# JTJ

**PROFESSIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA**

# 中华人民共和国行业标准

**JTJ 041-2000**

# Technical Specification for Construction of Highway Bridge and Culverts
# 公路桥涵施工技术规范

**Issued on August 24, 2000** **Implemented on November 01, 2000**

**Issued by Ministry of Communications of the People's Republic of China**

# Notification of Issue of *Technical Specification for Construction of Highway Bridge and Culverts*

## (No JTJ 041—2000)

Document No 434 [2000] from Highway Dept, Ministry of Communications

To Ministry of Communications in each province, municipal and autonomous regions; to Beijing Highway Bureau, to Shanghai Municipal Engineering Management Bureau; to relevant units, colleges and universities concerned with design, construction, research and supervision of highways,

Please be informed that *Technical Specification for Construction of Highway Bridge and Culverts* (No JTJ 041—2000) is now issued as professional standards in effect from November First, 2000 on, which makes invalid the *Technical Specification for Construction of Highway Bridge and Culverts* (No JTJ 041—89).

The said 2000 Specification is under compilation and interpretation from RBG First Highway Engineering Bureau, published from the People's Communications Press. It is expected that experience be accumulated and summarised in practice to inform the said No One Highway Engineering Bureau of any defects therein or any proposal for improvement for reference in modification.

Ministry of Communications, People's Republic of China

# Preface

In line with the document No [1997] 1085 from the Highway Bureau, Ministry of Communications and the document No [1997] 028 from the Highway Department, Ministry of Communications concerning modification of *Technical Specification for Construction of Highway Bridge and Culverts*, three years' endeavours have completed the interpretation of relevant articles and clauses thereof.

In light of challenge from complicated modification tasks, a compilation tem is formed in accordance with recommendation from the Highway Department of Ministry of Communications, with Shen Tianyong as dean, Chen Mingxian, Zheng Yushu, Huang Jianyue, Zhang Zhengxian as members. The said team is responsible for organization and coordination of modification of the said Specifications.

The said modified Specifications is capable of better expression of the construction techniques as applied in China in recent years in construction of highways and bridges, in line with numerous latest standards applicable domestically as issued by the government or by the relevant profession. After modification the Specifications on the whole covers any such respect as various construction techniques and process in construction of highways and bridges as well as construction requirement in key net, to play an instructive and guideline role in improvement of domestic construction techniques, in normalization of construction approaches and in assurance of construction quality.

The major items under modification in the said Specifications go as follows: original Chapter 6 of Column Foundation and Chapter 17 of Wood Bridge are cancelled; original Chapter 14 of Assembly Concrete, Reinforced Concrete and Pre-stressed Concrete is under adjustment to be Chapter 15 of Reinforced Concrete and Pre-stressed Concrete Beam Bridges; original Chapter 16 Suspended Bridges and Cable-stayed Bridges is adjusted to Chapter 18 Suspended Bridges and Chapter 19 Cable-stayed Bridges; original Chapter 19 Thrust of Bridges and Culverts and Chapter 20 Drainage & Water-Proof of Bridges & Culverts are combined to Chapter 22 Approaches, Bridges & Culverts. Newly added to the Specifications are such contents as Chapter 8 Underground Continuous Walls, Chapter 16 Arch Bridges and Chapter 22 Bridge Deck & Accessories Works, with numerous contents under supplement to each chapter.

Any problems as discovered and any proposals as formulated in compliance with the said Specifications are expected to inform RBG First Highway Engineering Bureau (Guanzhuang, Chaoyang District, Beijing, ZP: 100024) for reference in consequent modification.

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# Contents

# 1 General Specification

**1.0.1** This Specification is formulated for the sake of satisfaction of the demand for domestic highway and bridge construction and for guarantee of the quality thereof.

**1.0.2** This Specification is applicable for construction of fresh construction and re-construction of highways and bridges, for reference of major and medium-scaled overhaul in highways and bridges.

**1.0.3** Construction of highways and bridges shall proceed in line with relevant national infrastructure procedure. Any personnel in charge of engineering quality of the project under question shall undertake inspection concerning the said works and shall cooperate with the supervisors concerning check and acceptance after completion of the works.

**1.0.4** Construction of highways and bridges shall never commence prior to completed preparation. Such work as technical instruction, construction organization and construction management shall be in strict compliance with this Specification and relevant technical specification.

**1.0.5** Such new technique, new process, new materials and new equipment as proves mature and authorized by departments in charge shall be actively introduced into construction of highways and bridges in order to speed up modernization in construction thereof.

**1.0.6** Greatest attention shall be paid to saving of land in construction of highways and bridges in order to occupy as limited land as possible. All measures shall be undertaken to eliminate or reduce pollution to the environment in order to protect the nature.

**1.0.7** After completion, appropriate treatment shall be made concerning temporary works, temporary accessory facilities, temporarily occupied land and spoil, to achieve completion of the works in harmony with site clearing.

**1.0.8** Civilized engineering and safety operation shall be undertaken in construction of highways and bridges, in strict accordance with safety operation regulations by way of strengthened safety instructions and by establishment and perfection of safety operation rules.

**1.0.9** Construction of highways and bridges shall, in addition to this Specification, be in line with national and professional compulsory regulations, laws and decrees.

# 2 Definitions

**2.0.1** Control survey refers to the survey work for the establishment of surveying network, including but not limited to plane control survey, elevation control survey and 3-D control survey.

**2.0.2** GPS control survey of highway means any survey by employment of GPS for survey of various control point coordinates during highway construction.

**2.0.3** River-crossing leveling refers to leveling conducted in the case of line of sight coverage beyond designed requirement across rivers or lakes (including ponds, open canals, lowland or valleys).

**2.0.4** Construction survey means any works undertaken before or during the actual operation in line with the design plan for the purpose of determination of site approaches and structure location.

**2.0.5** Final survey is conducted concerning all actually completed works after completion of the project for the sake of compilation of acceptance documents.

**2.0.6** Cofferdam is the temporary works for water retaining during underground operation.

**2.0.7** Anchor refers to the temporary structure for the sake of tightening of the cables for holding of any ships or double-walled steel cofferdam.

**2.0.8** Ring curtain wall de-watering means a ring of de-watering wall established outside the foundation pit side for the purpose of reduction of seepage and prevention of such disaster as floating sand, sudden blow, suffusion, and underground erosion.

**2.0.9** Subsoil refers to the stratum that is under direct bearing of the structure.

**2.0.10** Consolidated subsoil means any subsoil under treatment from such consolidation approaches as replaced soil, compaction, and organic or non-organic materials.

**2.0.11** Natural subsoil is the subsoil prior to any artificial consolidation treatment or disturbance.

**2.0.12** Penetrated piles refer to any column-like structure made of fiber, steel, or reinforced bar, sunk or buried into the foundation after such work as hammering, vibration, jetting or static load.

**2.0.13** Penetration refers to the penetration as measured concerning each hit or per minute during hammering of piles, as indicated in mm/hit or mm/min.

**2.0.14** Cast-in place concrete piles are piles made of concreting into the drilled holes in the foundation by artificial or mechanic approaches.

**2.0.15** Large diameter piles refer to drilled piles with a diameter larger than 2.5m.

**2.0.16** PHP mud means the mud made of hydrolysate betonite, sodium carbonate, polystyrene and saw dust, rice straw, cement or organic fibre composite in certain proportion, featured by non-dispersion, low phase and high cohesion.

**2.0.17** Friction piles refer to the piles with major support from friction out of the pile surface and the foundation.

**2.0.18** Bearing piles are piles whose major support comes from the reverse force of the bottom end.

**2.0.19** Open caisson foundation refers to the foundation in form of shallow well-shaped structure with open ends, with the shaft as outer shell, penetrated into the underground up to designed elevation.

**2.0.20** Underground continuous wall is a unit wall out of special excavation equipment around the deep foundation or underground structure with the wall under support from mud, with certain width (or diameter) and depth, in form of pitch or canal and with bridle iron inside, concreting by guide pipes, constructed step by step, connected in certain approaches, until to form a continuous underground reinforced wall, to serve as support for the foundation pit against seepage, earth retaining, and support for structure adjacent, as well as part of direct bearing of vertical load of the foundation structure. Such an underground wall makes cast-in-place reinforced underground continuous wall.

**2.0.21** Guide wall is a wall constructed for guide of underground continuous wall, for mud storage and maintenance of surface height, for support of wall excavation equipment, for stability of pit surface earth and prevention of underground water into the pit, in form of plate, or reverse L.

**2.0.22** Flash butt welding of reinforcing steel bar means the form to connect 2 iron bars, by thermo melting of the contact points between the said bar, with strong flash like lightening, to be completed quick top pressure.

**2.0.23** Electroslag pressure welding of reinforcing steel bar is achieved by placement of 2 steel bars at straight angles, with welding current flowing through the interval between 2 bars' end, to produce arc and slag process below welding flux together with resistance heat and arc heat that melts the bars to be completed from pressure.

**2.0.24** Submerged-arc pressure welding of reinforcing steel bar at embedded components is achieved by position of steels plates and bars at T-typed angle, with welding current flowing to produce arc below the welding flux together with melting pond to be completed from pressure.

**2.0.25** Rebar mechanical splicing is achieved by mechanical splicing or by pressure upon the end of the bars, to transfer force from one bar to another.

**2.0.26** Compressed sleeve coupler refers to the coupler completed out of forcing connected steel shaft into deformation to produce splicing with steel bars with ribs.

**2.0.27** Coupler of taper threaded sleeve means the sleeve out of splicing between the special tapered screw at the end of the bar and the tapered sleeve.

**2.0.28** Coupler of linear screw thread sleeve means the sleeve out of splicing between the special linear screw at the end of the bar and the linear sleeve.

**2.0.29** Welding fabric means the reinforcing bar net out of bars arranged at straight angle of certain interval in longitude and horizontal direction, with all connections under welding from electric resistance.

**2.0.30** Cement strength refers to the strength of cement as classified in terms of compressive strength and flexural strength, at the unit of MPa, in degree of 32.5, 32.5R, 42.5, 42,5R, 52.5, 52.5R, 62.5 and 62.5R.

**2.0.31** Durability of cement refers to the capability of the cement under normal design, construction and maintenance, frost-resistant and preventive of steel bars from erosion as well as seepage-free.

**2.0.32** Major volume concrete refers to any concrete whose minimum side size is 1~3m and which requires certain measures to avoid hydration heat that may produce temperature change to go beyond 25 $^{0}$C.

**2.0.33** Pretensioning method is a construction method in which pretentioned steel is first pulled in the buttress followed by concreting to form cast-in-place pre-tensioned concrete structure.

**2.0.34** Post-tensioning method is a construction method in which concreting is cast first followed by pull of pretentioned steel when the cement reaches design strength to form cast-in-place pre-tensioned concrete structure.

**2.0.35** Rubbles are rocks in line with engineering works, employed in various shapes with side no less than 15cm.

**2.0.36** Block stones are rocks in line with engineering works, employed and processed to form relatively unique shapes.

**2.0.37** Dressed stones refer to stones under process as required to form unique shapes.

**2.0.38** Surface factor of structure means the ratio between the cooling area ($m^2$) and the volume (m3) of the said structure.

**2.0.39** Span by span method (stepping formwork) is a kind of construction methods in which the support and forms are adopted that may move around the pier on the basis of which precast concrete beam or cast-in-place beam may be constructed span by span with pre-stress upon each span.

**2.0.40** Cast-in-place cantilever method is a type of construction methods in which a work platform is established on two ends of the pier on the basis of which concreting on beam by way of cantilever is conducted in balance span by span with pre-stress placed span by span.

**2.0.41** Movable suspended scaffolding refers to the major process in which, in the case of concreting of inclined beam, T-structure or continuous beam, the construction facilities may bear the major construction load and the gravity of the beam and may move gradually span by span. The said facilities are made mainly of load-bearing system, hoisting system, anchoring system, runaway system and form and support system.

**2.0.42** Expansion joint means the interval constructed in advance within the structure for the purpose of elimination of impact from material expansion upon the structure.

**2.0.43** Settlement joint refers to the interval constructed in advance within the structure for the purpose of prevention of uneven deformation in the foundation.

**2.0.44** Construction joint refers to the splice section reserved in designed area or the post-concreting partition ditch that occurs during concreting which can not be performed in a continuous way due to technical or organizational causes.

**2.0.45** Erection by protrusion means a kind of construction methods by which a hanger frame is established on both ends of the pier for the sake of concreting in balance toward the beam between the spans with pre-stress placed section by section.

**2.0.46** Corbel refers to the support made of bury-in parts in the piers or of universal rods applicable during concreting of the suspended sections in the case of construction of pier top and beams adjacent.

**2.0.47** Falsework refers to the support made of bury-in parts in the piers or of universal rods in line with the pier height, pile cap type, and geology, applicable during cantilever concreting of the

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