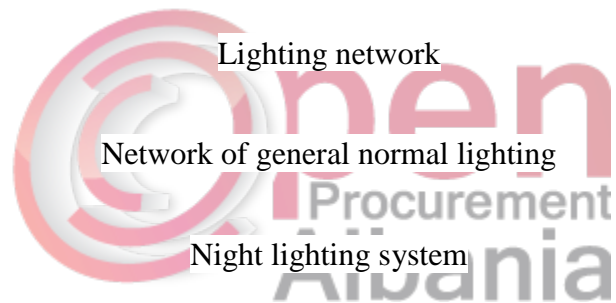
Special venues box

General Power Grid

Supply of general consumers from normal network

Supply of preferential consumers from generator

Supply of important consumers from UPS



Lighting network

Network of general normal lighting

Night lighting system

External lighting system

Security lighting network

Emergency lighting network

Evacuation lighting network etc.

Earthing grid, atmospheric discharges and equipotential schemes

**Project of special installations shall contain the following systems:**

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Security system

Fire and gas detection and alert system

Sound alert system

System for blocking unwanted entries

Doors control system

CCTV monitoring system.

Communication system installation

System of structured cables, optical fiber

Active devices of data transmission network

TV-SAT signal system .

Video-doorbell system

The above-mentioned system shall be accompanied with all the calculations and selected technical specifications.

**Power supply system.**

This system will be designed to enable the uninterrupted power supply in all the venues. In this case, there shall be 3 sources of power supply.

From the network of electricity system - normal voltage

The distribution of power supply lines depends on the organization of venues. E.g. security systems shall have uninterrupted supply from UPS, same for high sensitivity zones for children, the UPS lines will supply also the informatics systems and those of preservation of uninterrupted information, if any.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

With critical voltage (from generator after 15-20 sec) will be supplied those consumers who for 15-20 sec period will not lose the work parameters and do not influence in the normal development of the garden's activity.

With this voltage will be supplied consumers of general lighting, emergency lighting, security systems, etc.

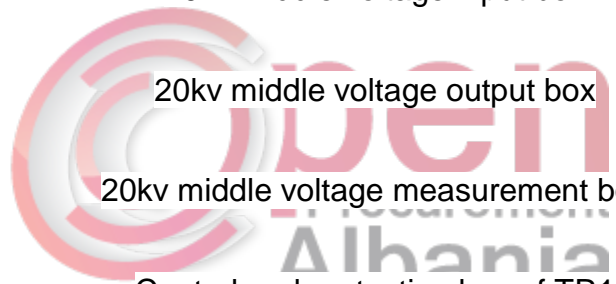
With normal voltage will be supplied all the venues of the garden considering it as basic supply, but for security and continuity reasons shall be doubled with voltages from the generator and UPS automatically, which shall be envisaged in the designing schemes.

For the power supply of the object in cases when the required power passes the value of 150 kW and when there is no possibility of power connection of low voltage in that area, it shall be envisaged the construction of a substation, which will included the following technical rooms:

### middle voltage room

This room will be equipped with middle voltage boxes according to the following listing:

20kv middle voltage input box



20kv middle voltage output box

20kv middle voltage measurement box

Control and protection box of TR1

In the second room, it is envisaged the establishment of middle voltage transformers TM 20/0.4 kv with resin.

Transformers are divided from the venue with an iron grill 40x40x4 (mm) with secured doors and protection elements in case of doors opening.

The third room envisages establishment of generators and after necessary calculations shall be determined even their power.

In the fourth room will be established the panel of automatic passing into generator network, and regulation panel of  $\cos \Phi$  which will be calculated based on the installed power and calculations shall be presented, etc.

It is better to place the low voltage box nearer to the venues that they supply for saving energy and having a stable voltage. Middle voltage panels and generators shall be placed outside the object. Establishment of low voltage boxes within the kindergarten building makes them more controllable,



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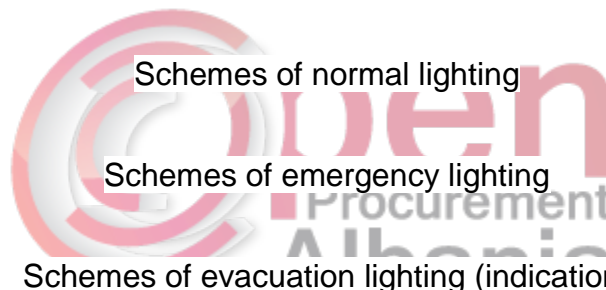
manageable and economic. During the design of electrical installation, we recommend that the low voltage lines shall be carried out by respecting TNS system for three phase voltage and by respecting TS system for mono phase system. The realization of TU panels design is carried out in conformity with CEI norms, programmed by implementation of powers, dimensions, temperature, lines length and type of consumers. During the design of the project, there shall be considered that lines shall be straight, no joints, labelled according to destination, different from one another, i.e. Grid, Generator, UPS as well as derivation boxes shall be labelled and easily readable. The electrical boxes must contain the protection controlling and measuring elements, protection from atmospheric discharges, etc. Voltage boxes shall provide sustainability REI -120.

The designer shall provide the Approval of Electrical Projects in ISHTI and CEZ, as well as determined the point of power connection from power grid (sub-station or zone transformer).

The electrical project shall be accompanied with the certified license of the electrical engineer, which will serve for further procedures for approval of connection point with CEZ.

### Lighting System

The design shall take into consideration that this system will clearly include :



Lighting flow shall be respected according to the venues where will be installed by respecting Lux per m<sup>2</sup> in relaxing venues, eating, teaching, corridors, kitchen, toilets, etc.

The control mode of lighting shall be used with efficiency in order to save as much energy as possible.

The lighting shall be with LED lamps with high energy efficiency and minimal consumption. LED lamps shall be specified so that the lighting body (lamp) shall be changeable without needing to change the entire lighting set in case of a defect and capable to operate for 50.000 working hours and meet the DIN EN 60598-1 requirements (VDE 0711-1): 2005-03

Technical specifications of lights shall take into consideration all the necessary standards in order to avoid installation of uncertified products.

### Power System in venues

In all venues shall be envisaged monophase sockets working with normal voltage and generator in harmony with furniture as well as lighting output in the toilets and aspirator if necessary. Në të In corridors in 15 -20 m distance shall be envisaged installation of mono phase sockets with normal voltage for cleaning equipment.

### **Equipotential scheme**

In special venues, such as technical, mechanical, electrical, kitchen spaces, etc, during the realization of the project shall be equipped with a equipotential busbar placed after each door where all the metallic parts will be connected on the floor, walls or ceiling with the equipotential scheme.

VO!

Realization of equipotential scheme during the design shall be absolutely separated from the earthing scheme and lightning rod system.

Inside the equipotential box is envisaged a copper busbar with holes for realization of all connections in equipotential points. The equipotential scheme begins in every venue and ends in the electrodes places on the ground outside the object.

### **Earthing scheme**

During the design of earth scheme shall be taken into consideration all the elements, such as sigma of the earth, type of earth, humidity, so that during the calculation the final resistance shall be less or equal to  $4 \Omega$ . The quantity of electrodes depends on RT realization. During the measuring with controlled currents differential from 2mA-30mA, the differential relay shall act within this diapason.

### **Lightening rod system**

The scheme shall be realized by the designer taking into consideration that  $R_r$  shall be smaller or equal to  $10 \Omega$ . The counture on earth surface and terrace shall be realized with a zinc stripe 30x3 and zinc rods  $L=1.5m$ , whereas surrounding counture and connector of electrodes on the ground with bare copper conductor  $S= 50mm^2$ . For every discharge shall be placed the disjoint for measuring. Number of discharges shall address the report  $n=P/15 +2$  and resistance of the lightening rod will be calculated with a smaller value than 10 om.

### **Schemes of supply and control of mechanical and hydronic devices**

During realization of the project shall be taken into consideration the realization of schemes of supply and control of heating system, ventilation and water supply. Therefore, in the framework of the prepared schemes by the mechanical and hydrotechnic designer, the electrical project shall contain the following:

panel and cables of ventilation units

panel and cables of pumps (heating, cooling, twins)

panel and cables of boiler

panel and cables of fire pump

panel and cable of water supply pumps I

panel and cables of submersible pumps (if any)

### **Security systems**

Cameras, alarms and control access shall be placed in order to provide uninterrupted information through venues, as well as monitoring of the entire situation in all the venues of the garden - inside and outside. For realization of the electrical installation project shall be carried out a coordination of work with all the designing groups in order to serve at best all the specialties and realize a qualitative service of the staff and apparatus.

### **Fire Detection System**

During realization of the project of fire detection shall be taken into consideration the selection of detectors according to their function and location.

During completion of the project shall be taken into consideration the distance of establishment of detectors, sirens, alerts, so that the entire zone could be covered. The project shall envisage multifunctional detectors, optical, CO<sub>2</sub>, NO<sub>2</sub>, and temperature detectors. The alerts shall be placed on the corridors in the quotes 1 m and 40 cm from quote 00 of the floor. Internal and external sirens shall be placed in the most positions with the best acoustics. The station to be used shall offer all the informations to the system, location of all elements of the scheme and be equipped with GSM. The station shall have a voltage 24 and 48 V for controlling electromagnetic dampers, etc.

The magnifying glass of this station shall not pass 80-125 elements including detectors, sirens, etc. The station shall be connected with the public system of the zone without causing panic in other zones. The fire system software shall be accessible in more than two points and display in a clear situation of the entire system.

### **Satellite and terrestrial TV system**

During the design, this system shall take into consideration the equipped of all entertaining and relaxing rooms of children with territorial and satellite system.

### **Sound alert system**

Sound alert system shall be used to offer information to the staff in cases of emergencies and special occasions. All the components, such as voice center, central, distribution and connection components shall be envisaged and adjusted for every venue. They can be connected with the central CD player device to play music in suitable hours.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Following zones/rooms will be equipped with sound alert

- Corridors
- common venues

During the designing phase, planed exits shall be coordination with those of the client.

### CCTV System

In line with requirements and standards of the installation, the project shall envisage a CCTV system for common school venues. It shall cover the necessary fields required by the benefiter, which are divided into categories. Based on these special requests in every field, the selection of equipment shall meet these requirements. For the outside areas, there will be the main entries and other requirements that will be coordinated with the benefiter, mobile cameras, suitable for the installation, anti-intervention protection, with IP-66 case and motion detection, etc.

For the internal area will be used high-resolution cameras placed in key monitoring points. All the data will be registered with NVR registration equipment, which shall be placed in the server room with a a calculated capacity with the time required by the benefiter. The monitoring room shall display the images of the cameras of the monitor covering the entire divided space in the screen with all the envisaged cameras.

### 695.

### Complete project of water supply system

The supply with cold sanitary water is necessary for normal performance of teaching activity.

Water supply in education venues can be carried out from the urban network or wells in cases when the urban network does not guarantee the needs for water supply of these venues.

Likewise, beside the need for water reserves that will serve for fire protection system, there shall be provided also the quantity and necessary reserve quantity for consumption needs on the users bases.

The referring values for necessary flow in all the hydrosanitary equipments used in the teaching venues is indicated in the following table expressed in “l/s”.

<b>NOMINAL FLOW TO BE PROVIDED IN EACH TAP</b>			
Hydrosanitary equipment	Cold water (l/s)	Hot water (l/s)	minimal pressure mk H2O
Sink	0.10	0.10	10
Bide	0.10	0.10	10
WC	0.10		10
Shower plaque	0.15	0.10	10
Basin	0.20	0.20	10

696.

697.

Full project of heating and ventilation

**698. Meteorological data and external conditions of the environment**

During the initial phase of design of mechanical plants, shall be taken into consideration the geographical position of the object which conditions the way of design due to external meteorological conditions of the areas, as well as the internal factors affecting the venue’s temperature, such as lighting, equipment transmitting heat, etc. Among many factors influencing the thermal amenity can be listed the following:

Temperature

Air Humidity

Solar radiation

Winds

The following table shows the external designing temperatures for winter period and geographical data according to cities in the Republic of Albania.

**699. Designing norms and recommended values of temperatures in venues**

Thermal conditions within the education buildings shall be in harmony for the activity performed in them. It is necessary for the designer to take into consideration the function of activities and the activity to be performed. The following table offers the recommended values of internal temperature, relative humidity, quantity of fresh air, level of noise and speed of air movement that shall be taken into consideration during design phase of school venues.

Minimal daily consumption necessary to support the European Standards shall be provided to meet the requirements for sanitary water is 25 liters/user.

Sanitary cold water supply is done through the external network from the controlling manhole.

**Connection point shall be coordinated with the water supply enterprise.** Water supply system from external network shall guarantee sufficient water for sanitary use. Through the flow and pressure of external network is enabled the supply of general water reserves. A water supply group shall consist of: water measuring, pressure reduction tool, non-return valve and “Y” filter. The pumping group shall be placed in the technical venue.

Water reserve basins shall be calculated in order to provide water quantity for the required amount (maybe 1 day). Specifications (quantity, capacity, etc) shall be defined from the designer based on the

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

diagram of daily use by consumers. Beside sanitary cold water reserves placed in the technical premise, the project shall contain also a water tank in free flow as well as its connection with toilets and pissoirs in cases of power cut. The tank volume shall be calculated by the designer and cover the needs for at least 1 day.

The taps in sanitary connections shall be equipped with water flow timer time press to enable water saving, as well as the hot water mixers shall have thermostatic valve.

The pumping station is the most important part of the system. The pumps parameters shall be calculated in line with daily needs diagrams for water and network configuration.

In this respect, there shall be calculated the pressure, flow, pump power and other technical specification. The project design shall include a pumping station, which is installed in line with the project requirements.

The distribution network comes from the pumping station to the technical building and sanitary connections. Every joint from the main magistral serving as a supplying branch or a columns for shall be equipped with a stopper valve for interruption of water when is necessary to intervene in the system without interrupting the supply for other consumers. The pipeline system of sanitary water needs all the requirements of defined norms and standards. The entire distribution network will be insulated to eliminate the condensation phenomenon and will be equipped with stopping valves wherever necessary, in case of necessary interventions for potential repairs. The system of sanitary water pipes will meet the requirements of norms and standards defined and selected since the designing phase by the engineering staff, as well as preliminary requests of the investor. The pipes shall be sustainable against mechanical blows and resistant to atmospheric agents. The pipes of this system are divided according to the function of their material as following:

Zinc-plated steel tubes without dart for columns;

Tubes PE-Xa – (Reticulated Polyetilen) for distribution into floors;

Tubes PPR;

Tuba PEHD (polyetilen with high density).

Before use, the sanitary water shall be treated (filtered) based on its physical-chemical characteristics.

Filtration may be:

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Mechanic filter;

Cartridge filter;

Sand filter;

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Carbon filter;

Ultraviolet filter.

**Plant for supply with hot sanitary water**

The hot sanitary water shall be prepared in solar panel systems for hot water, where shall be taken into consideration at least 1 m<sup>2</sup> solar panel over every 100 liters of hot water per day. Panels may be either with a thermosiphon system, without electrical resistance, but designed in order to supply the boiler directly or with central system with pumping circulation.

Hot water accumulation shall have a temperature not less than 60 °C. Nevertheless, for the children security, for reduction of risk from very high water temperatures, regulations of kindergarten venues require that the temperature for use (in the output of hydro-sanitary equipments) shall not be higher than 43 °C for all the hot water equipment. Such thing is achieved through thermostatic mixture completed by the mixer.

The dimensions of sanitary hot water network shall be carried out based on the designing norms and standards.

The sanitary water system shall serve for providing cold and hot water from the pumping station to collectors and after this shall provide the water distribution in equipment of sanitary venues. the distribution of sanitary water is realized through:

Hot water distribution lines;

Re-circulation of hot water (if it is chosen the version with hot water central boiler)

Water supply collectors (if it is chosen the collector version from the designer)

700.

**Full project of sewerage system**

The sewerage system consists of the network of collection of atmospheric waters, sewers, gray waters and waters containing fats.

- Atmospheric waters are waters falling on the earth surface in the form of liquid falls (rain) and solid form (hail and snow)

Sewers are all the waters collected by the sewerage system of WC of all schools.

## “On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”

Gray waters are waters collected by the draining network of sinks, bidets, showers, washing-machines, etc.

Waters containing fats are collected from the draining network of all kitchens in different building.

In the water draining system in which we have presence of waters containing fats, it is installed the plant of collection of fats before outflow in the main collector of sewerage system.

### **701. Dimensions of draining plants, normative values of draining**

Dimension of draining network of waters is made based on calculations of flows for draining units of different equipment, velocity of flow of liquids in pipes and inclination of pipes. The water flow in the draining system shall not create pressure that could create hydraulic blows in the pipes. Pipes shall have a sufficient diameter to enable free circulation of air ventilation that provides the stability of network pressure.

### **702. Values of drain units accompanied with respective details and table of materials and technical specifications of materials.**

Every sanitary equipment is characterized by a defined norm of water flow, which depends on its size and functioning. Norms of dimensions addressed for the draining network are proposed by **UNI 9183** standards.

**Table 1 – Amount per draining unit for equipments (UNI 9183)**

<b>Equipments</b>	<b>Draining unit</b>
Tube (no shower)	2
Shower (per one siphon)	2
Shower (per every siphon installed together)	3
Sink	1
Bidet	2
WC with cassette	4
WC with cassette incorporated in the walls	8
Kitchen sink	2
Sink	3
Dish washer	2
Washing machine	2
Floor drain	1
Combination Sink-Bidet-Tube-WC with cassette	7
Combination Sink-Bidet-Tube-WC with cassette incorporated in the wall	10



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Combination Sink-WC with cassette	4
Combination Sink -WC with cassette incorporated in the wall	8

**Dimensions of joints**

The internal system of collection of sewage waters is composed of the joints of all sanitary equipment. From the internal network, water is send to the vertical draining column. The flow in one joint is the unit flow of the apparatus that will drain to the joint. Diameter is defined based on the following table:

**Table 2 – Diameter of draining joints ratio to maximal number of unit joints of drains in them (UNI 9183).**

<b>Diameter of branches (mm)</b>	<b>Total load</b>
40	3
50	6
65	12
80	20
100	160
125	360
150	620
200	1400

**703.**

**704.**

**705.**

**706. Dimensions of draining columns**

A draining column normaly counts different joints in different floors. The maximal flow in a draining columns increases with the height of the floors where there exist joints. The dimensions of the vertical draining column pipes depend on the maximal flow of the column.

**Table 3 – Diameters of the draining columns ratio to maximal number of units per drain, number of floors and loads in the draining units in the busiest floor (UNI 9183)**

<b>Columns Diameter (mm)</b>	<b>Built up to 3 floors</b>	<b>Maximal load per one floor</b>
50	10	6
65	20	9
80	30	16
100	240	90
125	540	200
150	960	350
200	2200	600
250	3800	1000
300	6000	1500



The main purpose of ventilation of sewerage system aims to bringing out the gases collected from sewers, as well as encourages the normal function of the installed siphon in each equipment and to keep them under the atmospheric pressure. An efficient ventilation system is also useful in fight against creation of mould.

Ventilation columns are divided into four categories:

Primary ventilation

Direct parallel ventilation

Indirect parallel ventilation

Secondary ventilation

710.

711. **Processing of drain waters**

Processing of sewerage waters consists of removal of pollutants in these waters

Processing of sewerages is done through the construction of water treatment plants

These plants are built outside the inhabited centers

After the cleansing these waters are used for communal purposes

712. **Materials of pipes and main components of sewerage system**

Pipes of internal network feeder and sewerage columns are made of different materials, pressure pipes: geberit piping system with welding.

Pipes without pressure: Politelien and PVC

Collectors pipelines are divided into pipes with loads and pipes without pipes.

When pipes pass through pavements or green spaces, there shall be used junction pipes without loads SN4, PVC SN4.

When pipes pass through a road soil where there are dynamic loads and it is used by high tonnage vehicles, there shall be used junction pipes with loads SN8, PVC SN8. Materials shall be accompanied with manufacturing certificates. Based on **UNI 9183** and **UNI EN 1091** norms.

**Rain water draining system**

Dimensions of roofs and terraces draining network

Dimensions of ruts.

Dimensions of descending columns.

Dimensions of pipelines collectors

Dimension of superficial drainage

White water draining plants

- Condense waters
- Accidental waters from fire protection plant
- Waters in underground floors, from infiltrations, etc.

Water rain draining networks and main elements

Materials of pipes and main elements of plants

Preservation and use of rain waters



**713.**

**Complete project of fire protection system  
(MKZSH)**

This system includes the total of architectonic, constructive, mechanic and electrical measures for “Prevention, protection and construction of Fire Protection System”.

These measures according to their function and way of application are divided into measures for “Passive Protection” and measures for “Active Protection”.

Passive protection that deals with architectonic and constructive arguments of fire prevention and protection, such as compartmentalization of structures; realization of roads and secure escape exists; reduction of fire load its spreading. Passive protection is subject of architectonic and constructive projects.

Active Protection that deals with manual fire detection and extinguishing system, fire and heat control system. Detection plants will be treated by electrical systems.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Fire protection system shall consist of hydrants. Hydrants shall be designed for the necessary flow and standards and shall be completed with all elements (cassettes, valves, rubber pipe, etc.). They need to be positioned in such a way that every point of the object could be covered by at least two hydrants and shall be placed nearest possible to passages of escape and evacuation (object shall have at least two escape and evacuation passages). If the building is more than story high, in the hydrants of each floor shall be a valve for connection of the fire-fighting teams.

Internal hydrants shall meet the following criteria:

To be installed separately for each compartmentalization;

To be positioned in the vicinity of exits of escape passages without being an obstacle;

To be positioned on both sides of the gate if there exists a REI gate;

To cover every space of the activity;

Every hydrant shall protect a zone up to 1000 m<sup>2</sup>;

Every point of the protected zone shall be in a maximal distance of 20 m per mural hydrants and 30 m per naspot;

External fire hydrants that consist of the type of columns on the ground with a flow of 350 l/m and output pressure not less than 2.5 bar are composed of a column coming from underground in which are positioned the connections that enable the water supply. The hydrant consists of columns with two exits respectively DN 70 and DN 100 with stoppers linked with a chain and maneuver key (optional). The column hydrants on the ground and underground hydrants shall be installed in order to:

To be not more than 60 m far from each other ;

Outside the building is recommended the use of column hydrants above the ground;

Where possible shall be installed in relation to exits from the building in order to be in a secure position in case of fire;

Distance between them from the external walls of the building is recommended between 5 m and 10 m .

The connection with auto-pump is a mean that helps fire extinguishing linked to the hydric network which can supply water in case of fire emergency. Every connection with the auto-pump shall provide:

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- 1 or 2 linkages with a diameter not less than DN 70;
- To be well-fixed in the lateral walls outside the building, easily identified and accessible by fire-fighting vehicle;
  - Output pressure not less than 1.2 Mpa.

Water supply system shall be able to provide at any time the necessary flow and pressure required by the plant in case of fire. As a water source shall serve:

- Fixed connection from the water supplying system of the city, uninterrupted;
- Fixed abundant basins with the with the necessary quantity of water anytime.

Wells, fountains or other insecure connections cannot be used as a source or water reserve. Measures shall be taken in order that the water shall contain no :

- Kelps or other blocking materials
- Corrosive Materials

The pumping group shall be positioned in a protected venue, in the same level of the water reserve and shall be composed of :

- 1 or 2 pumps in line with EN733 norm together with the pilot pump (jockey) and diesel.
- Control Panel equipped with buttons in the frontal part and LCD screen.

There shall be taken measures for providing power supply from the normal grid and moro-generator.

The distribution network includes the underground network, visual external network and internal network of the building. It is preferred a ring system equipped with controlling interrupting valves.

The distribution network shall take into consideration:

- To consist of materials according to the norms;
  - To be painted with anti-mould paint;
- To be protected from fire, damage and freezing;
  - To ensure the mechanical resistance;

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- To take measures for seismic zones, passages in the walls or anti-fire division.

The MNZSH project shall also define the positions and necessary equipments for evacuation of fire (space with an automatic opening, ventilators for removal of fire, etc.).

The MNZSH Project shall also include the evacuation signaling system. Signals system enables persons to find the escape ways, emergency exits, fire extinguishing equipments or emergency phone numbers. The fire alert, dimensions (depending on the sight distance) colors and their dimensions are determined in line with EN ISO 7010 norm. Signals system shall also be realized with other means :

through a sound communication system;

through a different consistency surface;

through chromatic contract on the floor visible in all illumination conditions



**715.**

**6.1 Standards for the construction project**

STANDARDS OF REFERENCE

Eurocodes

- EC0 Basis of structure design
- EC1 Load in structures
- EC2 r/c structures design
- EC7 Geotechnic design

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- EC8 Seismic structures design

Albanian Designing Terms and in concrete

- Technical Designing Terms KTP -1978
- Technical Terms for designing of anti-seismic constructions KTP-N.2-89

Schools design shall be based on structural design standards and also long as in our country there are still in force 1978 -1979 Technical Conditions of Design, which do not reflect the developments and recent norms drafted in this respect, we recommend that the school design could be done based on Eurocodes norms.

The eurocodes determine in details the types of loads (permanent, temporary, snow and wind, as well as their combination), which shall be taken into analysis during the structural analysis.

In this respect, we also underline that:

Before completing the design there should be carried out a geological and seismic study about the soil where the object will be built.

The school design shall be made with r/c structures and concrete make shall not be smaller than C25/30, whereas the steel to be used shall be from the make S500 (sidenor) or its equivalent (e.g. FeB44k).

Likewise, we recommend that foundations of the schools shall consist of r/c slabs, hydroisolated from outside.

Slabs of inter-floors of schools shall consist of monolite slabs with deep beams.



Standard Documents of the Concession\Public Private Partnership

**Annex 14**

*(Annex to be filled by the Contracting Authority)*

**BILL OF QUANTITIES OF WORKS**

Standard Documents of the Concession\Public Private Partnership

**Annex 15**

*[ Annex to be filled by the Contracting Authority ]*



**STANDARD ANNOUNCEMENT FOR THE DISQUALIFIED BIDDER**

[Location and date]

[Name and address of the Contracting Authority]

[Address of the bidder]

Honorable Mr./Mrs, <contact name>

Thank you for participating in the above-mentioned public procurement procedure. The Procedure carried out in line with Law No. 9643 dated 20.11.2006 “On Public Procurement” .

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Your bid was carefully evaluated, in line with terms and requirements defined in the contract announcement and bid file. Unfortunately, we want to inform of your disqualification, because the bid submitted by you was refused due to the following reason (s) :

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If you believe that the Contracting Authority has violated Law no.125/2013 “On concessions and public private partnerships” and CoMD no.575, dated 10.7.2013 “On approval of rules for evaluation and granting of concessions and public private partnerships”, during the public procurement procedure than you have the right to kick-off a review procedure, envisaged in Law on Concessions and public private partnership”

Even though we could not make use of your services in this occasion, we believe you may be interested in our procurement initiatives of concession/PPP.

Respectfully  
< Name



**Annex 16**

( Annex to be filled by Contracting Authority ]

**WINNER ANNOUCEMENT FORM**

[Date\_\_\_\_\_]

Procurement Procedure :

Brief Description of the Contract : *[Quantity or scope and duration of the contract ]*

Previous Publications *(if applicable )*: Public Announcements Bulletin *[Date] [Number]*

Criteria for determination of the winner: lowest price economically most favorable bid

We inform that participating in this procedure were the following bidders with the respective bidding amounts :

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

1. \_\_\_\_\_

*Full name of the company*

Amount \_\_\_\_\_

*(in figures and letters)*

2. \_\_\_\_\_

*Full name of the company*

Amount \_\_\_\_\_

*(in figures and letters)*

Etc. \_\_\_\_\_

The following bidders were disqualified :

1. \_\_\_\_\_

*Full name of the company*

\_\_\_\_\_

*number of NUIS*

2. \_\_\_\_\_

*Full name of the company*

\_\_\_\_\_

*number of NUIS*

Respectively for the following reasons :

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Referring to the above-mentioned procedure, we inform [*Name and address of the winning*] that the submitted bid with a general amount of about [*respective amount expressed in letters and figures*]/total points [\_\_\_\_\_]has been identified as a successful bid.

As a result, you are pleased to submit to [*Name and address of the contracting authority and reference of the contact*] the guaranty of the contract as envisaged in tender documents within \_\_\_\_\_ days from the receiving/publication of this announcement.

Deadline for negotiation of your Contract will be \_\_\_\_\_

Bidder [name ] shall present (Contracting Authority) the following documents :

- Copy of briefing of the Form on General Terms and Special Terms of Concessionary/Public Private Partnership Contract, signed.

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

- Contract Warranty according to the form required in the Standard Documents of Competition Procedure. The warranty shall be submitted not later than the moment of signature of the Contract by both parties.
- Banking document certifying the payment carried out for expenses of publication and expenses for special consultancy (*if any*). This payment will be carried out before the kick-off negotiations.
- In case of a withdrawal from the contract, you shall inform in writing.

The Announcement of the Classification has been carried out on \_\_\_\_\_

Complaints : yes or no \_\_\_\_\_

(if any) have received a reply on \_\_\_\_\_

[Director of the Contracting Authority ]

**Annex 17**

**GENERAL TERMS OF THE CONTRACT  
Works**



**Article 1 Scope**

1.1. These General Terms of the Contract (GTA) will be implemented for completion of the Services procured through an open procedure.

1.2. Law on Public Procurement in the Republic of Albania envisages that the provisions of the Albanian Civil Code will be implemented for public procurement contracts. Some provisions of the Civil Code are re-expressed in the GTA aiming to boost transparency of the terms of the contract. Even though, quoting of some provisions here does not deny the implementation of other provisions of Civil Code for this Contract.

1.3. In a similar way, some procurements of Law on Public Procurement are re-expressed in the GTA aiming to boost transparency of the law that regulates the public procurement. Nevertheless, the quoting of some provisions here does not deny the implementation of other provisions of Law on Public Procurement on rights, tasks and obligations of the parties.

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

1.5 The GTA will be implemented up to a limit for not running counter to the terms and provisions presented in other parts of the Contract.

1.5 The Contract’s Terms include also Special Terms of the Contract (STA). In case of a dispute between GTA and STA, the STA prevail over GTA.

### **Article 2 Definition**

2.1 “Contract” is the written Contract between Public Buyer and Contractor, consisting of tender documents including GTA and STA, all the attachments and filled forms, as well as other documents included in the reference of each document.

2.1 "Term of Works Execution" means the date that Works must be completed as expressed in the Workshop Graphic, certified by the Procuring Entity.

2.2 "Total IPR" means the volumes of work provided in a project that are as a reference,

2.3 "Defect" means any part of the work that is incomplete in accordance with the contract.

2.4 "Date of start" means the date that the Contracting Authority allows the contractor to the site.

2.6 "Start Date" is included in Contract Data. It is the date when the contractor will start construction work. If this is not realized, the "start date" will be the day on which the payment will be paid.

2.7 "Equipment" means the contractor's machinery and tools temporarily brought to the construction site for the execution of the Works.

2.6 "Contract Object" means all works that the Contractor will provide under the terms of the Contract.

2.7 "Party (s)" means the contract signatories.

2.8 "Representative of the Contracting Authority" means the person appointed by the Contracting Authority that is responsible for contract management for the Contracting Authority.

2.9 "Contracting Authority" means the Contracting Authority that is a party to this Contract and which contracts the works covered by this Contract. This term, wherever it is used, has the same meaning as defined in the law.

2.10 "Construction Site" means the physical working place.

2.11 "Site Inspection Report" means the documents contained in the tender documents that reflect factual and interpretative information about the surface and ground conditions of the site.

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

2.12 "Subcontractor" means any natural or legal person or combination of the foregoing that supplies the Works, materials or equipment to or on behalf of the Contractor.

2.13 "Contractor" means a natural or legal person that is a party to this contract and according to the provisions of this contract provides works.

2.14 "Technical Standards" means the specifications approved by a special standardization body for continuous or repeated application. Such standards are used as rules, regulations or definitions of features to ensure that processed materials and services are responsive to the purpose

2.15 "Site Construction" means temporary construction works, installed and constructed, which are necessary for the implementation of construction works.

2.16 "Works" means that the Contracting Authority requires the Contractor to excavate, construct, repair, renew or install as provided for in the tender documents including the related services, also defined in the tender documents.

### **Article 3: Drafting of the Contract**

3.1 Notification of the winning bid shall serve for the drafting of the contract between the parties, which must be signed within the deadline stated in the tender documents.

3.2 The existence of the contract shall be confirmed by the signing of the contract document by sanctioning all agreements between the parties.

### **Article 4: Corrupt Practices, Conflict of Interest and Control of Minutes**

4.1 The Contracting Authority may require the court to declare the contract unlawful if it finds that the contractor has committed corrupt actions. Corrupt actions include the actions described in Article 26 of the Law on Public Procurement.

4.2 The contractor should not have any relationship (present or past) with any consultant or entity that has participated in the preparation of tender documents for this private consortium / partnership.

4.3 The Contractor shall allow the Contracting Authority to inspect the accounts and records relating to the performance of the contract or to control them by means of auditors appointed by the Contracting Authority.

### **Article 5: Confidential Information**

5.1 The Contractor and the Contracting Authority shall keep in confidence all the documents, data and other information provided by the other party with respect to the contract.

5.2 The Contractor may provide to the Subcontractor such documents, data or other information received from the Contracting Authority to the extent required for the subcontractor to perform his / her work on the contract. In such case, the contractor shall include in his contract with the subcontractor a provision promising to maintain the confidentiality as stated in Paragraph 5.1 above.

## **Article 6: Intellectual Property**

6.1 Except as otherwise provided in the contract, all intellectual property rights secured by the contractor during the performance of the contract shall belong to the Contracting Authority which may use them at its discretion.

6.2 Unless otherwise provided in the contract, the contractor shall, upon termination of the contract, submit to the Contracting Authority all reports and data such as maps, diagrams, drawings, specifications, plans, statistics, calculations and supporting records or materials obtained, collected or prepared by the contractor during the performance of the contract. The contractor may keep copies of these documents and data, but should not use them for purposes that are not related to the contract without prior written permission from the Contracting Authority.

6.3 The Contractor shall ensure that the Contracting Authority waives liability for violations of intellectual property rights that may arise from the use of materials, drawings or any other property under the contract.

6.4 In the event of any claim or claim against the Contracting Authority relating to any breach of intellectual property caused by the performance of the contract or the use of materials, sketches or any other property protected and supplied under the contract, the contractor shall provide the Contracting Authority with all evidence and information in the contractor's possession relating to this claim or claim.

## **Article 7: Origin of Materials**

7.1 There is no restriction on the nationality of the origin of the materials, except those that may have been set out in any of the United Nations General Assembly Resolutions.

7.2 The contractor may be required to verify the origin of the materials

7.3 For the purposes of verification "origin" shall mean the place where the materials are extracted merged or produced materials are produced when through the production processing or sufficient assembly of components results in a new product known in trade that is quite different in the basic characteristics or in the purpose or use of its components.

7.4 The origin of the materials differs from the nationality of the contractor or subcontractor who supplies the material.

## **Article 8: Communication**

8.1 Any communication between the parties shall be in writing.

## **Article 9: Co-operation on the Site with Others**

9.1 The Contractor shall cooperate and divide the site with other firms public authorities, public services and the Contracting Authority as required and defined in the Workshop Graph.

## **Article 10: Responsibility of the Contracting Authority**

10.1 The Contracting Authority has the responsibility to compensate the contractor for damage to the equipment of the contractor to the extent that it relates to the actions of the Contracting Authority or to the projects of the Contracting Authority except in the case where the latter have been misdiagnosed that could have been ascertained easily by the contractor.

## **Article 11: Contractor Performing Works**

11.1 The Contractor must complete and finish the Works in accordance with the technical specifications set out in the tender documents.

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

11.2 The Contractor shall not be liable for project errors, data, plans or other aspects of technical specifications provided by the Contracting Authority, except where the error was as apparent as the contractor should have observed and advertise it to the Contracting Authority.

11.3 The codes and standards to be applied will be expressed in the tender documents. If during the execution of the contract there are changes in the application of codes or standards, these changes will only apply once they have been approved by the Contracting Authority.

### **Article 12: Execution of Works**

12.1 The Contractor shall commence the implementation of the Contract as soon as it is affixed and shall terminate the Work within the Term of Term.

### **Article 13: Technical and Environmental Security**

13.1 The Contractor shall be responsible for the safety of all activities on the site.

13.2 The contractor shall provide the site in such a way as to minimize environmental damage. For example, it should save energy, water and other resources, reduce the loss and minimize the use of depleting ozone depleting substances, release of gases, composite organic substances and other substances that harm the health and the environment.

### **Article 14: Discoveries**

14.1 Anything of historical interest or significant value unexpectedly discovered at the site shall be declared to comply with applicable law. The contractor should notify the contracting authority of any such disclosure and follow the instructions of the project manager for the facility management procedure.

### **Article 15: Site disposal**

15.1 The Contracting Authority must grant the right of dispose of the yard to the contractor at the date of entry expressed in the tender documents. If the availability of any part of the site is not provided within the date of entry for the site or that part of the site as provided in the tender documents, it shall be considered that the Contracting Authority has delayed the beginning of the contract execution and the contractor is entitled to request the amendment of the contract regarding the postponement of the Term of Termination. The Contracting Authority and the contractor shall keep a record of the date of entry.

### **Article 16: Changing Laws and Regulations**

16.1 If, after the date of signing the contract, any law, regulation, order, order or procedure with the effect of law in the Republic of Albania enters into force, is issued or amended and the terms, including the date of delivery or the contract price, the terms or the contract price shall be adjusted to the extent that the contractor has been affected by the fulfillment of his obligations under the contract.

### **Article 17: Force Majeure**

17.1 The Contractor shall not be liable for the loss of contract security, liquidated damages or termination of termination if, and to the extent that the delay in implementation or any other failure to meet its obligations under the contract is due to the events of Force majeure.

17.2 For the purposes of this Article "Force Majeure" means an event outside the control of the contractor and unpredictable. Such events may include but are not limited to, the actions of the Contracting



## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Authority, whether in its sovereign or contractual capacity, war or revolutions, fire, flood, earthquake, epidemics, quarantine restrictions and transit embargoes.

17.3 If any Force Majeure situation occurs, the Contractor shall immediately notify the Contracting Authority. Unless the Contracting Authority issues different guidance, the contractor shall continue to apply his obligations under the contract to the extent reasonably practicable and must seek all reasonable means of enforcement that is not hampered by the Force Majeure.

### **Article 18: Negotiations and Amendments**

18.1 Contracts provided by this law may be amended by adding an annex to the contract, provided that this possibility is provided in the tender documentation and in the contract.

18.2 Changes to the contract are made by the contracting authority and the concessionaire / private partner.

18.3 Amendments to the Contract may be made at the initiative of both Contracting Parties, in particular in the following cases:

- (a) when the national security and the protection of the country is endangered, the environment, nature and human health are endangered;
- b) when the object of the contract is lost or when there is an objective inability to use it in the case of force majeure;
- c) when changing the legal framework;
- ç) in other cases that lead to the change of the real or legal situation for the use of the facility or the provision of services or in the performance of the contract.

18.4 Changes in substantive contract terms not provided in the tender documentation and / or the contract itself require the implementation of a new procedure of awarding the private concession / public partnership contract.

18.5 Without prejudice to the provisions of Articles 32 and 33 of the Law on Concessions and Public Private Partnerships, the term "essential conditions" refers in particular to the terms which, if they were included in the initial contract notice or the tender documentation, shall would have made it possible for bidders to submit a substantially different offer and whether the changes would have exceeded the scope of the contract to the extent that these changes would include services not originally covered.

18.6 The contracting authority requires prior approval by the Ministry of Finance for all planned changes that affect or create the risk of direct or indirect impact on the state budget or the budget of local authorities or which may in some way change the financial support as defined by this law.

18.7 The Contracting Authority shall notify the Ministry of Finance no later than 20 days of any changes made to the contract in accordance with this Article.

### **Article 19: Interruption due to Bankruptcy**

19.1 The Contracting Authority may terminate the contract at any time if the contractor defaults or becomes incapable of paying.

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

19.2 The Contracting Authority shall provide the Contractor with written notice of termination.

### **Article 20: Interruption due to Public Interest**

20.1 The Contracting Authority may terminate the contract at any time if it deems that such action is to be undertaken to best serve the public interest.

20.2 The Contracting Authority shall provide the Contractor with written notice of termination.

20.3 The Contracting Authority shall pay the contractor for all work received and performed before the termination and shall pay to the Contractor the damages incurred for the partial performance of the Works. In calculating the amount of damages, the contractor will be required to take all necessary actions to minimize the damages.

### **Article 21: Subcontracting**

21.1 A contracting authority may:

- a) require the Concessionaire to award contracts that are at least 30% of the total value of the Concession Contract to third parties, while at the same time providing an opportunity for the bidders to increase this percentage, while this minimum percentage is specified in the concession contract;
- b) require the bidders to indicate in their bids the percentage of the total contract value they plan to assign to third parties.

21.2 For the subcontracting of public private partnerships that are realized as public works or public service contracts, the relevant provisions of the public procurement law shall be applied accordingly.

### **Article 22: Transfer of Rights**

22.1 In accordance with the provisions of this Article, the concession / public private partnership contract may be transferred to a third party that meets the eligibility requirements set out in the tender documentation, upon prior written consent of the contracting authority, on the basis of which the contract was initially issued unless these requirements refer to conditions that are no longer necessary for the performance of the contract due to the fact that these obligations and requirements are already being consumed or being carried out by the concessionaire / private partner previous.

22.2 The transfer of the concession contract does not impair the quality and does not aggravate the continuity of performance and performance of the contract.

22.3 When the concessionaire / private partner is a subject for special purposes, then the change of ownership or management of the Special Purpose Entity (SPV) as a result of the transfer of capital or business shares cannot be implemented without the approval of the contracting authority and the Ministry of Finance, except if this is a result of regular stock trading in a regulated capital market.

22.4 The contracting authority requires prior approval by the Ministry of Finance for all planned contract transfers that affect or create the risk of any impact on the state budget or local government budget or which may change in any way financial support, as defined by this law.

## **“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

22.5 The contracting authority shall notify the Ministry of Finance of the transfer of the contract made in accordance with this Article.

### **Article 23: Contract Warranty**

23.1 Within \_\_\_\_\_ days of receipt of the contract award notice, the contractor shall submit to the Contracting Authority the provision of the contract in the amount and form as provided for in the contract. Failure to provide the contract security in the form and the required value within \_\_\_\_\_ days will result in cancellation of the contract and loss of contractor's Bid Security.

### **Article 24: Legal Basis**

24.1 The contract shall be governed and interpreted under the laws of the Republic of Albania.

### **Article 25: Settlement of Disputes**

25.1 The Contracting Authority and the Contractor shall make every effort to resolve disputes or conflicts between them or in connection with this Agreement by direct negotiation.

25.2 If the parties fail to resolve the dispute or conflict, they shall address the settlement of the agreements under the contract and legal procedures in force under the legislation of the Republic of Albania.



### **Article 26: Representation of Parties**

26.1 Each party must nominate in writing a person or organizational structure that will be responsible on behalf of the party to receive communications and to represent the party on issues related to the execution of the contract.

26.2 Each Party shall immediately notify the other Party of any change in the appointment of the Party Representative. If one party fails to report, it must take any loss caused by failure to provide sufficient notice.

26.3 The parties may appoint additional persons or organizational structures to represent the party in specific actions or activities in which case the written notice must be given and shall determine the extent of the representative's authority.

### **Article 27: Announcements**

27.1 Any notice given by each party to the contract must be made in writing at the address specified in the contract.

27.2 The notice shall have effect as soon as it is delivered.

### **Article 28: Calculation of Time Limits**

28.1 All references of days shall be calendar days unless otherwise provided.

**Annex 18**

*[Annex to be filled in by the Contracting Authority]*

**SPECIAL CONDITIONS  
Works**

The following specific terms of the Contract shall meet the General Conditions of Contract. in the event of any conflict occurring, the following provisions shall prevail under the General Conditions.

**Article 1: Definitions**

1.1 The Contracting Authority is \_\_\_\_\_

1.2 Contractor is \_\_\_\_\_

**Article 2: Provision of the Contract**

2.1 The contract security in the amount of 10% of its value must be provided by the contractor to ensure the execution of his obligations under the contract.

2.2 The contract security shall be issued or returned immediately to the contractor under the following file: \_\_\_\_\_

\_\_\_\_\_

**Article 3: Representative of the Contracting Authority**

3.1 Representative of the Contracting Authority: \_\_\_\_\_

3.2 Address / Contact Point: \_\_\_\_\_

**Article 4: Shipyard**

4.1 The Workshop will be (the exact description of the location of the object to be executed):

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**Article 5 Start Date**

5.1 This Contract: \_\_\_\_\_

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**Article 6: Type of Contract**

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**Annex 19**

[Letter with the Bank Logo / Insurance Company ]

[ Annex to be submitted by the Economic Operator]

**FORM OF THE CONTRACT GUARANTY**

[Date \_\_\_\_\_]

For: [Name and address of the Contracting Authority]

In the name of: [Name and address of the guaranteed bidder]

Procurement Procedure: [type of procedure ]

Brief description of the Contract : [object]

Publication (if applicable): Public Announcement Bulletin [Date] [Number]

As long as :

- (name of the bidding winner) has been declared winner in the procedure for concession/ppp of \_\_\_\_\_, according to minute (name of the contracting Authority \_\_\_\_\_), located in \_\_\_\_\_ (with \_\_\_\_\_ Hereinafter referred as "Contracting Autho"), Nr. \_\_\_\_\_ Prot, date \_\_\_\_.

"Winner Announcement "; and

- The Winning Bidder has presented with us the Draft Contract between him and

Contracting Authority, "For concession / ppp to; and

- Your Contract requires the Issuance of a Contract Guaranty at the specified amount as below, as a guarantee for the fulfillment of the obligations of the Concessionaire provided for in the Contract; and

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

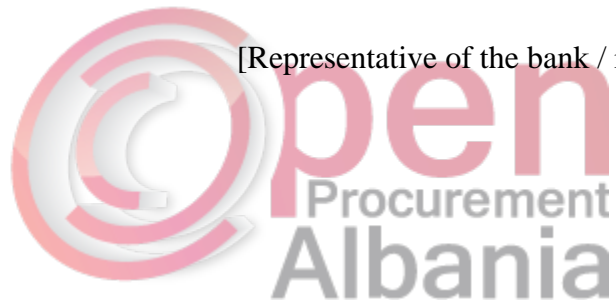
- (the name of the Bank of the insurance company) agrees to issue this guarantee.

We declare that:

- we are the guarantors of the aforesaid contract up to the total amount of (sum in the number and letters), that is payable in the manner and currency specified in it contracts; and
- we will pay as soon as you make the first written request and without the need to claiming property, any amount within the limit of (the amount of the guarantee); and
- to get this guarantee, you do not have to contact me before the Public Private Partnerships party to realize the payment according to your request; and
- no additional or modification of the terms of the Agreement, for which you may agree with the Concessionaire, does not exclude us from the obligations of this Guarantee.

This guarantee is valid until the date that includes \_\_\_\_\_ days from the date of issue of the Certificate of Completion.  
\_\_\_\_\_

This Guaranty is valid until the full implementation of the Contract.



[Representative of the bank / insurances company]

**Annex 20**

[ Annex to be filled by the Contracting Authority]

**FORM OF THE PUBLICATION OF THE ANNOUNCEMENT OF THE SIGNED CONTRACT**

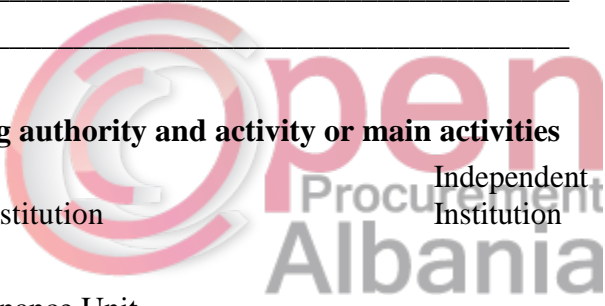
**Section 1 Contracting Authority**

**1.1 Name and Address of the Contracting Authority**

Name \_\_\_\_\_  
Address \_\_\_\_\_  
Tel/Fax \_\_\_\_\_  
E-mail \_\_\_\_\_  
Web \_\_\_\_\_

**1.2 Type of the contracting authority and activity or main activities**

Central Institution  Independent Institution   
Local Governance Unit



**Section 2 Object of the Contract**

**2.1 Type of contract**

Service

**2.2 Short Description of contract**

1.Object of the contract \_\_\_\_\_  
2. Type of the Contract \_\_\_\_\_  
3. Source of financing \_\_\_\_\_





**4.4 Additional Information (if any)**

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Date of the delivery of this announcement / /



**Annex 21**

**FORM OF THE COMPLAINT TO CONTRACTING AUTHORITY**

Complaint addressed to: Contracting Authority

***Section I. Identification of the Complainer***

*The Complainer may be a bidder or a potential bidder (e.g., as an individual, in partnership, in cooperation, in merge of companies).*

\_\_\_\_\_  
Full name of the complainer (Please type)

\_\_\_\_\_  
Address

\_\_\_\_\_  
City

\_\_\_\_\_  
State

\_\_\_\_\_  
Postal/Code Zip

\_\_\_\_\_  
Telephone No. (including also the zone prefix)

\_\_\_\_\_  
Fax (including the zone prefix)

\_\_\_\_\_  
E-mail

\_\_\_\_\_  
Name and position of the authorized position filling the complaint (please type)

\_\_\_\_\_  
Signature of the authorized official

\_\_\_\_\_  
Date (year/month/day)

\_\_\_\_\_  
Telephone No. (including the zone prefix)

\_\_\_\_\_  
Fax No. (including zone prefix)

*Section II. Information on the Procedure*

**1. Identification Number**

*Fill in the number of the contract in the contract’s announcement or in the tender documents, including **type of procedure used** for the said procurement (e.g. Request for Proposal (RP), Open Procedure (OP), Limited Procedure (LP), Procedure with Negotiation (PN), Consultancy Service (CS), Designing Competition (DC).*

**2. Contracting Authority**

Name of the Contracting Authority administrating the procurement process.

**3. The calculated amount of the Procurement**

*Calculation of the contract’s amount (sum expressed in figures and letters)*

---

**4. Object of the Contract**

*Brief description of works/goods/services that are purchased*



**5. Final deadline for submission of the bid**

Final deadline for submission of the bid.

---

**6. Date of the Selection of Winning Contract**

*Section III. Description of the complaints*

**1. Legal Basis of the Complaint**

(write down the legal violation, based on decisions, acts, documents, etc.)

## 2. Detailed Declaration of Facts and Arguments

*Provide a detailed declaration of facts and arguments supporting your complaint. For each reason of complaint specify the date in which you were informed of the facts related to the reasons of filing the complaint. Mention also the respective sections of tender documents, in applicable. Use an extra sheet if necessary.*

### 3. List of Annexes

*For a complaint to be considered, it should be complete. Attach a readable copy of all documents related to your complaint and a list of all these documents. The Documents must normally include every published announcement of all tender documents, with all the changes and annexes, and your proposal. Define what information is confidential, if any. Explain why this information is confidential or submit a version of the respective documents with the removed confidential parts and a summary of the content.*

## 4. Preliminary Objection against the Contracting Authority

*An objection is referred to as a complaint directed directly to the contracting authority. Attach a copy of each written complaint, including the reply, if any.*

1. Have you made any such objection? If so, then specify the manner of opposition (eg, in writing, via fax, etc.).

Yes

No



2. Contracting Authority subject of objection

*Name of the contracting authority .*

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*Name and position of the official against whom was made the objection*

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3. Nature of the Required Correction Amount

*What correction amount do you want?*

## 4. List

For a complaint to be considered submitted, it must be complete. Attach a legible copy of all documents pertaining to your complaint and a list of all these Public Concession Standard Public Documents

**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

Documents should normally include any published notice, all competitive process documents, all changes and additions, your proposal; all correspondence and any written information relating to an objection you have made. Determine which of the information is confidential, if any. Explain why the information is such, or submit a version of the relevant documents with the confidential sections removed and a summary of the content.

Note:

For complaints to the Public Procurement Commission, please refer to the Complaint Form issued by this institution.

Send the filled form of the complaint for procurement, all the necessary annexes and some additional copies to the **Respective Authority according to Law No. 125/2013 “On Concession and public private partnership”**.

**Note:** For the complaints filed at the Public Procurement Commission shall be referred to the Complaint Form extracted from this Institution.

**No. Fax:**

**E-mail:**

**Signature and seal of the complainer**



**“On Improvement of Educational Infrastructure of Tirana Municipality in Tirana 4 Zone”**

**Annex 22**

[ Annex to be filled by the Economic Operator ]

**FORM OF POWER OF ATTORNEY**

Today on date, month, year .....

Before me

The public notary

The undersigned Mr. /Ms in the capacity of

Nationality

Holder of Passport or ID card No. issued by \_

On resident in

Appoint Mr/Ms. in the capacity of \_\_\_\_\_ to :

- (a) Sign or seal and submit to competent authorities all the documents listed in Table 1, attached;
- (b) Submit and receive any kind of document or instrument related to documents listed in Table 1, attached;
- (c) Carry out all the necessary or additional actions regarding issues determined in this document, including signature and implementation of any act that is needed for implementation and completion of documents listed in Table 1 or that these document derive.

And is authorized to appoint other persons to exercise all or a part of the rights defined in this Power of Attorney.

<sup>i</sup> Added with CoMD No. 401 dated 13.5.2015