CHINA REPORT

CONSTRUCTION PROCUREMENT AND COST INTELLIGENCE

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RLB 利比 Rider Levett Bucknall

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FOREWORD

In 2017, China's economy achieved a steady growth which is expected to continue into the near future. China's GDP has increased 6.9% year-on-year. There have been structural enhancement and improved efficacy in the economy as evidenced by the expansion of job opportunity, an increase in average household income, a steady rise in of commodity price and an improvement in foreign investment.

The total investment in real estate developments in China was RMB10.9799 trillion in 2017, a year-on-year growth of 7.0%, and a drop by 0.5% as compared to the first 11 months of 2017. Total residential property investment reached RMB7.5148 trillion, a year-on-year growth of 9.4%, and a drop by 0.3% as compared to the first 11 months of 2017, and accounted for 68.4% of the total investment in real estate development.

The total investment in real estate developments in Eastern China* amounted to RMB5.8023 trillion in 2017, a year-on-year growth of 7.2 %, and a drop by 0.2% as compared to the first 11 months of 2017; while that in Central China* reached RMB2.3884 trillion, a year-on-year growth of 11.6%, and a drop by 0.8% as compared to the first 11 months of 2017; and that in Western China* reached RMB2.3877 trillion, an increase of 3.5%, and a drop by 0.8% as compared to the first 11 months of 2017.

In 2017, the total floor area under construction in the real estate developments was 7,814.84 million m^2, a year-on-year growth of 3.0%, and a drop by 0.1% as compared to the first 11 months of 2017. The floor area for residential development under construction was 5,364.44 million m^2, a year-on-year growth of 2.9%. The total floor area of new project was 1,786.54 million m^2, representing a year-on-year growth of 7.0%, and an increase of 0.1% as compared to the first 11 months of 2017. The total floor area of new residential project is 1,280.98 million m^2, representing a year-on-year growth of 10.5%. The total real estate completions reached 1,014.86 million m^2, a year-on-year down by 4.4%, a drop by 3.4% as compared to the first 11 months of 2017. The total completed residential floor area was 718.15 million m^2, representing a year-on-year down by 7.0%.

With regard to the land market, all land plots in terms of site area acquired by property developers and real estate companies amounted to 255.08 million m^2 in 2017, an increase of 15.8% as compared to last year, and a drop by 0.5% as compared to the first 11 months of 2017. The aggregate land transaction value of the land market was RMB1.3643 trillion, representing a year-on-year growth of 49.4%, up by 2.4% as compared to the first 11 months of 2017.

(Source: www.stats.gov.cn)

* Eastern China includes 10 provinces (cities), which are Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan.
* Central China includes 6 provinces, which are Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan.
* Western China includes 12 provinces (cities and autonomous regions), which are Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang.

IMPORT PRICE COMPONENTS FOR CHINESE BUILDING MATERIALS/EQUIPMENT

Building materials/equipment import price refers to the price of building materials/equipment imported from one country to another country given that a normal trade is conducted, i.e. the price of the products that the importers buy from the exporters. The price is mainly composed of the following parts:

1. Import price of commodities

Import price refers to sale price delivered to the shipment by the seller, so called FOB. Import price for building materials/equipment shall be calculated based on the manufacture's quotation and the purchase order.

2. Import expenses

All the related expenses except the material/equipment price (FOB) during the I/E (import/export) trade for the materials/equipment transported into China by importers and exporters.

2.1 International freight

The transportation cost from the port (station) of the seller to the port (station) in China. Most imported materials/equipment in our country are by shipping, some by railway and few by air. The international freight of the imported materials/equipment shall be calculated as below formula:
(1) International freight (sea, land, air) = Free on board (FOB) × Freight fee; or
(2) International freight (sea, land, air) = Freight quantity × Freight unit price,
Freight rate and freight unit price shall be calculated based on regulation from related authorities or I/E (import/export) company.

*Free on board (FOB) + International freight = Cost and freight (CFR)

2.2 Freight premium

The freight premium for I/E trade is a written agreement between the insurer (insurance company) and the insured (I/E company). The insurer shall reimburse the insured any financial loss under the liabilities which are covered in the insurance agreement. This falls under property insurance. The formula is
freight premium = (Free on board (FOB) + Overseas freight) / (1 - premium rate) × premium rate.
The premium rate shall refer to the premium defined by the I/E company for the imported goods.

*Free on board (FOB) + International freight + freight premium = Cost insurance and freight (CIF)

2.3 I/E expense

Including bank charges, I/E trade commission, tariff, sales tax, import VAT (value-added tax) and vehicle purchase tax for imported vehicle . It shall be calculated as below formula:
(1) Bank charges=Free on board (FOB) × RMB exchange rate × Bank charges rate.
(2) I/E trade commission=Cost insurance and freight (CIF)×RMB exchange rate× Foreign trade commission rate.
(3) Tariff=Cost insurance and freight (CIF) ×RMB exchange rate× Imported tariff rate.
(4) Payable sales tax = (Cost insurance and freight (CIF) ×RMB exchange rate + tariff) / (1- sales tax rate) × sales tax rate. Sale tax rate shall be calculated according to related regulation.
(5) Import VAT = Composite value × VAT rate; Composite value = Tariff dutiable value + Tariff + Sales tax. Sales tax rate shall be calculated according to related regulation.

2.4 Miscellaneous freight charges

The charges arising from purchasing, transportation, freight premium, storage, loading and unloading etc. for the imported materials/equipment transported from the port in China to the site warehouse or designated storage. It shall be calculated as below formula:
Miscellaneous freight charges = Free on board (FOB) × Freight charge rate. The freight charge rate shall be calculated according to related authorities.

3. Expected profit

The profit that the importer expects to make.

Please note the list above shall not be deemed as exclusive. Please consult with local authorities and I/E company for detailed regulations. Considering the fees may vary from region to region, the cost calculation shall be determined after consultation with local authorities.

IMPORT PRICE COMPONENTS FOR CHINESE BUILDING PRODUCT

Sample price breakdown

This case is the imported product - 18mm thick, Galala, Grade I Stone, Length: 1600mm-2800mm; Width: 1200mm-1800mm

The import price listed in the following table refers to the price of the product imported from Egypt to Shanghai, China

(Price as at fourth quarter of 2017)

Item			Price RMB/m²	Percentage %	Notes
1.	Import price of commodities		190.00	65.01%	Free on board (FOB)
2.	Import expenses		53.56	18.33%	
	2.1 International freight		12.38	4.24%	Ocean freight of goods from the port (station) of the seller to the port (station) in China (varies with seasons and shipping companies)
	2.2 Freight premium		0.29	0.10%	Financial reimbursement for any loss under the liabilities which are covered in the insurance agreement.
	2.3	I/E expense	34.82	11.91%	
		2.3.1 Bank charges	1.90	0.65%	
		2.3.2 I/E Trade Commission	0.62	0.21%	
		2.3.3 Tariff	-	-	N/A
		2.3.4 Sales tax	-	-	N/A
		2.3.5 Import VAT	32.30	11.05%	
	2.4 Miscellaneous freight charges		6.07	2.08%	The charges arising from purchasing, transportation, freight premium, storage, loading and unloading etc. for the imported materials/ equipment transported from the port in China to the site warehouse or designated storage.
3.	Expected profit(20% of total of items 1&2 above)		48.71	16.67%	
Import price (from 1 to 3)			**292.27**	**100%**	

SOME EXPORT COSTS OF CONSTRUCTION BUILDING MATERIALS

No.	Description	Sizes/Dimensions	Unit	Reference price (RMB) (Excludes export tax rebate)
1.	Precast reinforced concrete members			
	PC external wall panel	Precast external wall panel(ratio:130kg/m3)	m^3	3,400.00 ~ 4,190.00
	PCF external wall panel	Precast external wall panel(ratio:130kg/m3)	m^3	3,740.00 ~ 4,540.00
	Stair	Precast stair(ratio:125kg/m3)	m^3	3,010.00 ~ 3,710.00
2.	Timber door/Steel door			
	Painted timber door (for interior door)	800x2150x40	No.	550.00 ~ 1,100.00
	Painted timber door (for kitchens, toilets)	800x2150x40	No.	605.00 ~ 1,100.00
	Painted timber door frame (single door angle frame)	858x2041x150	No.	715.00 ~ 990.00
	Painted timber door frame (single door angle frame)	858x2041x250	No.	825.00 ~ 1,100.00
	Steel safety door	1000x2100	m^2	935.00 ~ 1,980.00
3.	Door hardware			
	Three-dimensional hinge (for sliding doors)	Standard product	No.	22.00 ~ 28.00
	Door lock (silent lock, suitable for interior door)	Standard product	No.	110.00 ~ 220.00
	Door lock (mute safety lock, suitable for interior door)	Standard product	No.	220.00 ~ 440.00
4.	Fire-rated door/fire-rated roller shutter			
	Steel fire-rated door	Customize size	m^2	750.00 ~ 3,600.00
	Timber fire-rated door	Customize size	m^2	850.00 ~ 1,500.00
	Composite type fire-rated steel roller shutter (4 hours FRP, exclude motor and accessories)	Galvanized steel	m^2	300.00 ~ 400.00
5.	Wall tile/floor tile			
	Emery sandstone (gloss finish)	600x600	m^2	80.00 ~ 95.00
	Emery sandstone (honed finish)	600x600	m^2	75.00 ~ 90.00
6.	Timber flooring			
	Wire drawing solid timber composite timber flooring(Hickory/Birch/Elm)	12mm thick	m^2	240.00 ~ 310.00
	Solid timber flooring(Merbau)	18mm thick	m^2	370.00 ~ 480.00
7.	Raised floor			
	OA network floor	500x500/600x600/609.4x609.4	m^2	170.00 ~ 200.00
	Free trunking floor	500x500/600x600	m^2	190.00 ~ 220.00
	Combined trunking floor	500x500/600x600	m^2	170.00 ~ 190.00
	Antistatic floor	600x600/609.4x609.4	m^2	250.00 ~ 270.00
	Calcium sulfate floor	600x600x30 (26)	m^2	210.00 ~ 240.00
8.	Gypsum board			
	Common gypsum board	9.5mm/12mm/15mm	m^2	9.00 ~ 18.00
	Moistureproof gypsum board	9.5mm/12mm/15mm	m^2	14.00 ~ 30.00
9.	Paint			
	Interior wall emulsion paint	Type I- Type III	kg	7.50 ~ 14.00
	Interior wall mouldproof paint	Type I- Type III	kg	12.00 ~ 24.00
	External wall emulsion paint	Type I- Type III	kg	15.00 ~ 19.00
10.	Glass (The given prices are for these kinds of glass which are not great than the standard size of 2.44m x 3.66 m)			
	Float transparent glass	6mm/8mm thick	m^2	47.00 ~ 63.00
	Toughened transparent glass	6mm/8mm/10mm/12mm thick	m^2	59.00 ~ 130.00
	Low iron float transparent glass	6mm/8mm thick	m^2	65.00 ~ 87.00
	Low iron toughened transparent glass	6mm/8mm/10mm/12mm thick	m^2	77.00 ~ 166.00
	6 mm/8 mm+12A+6 mm+1.52PVB+6mm toughened Low-E (double silver) insulated glass		m^2	397.00 ~ 417.00
	6 mm+12A+6 mm toughened Low-E (double silver) hollow glass		m^2	218.00 ~ 230.00
	8 mm+12A+8 mm toughened Low-E (double silver) hollow and hollow laminated glass		m^2	258.00 ~ 270.00
	6 mm+1.14PVB+6 mm toughened laminated glass		m^2	208.00 ~ 220.00
	8 mm+1.52PVB+8 mm toughened laminated glass		m^2	278.00 ~ 290.00
	12 mm+1.52PVB+12 mm toughened laminated glass		m^2	380.00 ~ 400.00
	12 mm+1.78SGP+12 mm toughened laminated low iron glass		m^2	830.00 ~ 860.00
11.	Structural Steel			
	Deformed steel bar			
		ø10/ø12/ø14/ø16/ø18/ø20/	ton	3,571.00 ~ 4,772.00
		ø22/ø25/ø28/ø32/ø40		
12.	Metal pipes			
	Galvanized steel pipe	DN20	m	7.20 ~ 7.30

No.	Description	Sizes/Dimensions	Unit	Reference price (RMB) (Excludes export tax rebate)
12.	Galvanized steel pipe	DN25	m	8.80 ~ 8.90
		DN32	m	11.40 ~ 11.60
		DN40	m	12.90 ~ 13.00
		DN50	m	16.40 ~ 16.60
		DN70	m	20.20 ~ 20.40
	"W" centrifugal cast iron pipe	DN50	m	42.80 ~ 52.30
		DN75	m	61.80 ~ 75.60
		DN100	m	77.60 ~ 94.90
		DN150	m	128.90 ~ 157.50
		DN200	m	192.70 ~ 235.50
13.	Non-metal pipes			
	UPVC pipe	DN50	m	4.40 ~ 6.00
		DN75	m	7.60 ~ 10.20
		DN100	m	16.30 ~ 22.10
		DN150	m	27.80 ~ 37.70
		DN200	m	45.20 ~ 61.20
14.	Cables and wirings			
	Wiring	WDZB-BYJ-2.5mm^2	m	2.30 ~ 2.80
		WDZB-BYJ-4.0mm^2	m	3.40 ~ 4.20
		WDZB-BYJ-6.0mm^2	m	4.90 ~ 6.30
		WDZB-BYJ-10.0mm^2	m	7.80 ~ 9.70
	Cable	WDZA-YJY-4x2.5+E2.5mm^2	m	12.10 ~ 16.00
		WDZA-YJY-4x10+E10mm^2	m	34.80 ~ 46.40
		WDZA-YJY-4x50+E25mm^2	m	142.10 ~ 184.20
		WDZA-YJY-4x120+E70mm^2	m	347.00 ~ 452.00
		WDZA-YJY-4x240+E120mm^2	m	693.90 ~ 893.40
15.	Valves			
	Ball valve (copper)	DN20	No.	18.50 ~ 22.60
		DN25	No.	29.30 ~ 35.90
		DN32	No.	44.50 ~ 54.30
		DN40	No.	70.00 ~ 85.50
	Gate valve (copper)	DN20	No.	22.50 ~ 27.50
		DN25	No.	32.00 ~ 39.10
		DN32	No.	42.50 ~ 52.00
		DN40	No.	57.70 ~ 70.50
		DN50	No.	85.10 ~ 104.00
	Gate valve (ductile iron)	DN65	No.	864.00 ~ 1,056.00
		DN80	No.	972.00 ~ 1,188.00
		DN100	No.	1094.40 ~ 1,337.60
		DN125	No.	1,488.60 ~ 1,819.40
		DN150	No.	1,641.60 ~ 2,006.40
	Butterfly valve (ductile iron)	DN50	No.	240.00 ~ 290.00
		DN65	No.	285.00 ~ 335.00
		DN80	No.	345.00 ~ 420.00
		DN100	No.	450.00 ~ 545.00
		DN150	No.	545.00 ~ 660.00
16.	MEP equipment			
	Centrifugal fan (HTFC-I)	Wind speed 3000CMH,1000RPM	No.	1,620.00 ~ 1,980.00
		Wind speed 9000CMH,1000RPM	No.	3,150.00 ~ 3,850.00
		Wind speed 15000CMH,900RPM	No.	4,050.00 ~ 4,950.00
		Wind speed 25000CMH,700RPM	No.	6,669.00 ~ 8,151.00
		Wind speed 45000CMH,600RPM	No.	9,900.00 ~ 12,100.00
	Single-level centrifugal pump (KQL)	Flow rate 50M3/H, rising capacity 50M	No.	4,800.00 ~ 6,300.00
		Flow rate 100M3/H, rising capacity 80M	No.	10,000.00 ~ 13,200.00
		Flow rate 100M3/H, rising capacity 150M	No.	23,000.00 ~ 30,500.00
	Chiller	Water-cooled centrifugal chillers, cooling load 900 tons	No.	1,000,000.00 ~ 1,300,000.00
		Water-cooled screw chillers, cooling load 390 tons	No.	550,000.00 ~ 700,000.00
	Boiler	Gas boiler, heating 4300KW	No.	463,500.00 ~ 618,000.00
	Generator	500KVA capacity	No.	302,400.00 ~ 369,600.00
		1000KVA capacity	No.	1,086,210.00 ~ 1,327,590.00

THE LATEST POLICY

On 21st February 2017, the General Office of the State Council of the PRC published their "Opinions on Promoting the Sustainable and Healthy Development of the Construction Industry". In specific, the third clause "Perfecting the Construction Industry and Organization model" proposed: 1. to speed up the implementation of Engineering, Procurement and Construction; 2. nurture whole process project consultancy.

The main contents are as follows:

1. **Engineering, Procurement and Construction (EPC)**
   EPC is where the Contractor in accordance with the signed contract is responsible for all activities from project investigation, design, procurement, construction, commissioning (acceptance of completion) etc. and also be responsible for quality, safety, duration and cost.

   EPC involves design, procurement and build or design and build contracting.

   Government invested projects with prefabricated buildings or BIM technology should actively adopt the EPC arrangement. EPC can be implemented in the following ways:

   1.1 Examine, check and approve project or complete administrative procedures (including feasibility report of government invested projects has been approved), then EPC can be put out to contract;

   1.2 The preliminary design documents have been approved or the overall design documents have passed the examination, including the inspection and tender of design completed in accordance with the law then EPC can be put out to contract;

   EPC should adopt a fixed-price lump sum contract, the Employer and the General Contractor during the tender document and EPC contract stage agree on a reasonable share of the General Contractor's risks.

2. **Whole Process Project Consultancy**
   Whole process project consultancy involves the life cycle of the construction project's consultancy planning, feasibility study, construction design, tendering agent, cost consultation, project supervision, early stage construction preparation, construction management, completion of acceptance and operation of the warranty etc., and the various stages of management services.

   Encourage investment in consultancy, surveying, designing, supervision, tendering agent and cost consultation etc., by using joint venture, mergers and acquisitions, etc., to develop the whole process project consultancy, nurture an international level whole process project consultancy enterprise.

   Government invested projects should take the lead in carrying out the whole process project consultancy, encourage non-government invested projects to engage whole process project consultancy service.

   On May 2nd 2017, the Ministry of Housing and Urban-Rural Development of the PRC published "the Notice of Conducting the Pilot Project on the Whole Process Project Consultancy", selecting a total of 8 provinces and 40 enterprises to carry out the pilot project of whole process project consultancy services for two years.

MAJOR ISSUES FOR THE IMPLEMENTATION OF AN EFFECTIVE COST MANAGEMENT FOR SUPER HIGH-RISE BUILDINGS

Developers of super high-rise buildings in China often engage international designers for preliminary and schematic design, while local design institutes in China are responsible for the design of the construction drawings. As the detailing of construction drawings prepared by local design institutes are all in accordance with China practices, which are in line with the traditional fixed unit rates method (similar to published schedule of rates) and re-measurement arrangement. Therefore, based on the design detailing and quality of such construction drawings, quantities cannot be measured accurately from the drawings in order to produce a lump sum. For example, local design institutes will not provide technical specification and not responsible for the design of construction details for the specialized works such as curtain wall, elv etc., and some of the detailed designs are even to commence only after the completion of procurement of the equipment by the developer. So, that caused lots of challenges and constitutes great difficulties in the implementation of effective cost management. Some common cost control issues in relation to local super high-rise building projects are listed as follows:

a. Based on the above reasons, the developers are not able to conduct accurate and comprehensive economic analysis of design options and to decide on an effective cost planning and budget control as well as to establish a realistic design based on the limited budget, which results in a low accuracy of cost control and ineffective implementation of design;

b. Developers are not able to work out precise and reliable bills of quantities for tendering all due to unclear descriptions items or even missed items exist in the bills of quantities. Therefore, adoption of prime cost rates is the choice for many materials and equipment in the early stage and the pricing can be only confirmed in the later stage. According to this, competitive market prices could not be obtained by the time of tendering;

c. Due to the design issues and time constraint, there is no choice to use open-end contracts in most cases and this may cause lot of potential contract disputes during the course of a project;

d. Since local design institutes do not provide technical analysis and evaluation of tenders by the time of the return of tenders, a large number of technical issues are left unsolved and led to possible disputes and arguments during the construction stage;

e. Most developers are eager to adopt either direct supply contracts (that means materials and equipment are purchased directly by the developers and installation will be carried out by the contractors) or nominated supply contracts (that means the developers nominated the suppliers and fixed the price then the contractors will purchase materials and equipment from that nominated suppliers with the fixed price accordingly) in most of contracts. The number of these contracts varies from few dozens to few hundreds. As a result, managing such numerous contracts create complexity of working relationship within the project team and also substantial difficulties in controlling the project program, quality and cost;

f. Lots of design problems that left over from the design stage and to be resolved during the construction stage caused lots of design modifications, on site records requiring endorsement and approval of technical requirements. As a result, this creates lots of contract dispute issues and difficulties in contract management.

In light of the aforesaid problems and taking into account of the practical experience for delivering successful super high-rise building projects, please note the following:

1. Due to the complexity of super high-rise building projects, the project team usually comprises of architect, design institute and more than few dozens of professional consultants such as architect, local design institute, traffic consultant, structure consultant, electrical & mechanical consultant, facade consultant, excavation and lateral support designer, interior designer, lift consultant, fire engineering consultant, damper consultant for vibration, lighting consultant, disaster and safety management consultant, aerial assessment consultant, seismic consultant, anti-terrorist consultant, leed consultant, sustainability consultant, bim consultant, risk management consultant, insurance consultant, and so on. Developers should engage architect, local design institute and professional consultants according to the functional requirements and specialized works involved at the early stage of the project so that they could co-ordinate with each other and undertake designs that are in line with the developers' aspirations. In the meantime, the responsibilities have to be identified clearly between local design institute and professional consultants, such as the demarcation between local design institute and electrical & mechanical consultant team in terms of electrical & mechanical construction drawings and specifications; the demarcation between local design institute and interior designers in respect to second fix of electrical & mechanical designs; the demarcation between landscape designer and landscape construction drawings consultant etc. Since the design and professional consultants of super high-rise buildings may come from around the world, it is especially needed a clear definition from the outset about the depth requirements of the design outcome document in each design stage in order to ensure that all of them can meet the cost control requirements. Based on this, as leaded by the architect and the project manager as well as collaboration with local design institute and professional consultants, quantity surveyor can undertake complete cost control during the design stages including the comparison of design options, estimate, preliminary estimate, cost planning, confirmation of target cost, and ensure that all the design outcome documents would achieve the fixed lump sum price approach.

2. Local design institutes does not provide the technical analysis and evaluation of tenders during the tendering stage, in fact, they lack of this kind of experience. In view of the technical complexity, diversity of professionalism, extremely high standards and technical challenges for super high-rise buildings, the developers are recommended to extend the consultancy services of the professional consultants to tendering and construction stages, which includes the technical analysis of all tenders, preparation of tender queries, attending technical interviews, preparation of tender reports, preparation of contract drawings as well as approval of shop drawings and material submissions etc. during the construction stage. This can pave the way for professional consultants to exercise their professionalism in all stages and to achieve "professional projects delivered by professional teams" . In this way, during the tendering stage, commercial and technical queries can be clarified, competitive bids could be obtained, contract risk could be minimized and lump sum price could be assured. As a result, all such pricing during the tender stage could be controlled.

3. There're hundreds of contractors and suppliers involved in the super high-rise building. Traditional Chinese contract model - such as contractors for structural and architectural works only, main contractors for construction management, specialized contractors that sign contracts with the client, direct suppliers, parallel contracting structures (where the developer signs contracts with the independent contractors and no main contractor involved, and site management works are the responsibilities of the developer themselves), and direct suppliers - may not fulfill the management needs of the super high-rise building. Based on the construction method and project management characteristics, developers should provide a reasonable and realistic list of tender packages and to take a holistic approach in project design, program and construction management for such developments. The ideal contractual arrangement is a main contract and nominated sub-contracts, which includes specialized nominated sub-contracts. In considering the sole responsibilities of detailed design and quality of works, it is not suggested to separate the supply of materials or equipment from the sub-contract and to be provided by the developers. The main contractor will be held fully responsible for project program and quality control while specialized nominated sub-contracts could be determined by the developer throughout the tendering process and the specialized nominated sub-contractor will sign the sub-contract with the main contractor. The typical contract frame work for super high-rise project comprises of pilings and retaining contract, main contract (including excavation, lateral support, structural works, structural steel works for hanging, masonry works, general decoration, external works, coordination and attendance for management of sub-contractors, etc.), structural steel supply sub-contract, curtain wall sub-contract, integrated electrical & mechanical sub-contract, lifts & escalators sub-contract, extra low voltage sub-contract, helipad sub-contract, BMU sub-contract, fire rated doors sub-contract, fitting out sub-contract, external lighting sub-contract, landscaping work sub-contract, damper sub-contract, signage sub-contract, traffic lining sub-contract and so on. The above mentioned contractual arrangement will facilitate the management of project progress and quality control. Owing to the tendering processes for relevant sub-contracts are drawn upon from the complete drawings and technical specification, the strategy of competitive pricing can thus achieve which is in favor of the project.

4. Apart from the architectural and structural works, the nominated sub-contractors should also be responsible for the detailed design of their works like structural steel works, curtain wall, electrical & mechanical, extra low voltage system, fitting out, façade lighting, lifts etc. for super high-rise project. Generally speaking, the tender or construction drawings of these works are not detail and accurate enough for the preparation of bills of quantities. In order to minimize the argument, by using the drawing specification lump sum fixed price model and the developer may provide schedule of rates with indicative quantities to the tenderers for reference, while tenderers may make amendments on the schedule of rates and offer their tender price based on their detailed design and holistic design as well as bearing the risk of the inaccuracy of the schedule of rates. This will be a significant reduction of risks to the developers in cost control when comparing with the re-measurement approach.

5. Super high-rise building projects involved lots of materials and equipment, although better cost and quality control may be achieved in a certain extent if local developer adopt direct supply contracts approach for purchasing of materials, it is inevitably to increase the project management cost of the developer and lots of manpower involvement as well, such as additional staff will be needed to deal with the tendering and daily management of the materials that provided by themselves. In addition, contract-related risk such as repetition or omission, disputes over quality such as the responsibilities of the failure for testing and commissioning etc. For instance, if the material provided by the developer cannot be delivered to the construction site on time, the developer has to bear for the loss caused by idling of the labor force and extended project duration. This caused additional responsibility imposed to the developer. Therefore, the number of such direct supply contracts for materials and equipment to be provided by the developer should be reduced to the minimum or even removed such arrangement.

6. According to the local practice, the formation of variation during construction stage is diversified, including design revisions as requested by the developer, design revisions as proposed by the design institute, contractor's technical endorsement, developer's on-site approval, etc. Changes in design proposed by the design institute mainly focuses on incorrect designs; technical endorsement is generally proposed by the contractor on the basis of poor buildability of design drawings or with better construction method while in some cases it may be suggested by the design institute in order to rectify the design errors. In most cases, on-site approval is drafted by the contractor, which is usually misleading and quantities of work done inaccurate. Therefore, it is very important for the local developer to consider in working out a complete set of cost control process during the construction stage in order to tie in with the international common practice. By experience, it is advisable to utilize the change control system under the architect, including the systems for evaluation of draft variation, instructions etc.

7. Local cost control is based on segmented management structure. For instance, cost estimate and cost plan are conducted by the local design institute; tendering by tender agent; interim payment during construction stage and assessment of variations are to be approved by the construction supervision unit or auditor; and settlement of final account by settlement audit unit. Since a complete cost management is breaking down manually into different divisions, it therefore creates chaos and often led to over budget. By experience, super high-rise building developer should engage quantity surveyor to provide a full and complete cost management process, that means the cost management process in every stages should be based on the principle of "contract sums±accumulated variation cost should be less than the budget control cost", and the final contract sums can also be controlled within the set budget control cost finally.

8. Based on practical experience accumulated from numerous projects, most super high-rise building developers will engage some professional consultant teams. However, the staff of the local developers may not have sufficient experience to work together with such professional consultants or even do not know how to instruct them, and thus causing inefficiency of the professional consultants and result in ineffective cost management implementation. Hence, the professional consultant teams must assist the developers to create a harmonious contractual relationship, including the setting up of working procedures, management system etc. And strengthen the trainings in design, construction, budget, contract management to the specialized staff of the developer. At the same time, professional consultant teams should take the initiation and proactively in exchanging ideas with the developers and strive to provide better services than the local design institute in a conscientious, professional and dedicated way. All in all, a well-established cost management system, a close collaboration among different parties and the expertise services that provided by design and consultant teams are the major prerequisites for a successful super high-rise building project.

As a conclusion, taken into account of the above-mentioned factors for the design, tendering and construction stage of super high-rise building, an effective cost management can be fully exercised and played an indispensable role from the inception to completion for super high-rise building projects.

AVERAGE WHOLESALE PRICES OF SELECTED BUILDING MATERIALS IN SELECTED CITIES OF CHINA (RMB)

(All rates described are at 4th Quarter 2017)

	Building materials		Beijing	Chengdu	Chongqing	Guangzhou	Hangzhou	Nanjing	Shanghai	Shenyang	Shenzhen	Tianjin	Wuhan	Xian
1	Reinforcement bar HPB235 (1st-class) 10mm	¥/t	3,969	4,200(#)	4,593 HPB300 (1st class) 10mm	4,446	4,835	4,597	4,597	3,748	5,001 HPB300 (1st class) 10mm	4,416	4,590	4,337
2	Reinforcement bar HRB400 (3rd class) 10mm	¥/t	4,026	4,629 HRB400E 8-10mm	4,643	4,511	4,784	4,827	4,757	3,827	5,070	4,210	4,692	4,343
3	Reinforcement bar HRB400 (3rd class) 25mm	¥/t	3,812	4,366	4,523	4,439	4,615	4,763	4,597	3,673	4,905	4,134	4,471	4,343
4	Reinforced concrete Grade C30 5-25mm aggregates P8 waterproofing (without pumping fee)	¥/m^3	447	505	395 Average of main areas of the city, electric pump	365	516	458	533	374	504	439	402 5-31.5 Stone	460
5	Timber Formwork local commonly used materials	¥/m^3	1,983	1,859 2440×1220×15	1,202 Average of main areas of the city, logs	1,280 pine broad	2,200 pine wood board	1,650	1,867	1,990(#)	2,610 1830x915x18 3rd Class blackboard	2,210	2,203	1,872 rigidity mixed logs
6	Portland cement Grade 42.5(bulk)	¥/t	444	467	457 Average of main areas of the city, bagged	398	510	499	520	346	489	426	431	447
7	Sand Rough/mixed	¥/t	91	124	100 Average of main areas of the city, extra fine sand	74	95 Gross sand	133	119	80	68	82	153	52
8	Hot rolled equal-leg angle steel 45-50×3-6mm	¥/t	3,755	4,617 Q235 L50×50×5	4,693 Q235 4-8mm	4,362	4,625 3#-4#	4,725	4,597	3,593	5,088	4,196	4,517 45-50×3-5mm	4,613
9	Galvanized steel sheet 1.0mm	¥/t	4,533	7,188 0.5-1.2mm	5,297	4,747	4,853	5,788	6,583	4,833	5,795	4,966	5,183	5,233
10	Seamless steel pipe 108×3.5-4mm	¥/t	4,670	7,215	5,923 108 x 4.5mm	4,967	5,800 108 x 4mm	5,900	5,943 108×3-4.5mm #20	4,873	6,223	5,134	5,423 108×4.5-5mm	6,263 Cold drawn
11	Galvanized welded steel pipe 20mm 26.75x2.75mm	¥/t	5,391	5,947	5,983 Hot dip galvanized steel pipe Q235 / Q195 DN15-20	5,977 Galvanized water, gas transportation pipe	5,944	6,233	6,536 Φ 20 mm	4,820	6,577	5,761	5,797 20×2.75mm	5,893 Galvanized steel pipe
12	Hot-rolled steel channel Grade a steel #16-18mm	¥/t	3,800	4,614 Q235 #18mm	4,877 Channel steel Q235 16-22#	4,448	4,727 8#-10#	4,736	4,530 Q235 # 16	3,677	5,108	4,196	4,568	4,730
13	Float plate glass 5mm	¥/m^2	23	28 White float glass	27 White float glass	28	37	37	31(#) (White glass original film)	29	35	32	33	30
14	Aluminum A00 aluminum ingot	¥/t	15,255											
15	Copper 1# electrolytic copper	¥/t	53,117											
16	Steel fire rate door (Grade II)	¥/m^2	338	400(#)	520	364 Single-leaf	530	-	704(#)	533	600(#)	530(#)	516(#)	520(#)
17	Timber fire rated door (Grade II)	¥/m^2	458	374(#)	320	428 Single-leaf	430	-	360	350(#)	680(#)	425(#)	444(#)	380(#)
18	PHC piles Φ 400A	¥/m	-	131(#)	-	103 Thickness 95mm	132 Thickness 95mm	-	155(#) Thickness 95mm	130(#)	123 Thickness 95mm	99 Thickness 95mm	140(#)	130(#) Thickness 95mm
19	APP Modified Bitumen Water-proofing membrane 3 mm PY	¥/m^2	33	43	27	27	37	29	37(#)	26	37(#) SBS 3mm	30(#)	27	44(#)
20	JS Cementious Waterproofing Coatings Type I two-component	¥/kg	10	21	16	13	9	13	15(#)	12(#)	14	14	15(#)	12(#)
21	Interior wall Latex paint Type II	¥/kg	16	15(#)	9	11	16 latex paint	16 Interior wall paint 2000 latex,22kg)	16(#)	11	11(#)	13	10 Interior wall paint 8802	13(#)
22	Advanced Acrylic Exterior Wall Latex paint Type II	¥/kg	25	23(#)	30 high quality emulsion paint (luminant)	27 weather proofing emulsion paint	20 elastic emulsion paint	21	24(#)	11	25(#)	26	21(#)	23(#)

Notes:

1. The above prices (except items 14, 15 and those marked with "#") are based on either guiding price from websites or periodicals published by local construction cost management office; or market prices published by "China construction material online" ;
2. Items 14 & 15 in the above table are based on final price by end of month published by Shanghai Futures Exchange (www.shfe.com.cn), as a general reference price for all areas;
3. "#" means its price is based on the market prices;
4. "-" means local price is not available;
5. The price selection guideline is based on actual current market prices ;
6. No price posted from Guangzhou's construction cost website; Quarterly price is based on guidance price pubilshed in Guangzhou construction cost periodical.

AVERAGE DAILY WAGES OF WORKERS FOR CONSTRUCTION INDUSTRY IN SELECTED CITIES OF CHINA

(All rates described are at 4th Quarter 2017)

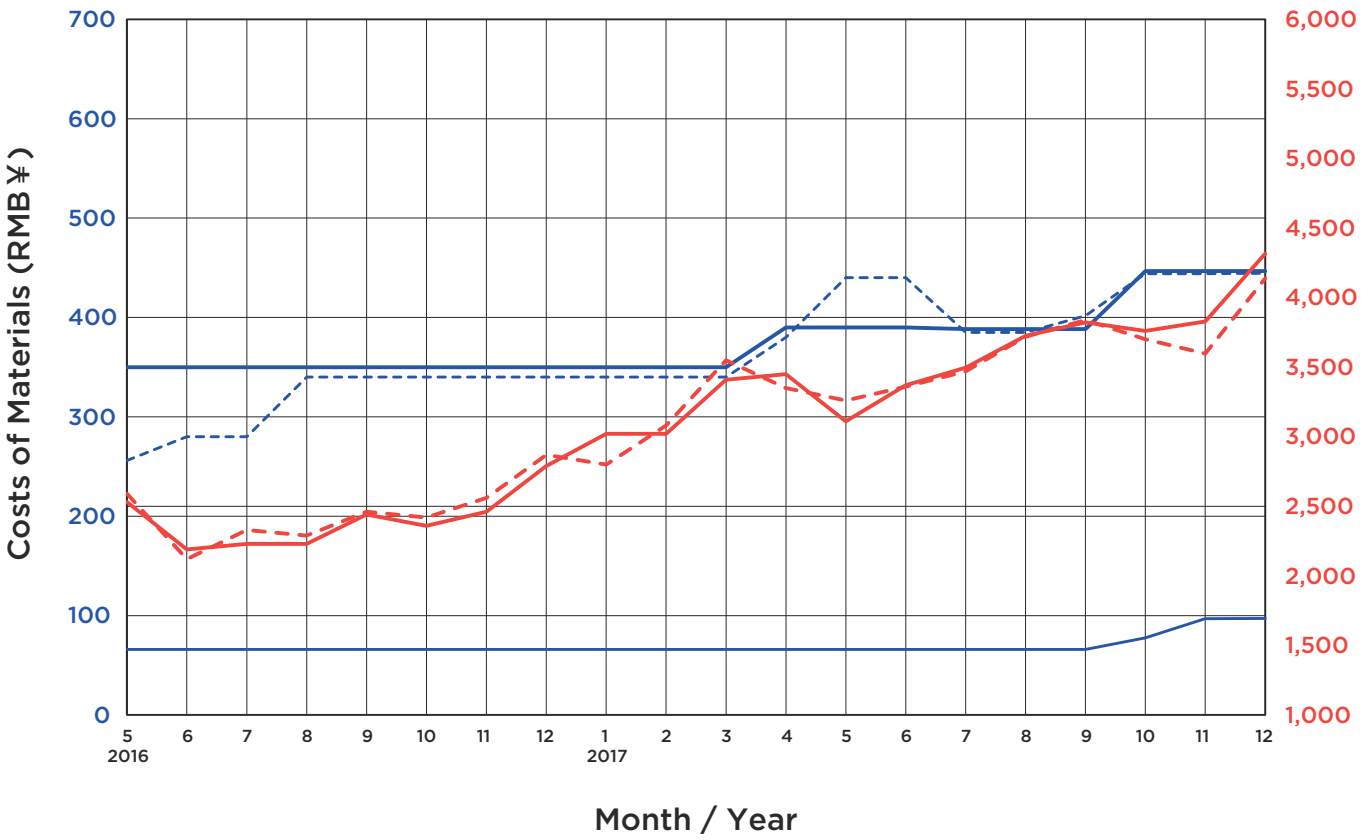
The currency below is RMB

Selected Occupations (according to the general public standards)		Beijing	Chengdu	Chongqing	Guangzhou	Hangzhou	Nanjing	Shanghai	Shenyang	Shenzhen	Tianjin	Wuhan	Xian
1	Joiner (construction)	257	238	202 Decoration Joiner	199	190	173	280	177	338 Decoration Joiner	203	187	290
2	Painter	239	176	176	192	180	152	260	129	255	183	170	230
3	Formwork erector	279	238	210	206	180	163	280	152	300	188	187	282
4	Plasterer (normal)	232	205	172	192	178	143	280	152	257	183	169	223
5	Bar Bender	255	230	198	206	179	159	280	152	292	178	173	266
6	Bricklayer (masonry)	237	210	173	192	188	152	280	152	277	180	177	210
7	E&M worker	214	149	165 Average plumber / electrician/ ventilation	184	194	163	280	129	261	175	168	243
8	Concretor	243	170	172	177	196	152	260	129	274	164	150	203
9	Waterproofer	285	169	166	174	181	152	280	129	252	170	167	217
10	Plaster (Surface)	298	192	191	199	205	163	300	177	291	183	211	280
11	Scaffolder	291	227	204	203	205	156	350	129	306	184	201	292
12	Welder	265	185	176	192	186	164	280	129	266	175	198	317
13	Rigger	241	159	147	184	185	156	260	129	264 mechanician	173	169	247
14	Glazier	317	147	158	181	192	153	260	129	274	119	159	290
Average daily wage (1-14)		**261**	**193**	**179**	**192**	**188**	**157**	**281**	**142**	**279**	**176**	**178**	**256**

Notes:

1. Various types of daily wage are based on construction market price, which are updated in real time. The data covers commercial, residential and industrial development project; every rate is weighted daily rates received from 2-4 construction companies;
2. Labour costs include: basic wage, allowances, benefits, etc. i.e. all expense payable to workers;
3. Daily rate is based on 8 hours per day, excluding overtime allowance;
4. All trades are based on general labour.

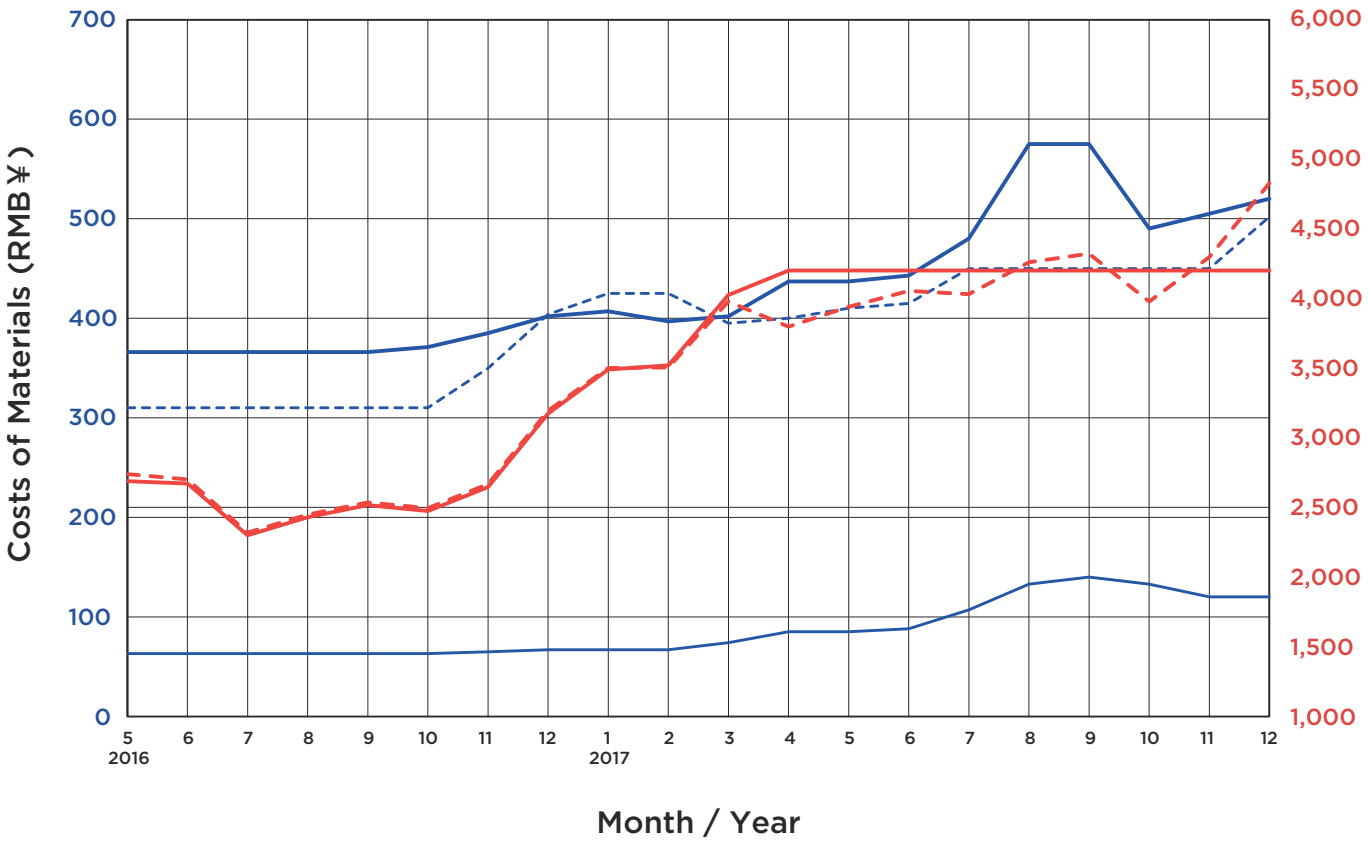
Wholesale Prices of Selected Building Materials in Beijing



Building Materials			Wholesale Prices of Selected Building Materials in Beijing																			
			2016								2017											
			May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Reinforcement bar HPB235 (I) 10mm	¥/t		2,530	2,190	2,230	2,230	2,440	2,360	2,460	2,790	3,020	3,020	3,410	3,450	3,110	3,370	3,496	3,726	3,821	3,761	3,829	4,316
Reinforcement bar HRB400 (III) 25mm	¥/t		2,590	2,120	2,330	2,290	2,460	2,420	2,560	2,870	2,800	3,080	3,550	3,350	3,260	3,360	3,470	3,718	3,838	3,701	3,598	4,137
Portland cement Grade 42.5 (bag)	¥/t		256	280	280	340	340	340	340	340	340	340	340	380	440	440	385	385	402	444	444	444
Reinforced concrete Grade C30 5-25 stone P8 waterproofing (without pumping fee)	¥/m³		350	350	350	350	350	350	350	350	350	350	350	390	390	390	388	388	388	447	447	447
Sand (rough/mixed)	¥/t		66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	78	97	97

(Source: www.bjzj.net)

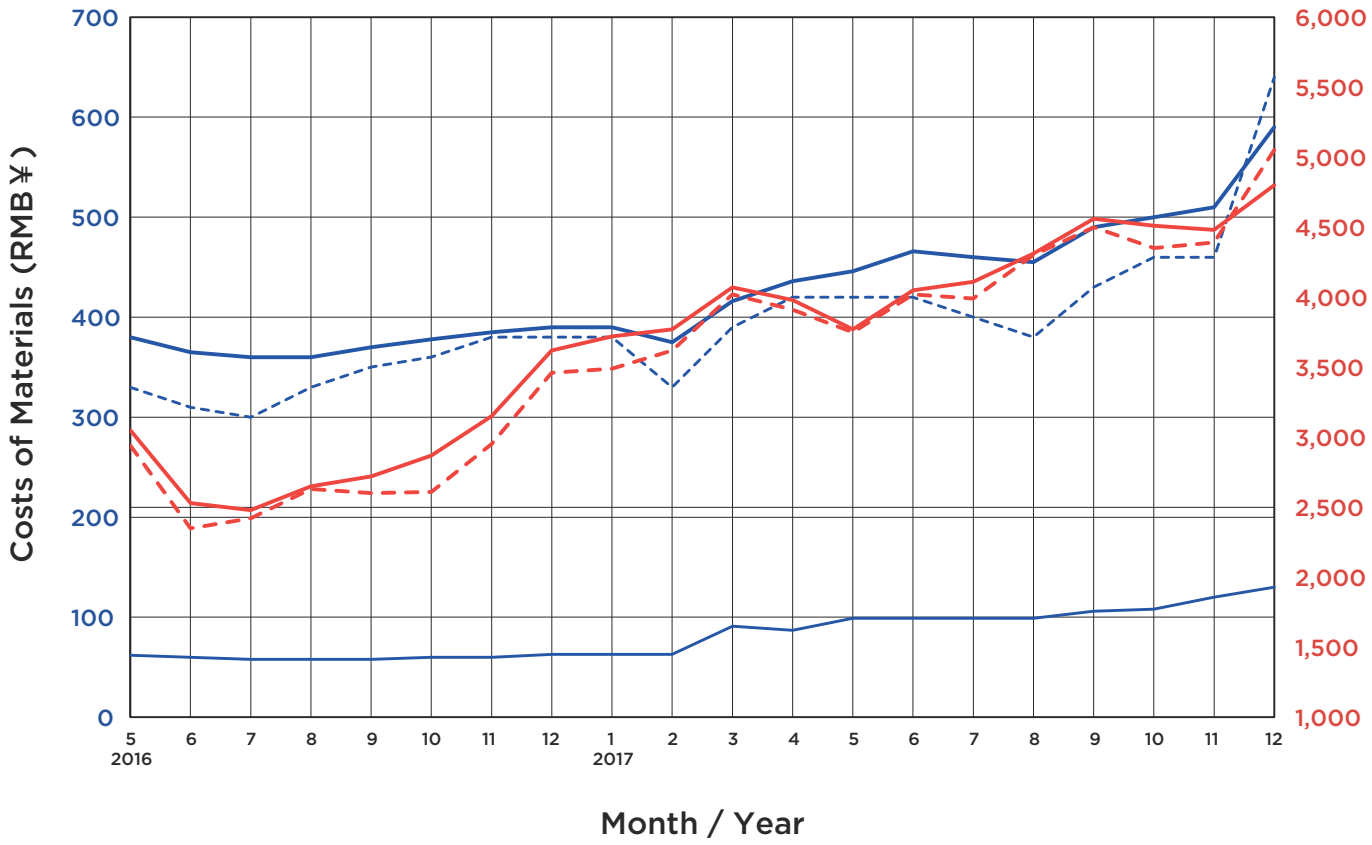
Wholesale Prices of Selected Building Materials in Chengdu



Building Materials			Wholesale Prices of Selected Building Materials in Chengdu																			
			2016								2017											
			May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Reinforcement bar HPB235 (I) 10mm	¥/t		2,689	2,670	2,300	2,429	2,516	2,474	2,646	3,174	3,490	3,519	4,024	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Reinforcement bar HRB400 (III) 25mm	¥/t		2,739	2,700	2,320	2,449	2,536	2,494	2,666	3,194	3,500	3,505	3,977	3,797	3,940	4,053	4,030	4,260	4,320	3,977	4,295	4,827
Portland cement Grade 42.5 (bag)	¥/t		310	310	310	310	310	310	350	404	425	425	395	400	410	415	450	450	450	450	450	502
Reinforced concrete Grade C30 5-25 stone P8 waterproofing (without pumping fee)	¥/m³		366	366	366	366	366	371	385	402	407	397	402	437	437	443	480	575	575	490	505	520
Sand (rough/mixed)	¥/t		63	63	63	63	63	63	65	67	67	67	74	85	85	88	107	133	140	133	120	120

(Source: www.sceci.net)

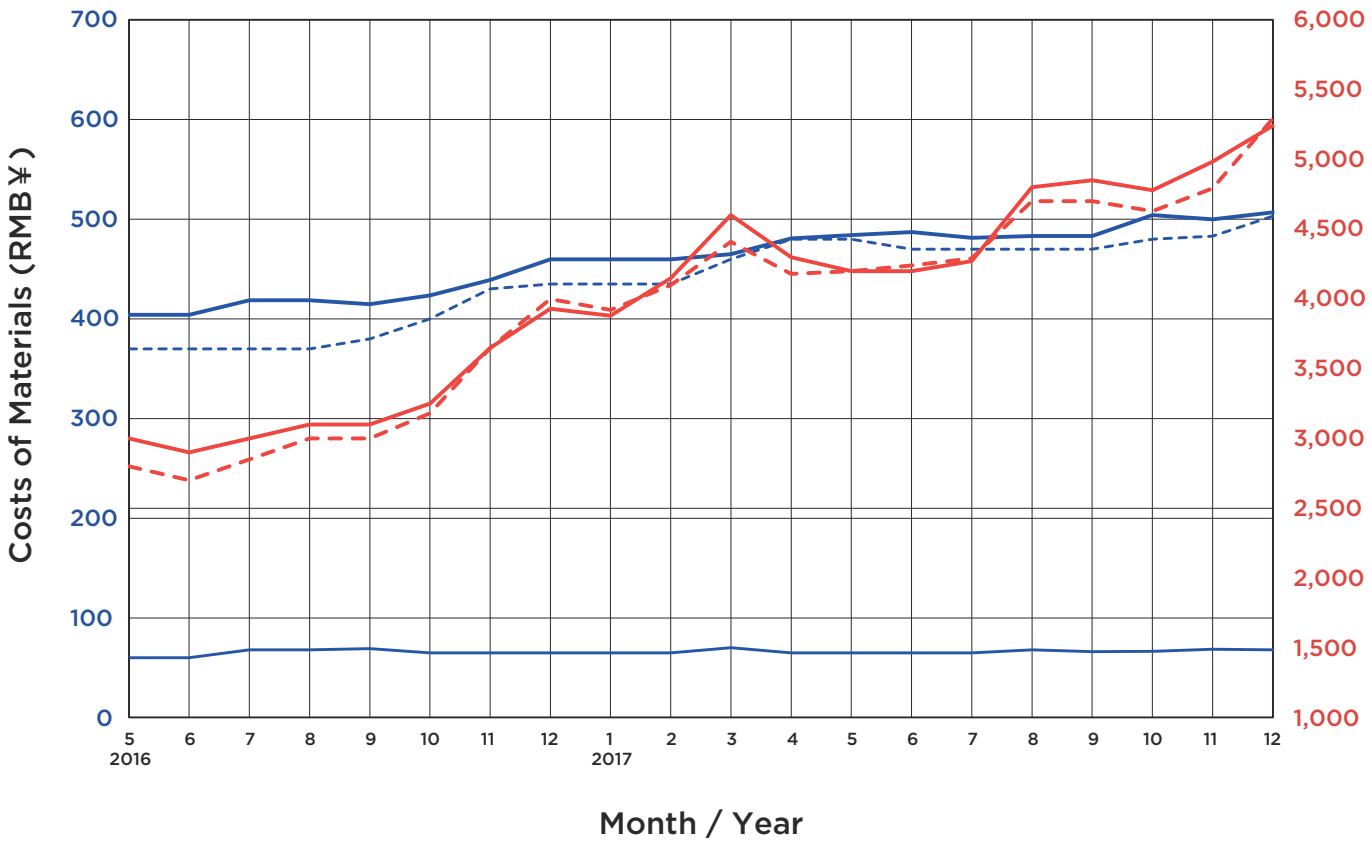
Wholesale Prices of Selected Building Materials in Shanghai



Building Materials			Wholesale Prices of Selected Building Materials in Shanghai																			
			2016								2017											
			May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Reinforcement bar HPB235 (I) 10mm	¥/t		3,050	2,530	2,480	2,650	2,720	2,870	3,150	3,620	3,720	3,770	4,070	3,980	3,770	4,050	4,110	4,310	4,560	4,510	4,480	4,800
Reinforcement bar HRB400 (III) 25mm	¥/t		2,940	2,350	2,420	2,630	2,600	2,610	2,950	3,460	3,490	3,620	4,020	3,910	3,750	4,020	3,990	4,300	4,500	4,350	4,390	5,050
Portland cement Grade 42.5 (bag)	¥/t		330	310	300	330	350	360	380	380	380	330	390	420	420	420	400	380	430	460	460	640
Reinforced concrete Grade C30 5-25 stone P8 waterproofing (without pumping fee)	¥/m³		380	365	360	360	370	378	385	390	390	375	416	436	446	466	460	455	490	500	510	590
Sand (rough/mixed)	¥/t		62	60	58	58	58	60	60	63	63	63	91	87	99	99	99	99	106	108	120	130

(Source: www.shjjw.gov.cn)

Wholesale Prices of Selected Building Materials in Shenzhen



Building Materials			Wholesale Prices of Selected Building Materials in Shenzhen																			
			2016								2017											
			May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Reinforcement bar HPB235 (I) 10mm	¥/t		3,000	2,900	3,000	3,100	3,100	3,250	3,650	3,930	3,880	4,150	4,600	4,300	4,200	4,200	4,270	4,800	4,850	4,780	4,983	5,241
Reinforcement bar HRB400 (III) 25mm	¥/t		2,800	2,700	2,850	3,000	3,000	3,180	3,650	4,000	3,920	4,100	4,410	4,180	4,200	4,240	4,290	4,700	4,700	4,630	4,793	5,292
Portland cement Grade 42.5 (bag)	¥/t		370	370	370	370	380	400	430	435	435	435	460	480	480	470	470	470	470	480	483	503
Reinforced concrete Grade C30 5-25 stone P8 waterproofing (without pumping fee)	¥/m³		404	404	419	419	415	423	439	460	460	460	465	481	484	487	481	483	483	504	500	507
Sand (rough/mixed)	¥/t		60	60	68	68	69	65	65	65	65	65	70	65	65	65	65	68	66	67	69	68

(Source: www.szcost.cn)

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