

TECHNICAL SPECIFICATIONS



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***Reconstruction of 9-Year School “Emin Duraku”,
Tirana Municipality***

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“Reconstruction of 9-Year School “Emin Duraku”,

Tirana Municipality

Structural Technical Specifications

STRUCTURAL TECHNICAL SPECIFICATIONS

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1. General

The publications listed below form a part of this specification to the extent referenced.

1.1. European Norms and Standards

DIN EN 12350-1 : 2001	On-site concrete sampling
DIN EN 12390-2	Concrete Test Specimens Preparation and Curing
DIN EN 12504-1	Sampling of Hardened Concrete
DIN EN 12390-3	Destructive Testing of Concretes
	Compression Test
DIN EN 934-2	Concrete Admixtures - Definition and Classification
DIN EN 206	Concrete
DIN EN 12350-2	Determination of Consistency - Slump Test

1.2. Concrete Qualities

Concrete shall be in strict accordance with applicable portions of DIN EN 206-1. The concrete shall have a 28-day compressive strength.

The work covered by this section of the specifications consists in the supply of all site, work, equipment, tools and materials, and the performance of all work, in connection with the casting, care, finishing of concrete work and reinforcing steel in strict accordance with this chapter of specifications and project implementation.

At the beginning of the Contract the Contractor must submit for approval to the Supervisor of Works a notice on the methods detailing in relation to the requirements of these Specifications, his proposals for the organization of concreting activities in the square (field). The announcement of methods will include the following issues:

1. Proposed production unit
2. Placement and extension of concrete production equipment
3. Proposed methods for organizing concrete production equipment



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4. Quality control procedures of concrete and concrete materials
5. Transport and casting of concrete
6. Details of the work of making the molds including the time of removal of the molds and the procedures for the temporary support of the beams and soles.

2. Products

2.1. Concrete

2.1.1 Strength Requirements

Concrete classified as follows shall be proportioned and mixed for the following strength characteristics in accordance with DIN EN 206-1

Class	Characteristic 28-day Cube Strength	usage
XC2 C16/20	20 N/mm ²	Sub base
XC2 C25/30	30 N/mm ²	Foundation slab
XC2 C30/37	37 N/mm ²	Structural columns, walls and structural slab
XC2 C7/10	10 N/mm ²	For sub base foundations

2.1.2 Concrete Qualities:

- General: Concrete shall have a minimum compressive strength as indicated, in the table of paragraph 2.1.1 unless specified otherwise.
- Concrete Consistency: Tests of the concrete consistency, esp. the slump test shall be carried out in accordance to DIN EN 12350-2



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2.1.3 Ready-Mixed Concrete:

DIN EN 206-1. Ready-mixed concrete is defined in this specification as concrete produced regularly by a commercial establishment and delivered to the purchaser in the plastic state. Ready-mixed concrete may be used provided that:

- The plant has sufficient capacity and transportation equipment to deliver the concrete at the rate desired
- The interval between batches for a pour shall not exceed 30 minutes
- The time elapsing between the introduction of the mixing water to the cement and aggregates, or the cement to the aggregate, and place of the concrete in final position in the forma shall not exceed one hour

2.2. Cement:

The cement used in the Works shall be ordinary Portland cement, if not specified separately. Portland cement shall comply in all respects with DIN 1164 or EN-2 for Ordinary Portland Cement.

- a. Ordinary Portland Cement will be used with BS 12 or ASTM C-150 Type II or Type V. This will be used where the concrete is not in contact with sewage, gas pipe or groundwater.
- b. Portland Sulfate Resistant Cement will be used with BS 4027. This will be used for concrete structures including wells and all other contact materials in contact with sewage, gas pipe or groundwater.

Cement must be distributed in original marked packages undamaged directly from the factory and must be stored in a warehouse, the floor of which must be raised at least 150mm from the ground. A sufficient quantity must be kept in reserve to ensure a continuous supply at work, in order to ensure that the various shipments are used in the way they are distributed. Cement should not be stored on site for more than three months without the permission of the Works Supervisor. Any other type of cement, except that which is intended for use in work should not be stored in such warehouses. All cement should be kept well ventilated and any cement that has started to harden, or otherwise damaged or deteriorated, should not be used. Factory analysis sheets must accompany each shipment certifying that the cement, which is distributed in the square has been tested and has met the requirements mentioned above. Upon arrival, certificates of such evidence must be passed to the Supervisor for approval. The cement obtained by cleaning the cement bags or by cleaning the floor will not be used. When instructed by the Works Supervisor, suspicious cement should be retested for loss of compressive strength.

2.3. Water:

The water used for concrete must be clean, fresh and free of mud, organic vegetable impurities and free of salts and other substances that interfere with or damage the strength or durability of the concrete. Water should preferably be provided from public supplies and can only be obtained from other sources if approved by the Supervisor of Works. Water from



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excavations, surface drains or irrigation canals should never be used. Only quality approved water should be used for washing and cleaning fittings, concrete care and similar purposes.

Water used for making and curing concrete shall be from a source approved by the Supervisor/Engineer and at the time of use shall be free from polluting matter in any quantity

2.4. Aggregates for Concrete:

Aggregates for concrete shall be coarse aggregate and fine aggregate conforming in all respects to ISO standards or equivalent standards. The grading should be such as to produce a concrete with the specified proportions and consistency and one that is readily workable.

2.5. Curing of Concrete:

Concrete must be treated during its curing so that conditions are created that allow necessary level of hydration to be reached and restrain the formation of shrinkage crack. Fresh concrete must not be exposed to shocks, vibrations or rapid cooling for 18 hours, and heating or drying for a period of at least 7 days.

2.6. Testing of Concrete:

The Contractor shall make all necessary arrangements for the sampling and testing of fresh and hardened concrete in accordance with the provisions of DIN 1048 and shall supply all necessary apparatus, labour, materials and transport.

2.7. Formwork:

The Contractor shall be responsible for the design of the formwork and shall supply and fix all necessary formwork, together with its attendant scaffolding, timbering, shoring, strutting, etc., required for the place of concrete. Where timber boarding is used, the formwork surfaces coming in contact with wet concrete shall be made of properly seasoned timber, of sufficient thickness to resist the pressure of the wet concrete whilst it is being placed and vibrated, without any distortion whatsoever.

2.8. Admixtures:

Additives for concrete shall conform to DIN EN 206-1. Super plasticizer admixture shall come from the same manufacturer as other admixtures, or shall be certified to be compatible with all admixtures



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2.9. Reinforcement:

- Reinforcing Bars, according to ENV 10080 shall be a ribbed reinforcing steel with a characteristic yield strength of 500 N/mm² and a minimum diameter of 8mm. (German BSt 500 S according to DIN 488).
- Connecting Rods of the reinforcement bars shall be wire bars with diameter 1.2 mm.

2.10. Concrete Cover of Concrete

The minimal concrete cover will be:

- | | |
|--|-------|
| ➤ Concrete in contact with the ground | 50 mm |
| ➤ Concrete exposed to atmospheric agents | 35 mm |
| ➤ Internal concrete (beams, columns) | 30 mm |
| ➤ Internal concrete (slabs) | 15 mm |

2.11. Overlapping Steel Bars:

The overlapping steel bars will be 40 Ø unless specified otherwise.

3. Execution:

3.1. Materials:

Steel reinforcement shall be high tensile, high-bond deformed bars complying with the requirements of Albanian Standards or EU norms and with a guaranteed yield stress of not less than 420 N/mm².

3.2. Minimum Test Procurement

Every 50 tons samples shall be taken and tested for:

- Tensile Strength
- Yield Point
- Elongation after fracture
- Behaviour in the bend test
- Behaviour in the rebound test



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➤ Chemical composition

3.3. Measuring, Mixing, Transporting and Placement of Concrete

Concrete shall be poured monolithically.

3.3.1. Ready-Mix Concrete

Ready mix concrete furnished in revolving concrete mixers on trucks will be acceptable provided the requirements of DIN EN 206-1, and the following are met:

The ready-mixed concrete manufacturer shall furnish duplicate delivery tickets with each load of concrete delivered to the project site, one for the Supervisor or his representative and one for the Contractor. In addition to the requirements of DIN EN 206-1, the delivery tickets shall provide the following information:

- a. Type and brand of cement
- b. Cement content per cubic meter of concrete
- c. Maximum size of aggregate
- d. Total water content expressed by Water/Cement Ratio
- e. Truck identification
- f. Volume of concrete in truck
- g. Batch time

3.3.2. Placement:

Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 30 degrees Centigrade. Reduce mixing time to 60 minutes if the air temperature is greater than 30 degrees Centigrade. Additional water may be added, provided that both the specified maximum slump and water-cement ratio are not exceeded. Do not place concrete when: (a) weather conditions prevent proper placement and consolidation; (b) in uncovered areas during periods of precipitation; and (c) in standing water. Prior to place concrete, remove dirt, construction debris, water, snow, and ice from within the forms. Concrete shall not be permitted to free fall over a height of more than 3 m to prevent segregation.

Consolidate concrete slabs greater than 10 centimetres in depth with high frequency, internal, mechanical vibrating equipment supplemented by hand spading and tamping.

Consolidate concrete slabs 10 centimetres or less in depth by hand rodding, tamping and spading.

-
- Concrete Vibration: Immediately after placing, each layer of concrete shall be vibrated using internal concrete vibrators supplemented by hand spading and tamping. Tamping or other external vibrations of forms are not permitted. Vibrators shall not be used to transport concrete inside forms. Internal vibrators submerged in concrete shall maintain a minimum frequency of not less than 8000 vibrations per minute. Duration of vibration shall be limited to time necessary to produce satisfactory consolidation, generally from 5 to 15 seconds. Vibrators shall be applied at uniformly spaced points of 45 centimetres.
 - Cold Weather: Provide and maintain 10 degrees’ Centigrade minimum concrete temperature. Do not place concrete when the ambient temperature is below 5 degrees Centigrade. Cover concrete and provide with a source of heat sufficient to maintain 10 degrees Centigrade minimum while curing.
 - Hot Weather: Provide and maintain 32 degrees’ Centigrade maximum concrete temperature. Cool ingredients before mixing, or use other suitable means to control concrete temperature to prevent rapid drying of newly placed concrete. Shade the fresh concrete and start curing as soon as the surface of the fresh concrete is sufficiently hard to permit curing without damage.

3.4. Stripping of Formworks:

Formwork shall not be removed before the concrete has attained sufficient strength to support its own mass and any loads that may be imposed on it. This condition shall be assumed to require formwork to remain in place, after place of the concrete, or the appropriate minimum period of time given in the Table below, unless the contractor can prove to the satisfaction of the Supervisor or his representative that shorter periods are sufficient to fulfil this condition.

Minimal periods before stripping the formworks:

Type of formwork	Surface temperature of concrete	
	16°C	7°C
Vertical formwork for columns	3 days	5 days
Formwork for walls and large beams	2 days	3 days
Formwork for slabs	4 days	7 days
Side formwork for slabs	11 days	14 days
Formwork for beams	8 days	14 days
Side formwork for beams	15 days	21 days



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4. Excavation

4.1. Purpose

This section contains general definitions and requirements for earthworks (in volume and / or layer) and excavations for canal structures, including underwater excavation. It further covers all work related to cutting construction, removal of unsuitable waste materials, and cutting slope finishes.

4.2. Definitions

The following definitions should apply:

- SOILS

Excavation in soils should be applied to all materials that can be excavated with both arms (including pickaxes) and machinery.

- SUITABLE MATERIALS

Suitable materials will include all materials that are acceptable in accordance with the contract of use in the works and that are able to be compacted in a specified manner to form a filling or track.

4.3. Excavation

- Excavation must be carried out in accordance with the levels and line of cuts as shown in the Drawings. Any greater depth excavated below the level of the formation, within the permissible tolerance, must be done well by filling with acceptable materials with similar characteristics by the Entrepreneur at his own expense.
- Particular care should be taken when digging cuts to avoid removing material beyond the specified cutting line and subsequently causing hazard to the structural stability of the slope or causing erosion or disintegration of compacted parts.
- The dimensions of the cuts must be in accordance with the details of the type cross sections as shown in the Drawings.

4.4. Treatment/Compaction of Excavated Areas

- The areas and slopes of the cuts must conform to the Drawings and must be adjusted according to a clean standard line, for a given type of material.
- All excavated horizontal areas must be compacted with a minimum dry density of 95% for loamy soils and 90% for bound soils.



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4.5. Site Cleaning

All sites where it will be excavated will be cleared of all shrubs, plants, thorns, large roots, fertilizers and other surface materials. All these materials will be moved and removed in order to be pleasing to the Employer. All trees and shrubs designated by the remaining Employer will be protected and stored in an approved manner.

All existing structures identified for demolition will be removed as instructed by the Works Supervisor. This will include shifting the foundations of buildings that may be encountered.

The contractor will take all necessary measures to protect the existing water lines, fences and services that will remain on the construction site. The cost of cleaning the site is mandatory to be paid within the unit price for excavation works.

4.6. Excavation for Structures

Excavation for structures must be in accordance with the Drawings. The sides should be supported appropriately at all times. An alternative is that they can be compressed appropriately.

Excavations must be kept clean of water. The sole of all excavations must be carefully leveled. Any part with soft material or rock debris in the sole should be removed and the resulting cavity filled with concrete.

4.7. Excavation of Canals for Pipelines

The channels will be excavated to the dimensions and level shown in the drawings and / or in accordance with the written instructions of the Supervisor of Works. The item shown in the Volume table (Preventive) regarding excavations, such as the removal of excavated material, etc. will include any type of soil, unless otherwise specified. Arm excavation is also necessary in the vicinity of intersections of other infrastructures to prevent their damage. With the exception of the places mentioned above, machinery may be used.

Unless otherwise ordered or allowed by the Supervisor of Works, no more than 30 meters of canal should be opened before the completion of the pipeline laying in this part of the canal. The width and depth of the pipeline channels will be as specified in the contract drawings or as instructed by the Supervisor of Works.

The grooves for the connecting parts will be dug by hand after the end of the channel is leveled. Unless otherwise required, the ducts for the pipelines will be dug below the level of the lower part of the pipeline as shown in the drawings, to enable the realization of the pipeline bed with granular material.



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4.8. Usage of Excavation Materials

All suitable and approved excavation materials should, as long as they are practical, be used in construction for filling and road works.

4.9. Construction of Fillings

The soil floor of the road layers is the part of the soil body where the gaps caused by the moving loads of the vehicles and the construction itself are distributed. This sole can be in filling or in excavation. In both cases it is necessary to provide a sole, to be able to transmit below, in the body of the earth the loads coming from the road layers, without suffering residual deformations.

The filling everywhere must have a density that referring to the modified AASHTO standard is max. in dry not less than 90%, for compacted lower layers and 95%, for the upper layer 30cm (subgrade).

Each layer should be glued to the optimum humidity by adding or drying the layer according to the case and the demand of the type of material to be used in the road filling.

Each new filling layer must be approved by the Supervisor of Works, after ensuring that the previous layer has no deformations or problems with water sources or excessive moisture.

The choice of compaction equipment is free to be made by the Contractor, it is enough for the compaction equipment to provide the necessary energy and to achieve the required compaction densities for the layer under construction.

4.10. Replenishment of Foundations

All fillings for this purpose should be made of suitable materials and compacted, unless otherwise indicated in the Drawings or ordered by the Works Supervisor.

4.11. Reinforcement of Buildings

As part of the work on the excavation works, the Entrepreneur, at his own expense, will reinforce all constructions, walls and other structures, the durability of which must guarantee non-risk during the implementation of works and will be fully responsible for all damages. of persons or property that will result from accidents of any of these buildings, walls or other structures.

If any of these assets, structures, installations or services are endangered or damaged as a result of the Contractor's actions, he should immediately report these risks or damages to the Project Manager and related authorities and take immediate action to correction always with the consent of the Supervisor of Works or the relevant authorities.



4.12. Reinforcement and Coating of Excavation

If routine excavation is not possible or advisable, supporting structures should be placed during excavation to prevent injuries and delays in work as well as to create safe working conditions. The contractor will supply and install all supporting structures, covers, beams and similar tools necessary to secure the work, the public in general and the nearby assets. Protective structures will be removed according to the progress of the work and in such a way as to prevent damage to the completed work as well as to the structures and assets that are nearby. Once these are removed all the gaps left by the removal of these structures should be carefully filled with selected and compacted material. The entrepreneur will be fully responsible for securing ongoing work, completed work, employees, the public and nearby assets. The cost of reinforcement and excavation coating is included in the unit price for excavation.

4.13. Maintenance of Excavations

All excavations will be properly maintained while they are open and exposed, both during the day and at night. Sufficient barriers, warning lights, signs, as well as similar tools will be provided by the Entrepreneur. The entrepreneur will be liable for any damage to the person or property due to his negligence.

4.14. Removal of Water from Excavation Works

As part of the work on the excavation items and not at a cost plus for the Employer, the Entrepreneur will build all the drains and will carry out the drainage with drainage channels, pumping or buckets as well as all other works necessary to keep the part clean excavated from sewage and external water during the advancement of work and until the finished work is secured from damage. The contractor must provide all the pumping equipment for the water drying works as well as the operating personnel, energy and others, and all this at no additional cost to the Employer. All water pumped or drained from the work must be removed in a manner approved by the Works Supervisor. Necessary precautionary measures should be taken against floods.

4.15. Reinforcement and On-site Coverage

The employer may order in writing that any or all reinforcements and load-bearing structures be left in place for the purpose of precautions for protection against damage to structures, other property or persons, if these load-bearing structures are marked on drawings or placed according to instructions, or for any other reason. If left in place these protective structures will be cut to height according to the instructions of the Supervisor of Works. The supporting structures that remain in place will be well tightened and will be paid according to the values to be mutually agreed between the Entrepreneur and the Employer or according to the price in the Bid if given, or by a written change order.

4.16. Protection of Existing Services

The contractor will take special care of the existing services that are under the surface which may be encountered during



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the implementation of works and which require special care for their protection, such as sewer pipes, main water pipes, electrical cables, telephone cables such as and the foundations of nearby structures. The contractor will be responsible for the damage of any of the services and must repair them at his own expense, whether or not these services are presented in the project. If the relevant authorities agree to fix themselves or through a sub-Entrepreneur appointed by him, the damages caused in these services, the Entrepreneur will reimburse all the cost necessary for this repair, and if he does not do so, these costs may be deducted from any payment that the Employer has to make or will make to the Contractor in continuation of the works.

4.17. Removal of Excess Materials from Excavation

All excess material excavated by the Entrepreneur will be disposed of at approved sites. When it is necessary to transport material on paved roads or places The Contractor must secure this material from dumping on roads or paved places.

4.18. Measures

All excavation items will be measured in volume. The measurement of the excavation volume will be based on the dimensions obtained from the drawings in which the excavation dimensions are determined.

Any excavation beyond the limits set out in these drawings will not be paid, unless previously specified in writing by the Supervisor of Works. However, if the excavation is less than the volume calculated from the drawings, the actual excavation volume will be paid according to the actual measurements.

Hydajet TOTA

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