



中國建築

中
建
鋼
構

铁骨仁心 钢构未来

巴新学校及公交站亭EPC总承包工程

Papua New Guinea School and Bus Stop Shelter EPC Project

经验交流

Experience Exchanging



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CSCEC STEEL

2018年9月

September 2018



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Innovativeness



◆ 项目背景 Project Background



中央和广东省有关工作部署

China and Guangdong's relevant work arrangement

深圳与巴新首都签署《友好交流合作备忘录》

Shenzhen and PNG Capital signed Memo for Friendly Communication and Cooperation

市政府要求在2018年APEC召开前完工

Municipal government requires completion before APEC 2018



特区建发集团代表深圳市政府开展援助工作



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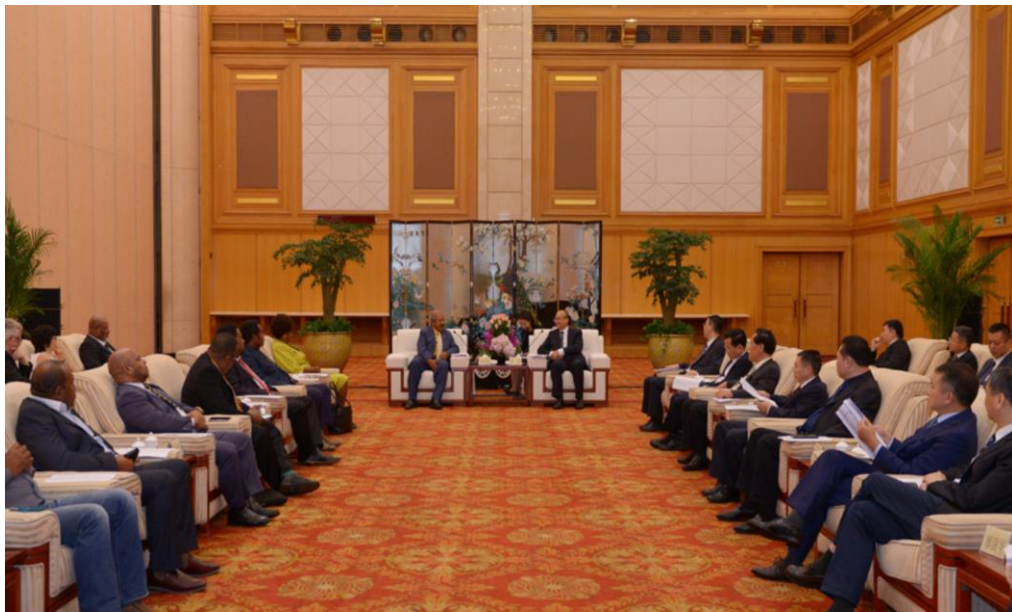
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◆ 项目背景 Project Background



- “一带一路” 战略引导工程
- Leading project of “Belt and Road” Strategy.
- 成功开启深圳与莫港友好交流合作计划
- Successful initiation of plan for friendly communication and cooperation between Shenzhen and Port Moresby.
- 深圳市政府各级领导高度关注，常务副市长张虎，副市长陈彪、艾雪峰等先后前往巴新考察调研
- Shenzhen senior government officials are mindful; Vice Mayors Zhan Hu, Chen Biao, Ai Xuefeng etc. visited PNG for inspection of the project.
- 特区建发董事长王宾、总经理李文雄、副总经理林建忠等先后前往巴新调研
- President of SEZ Development Group Wang Bin, General Manager Li Wenxiong, Vice General Manager Lin Jianyue visited PNG for inspection.



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◆ 项目介绍 Introduction of Project



地理位置 Location	莫尔斯比港 Port Moresby
占地面积 Land area	50,565m ²
建筑面积 Building area	10,800m ²
小学部 Primary school	26 Classes, 3,698m ²
中学部 Secondary school	16 Classes, 3,698m ²
幼儿园 Kindergarten	10 Classes, 1,305m ²
多功能厅 Multi-function hall	1,305m ²
教师公寓 Staff apartment	12 Units, 1,143m ²



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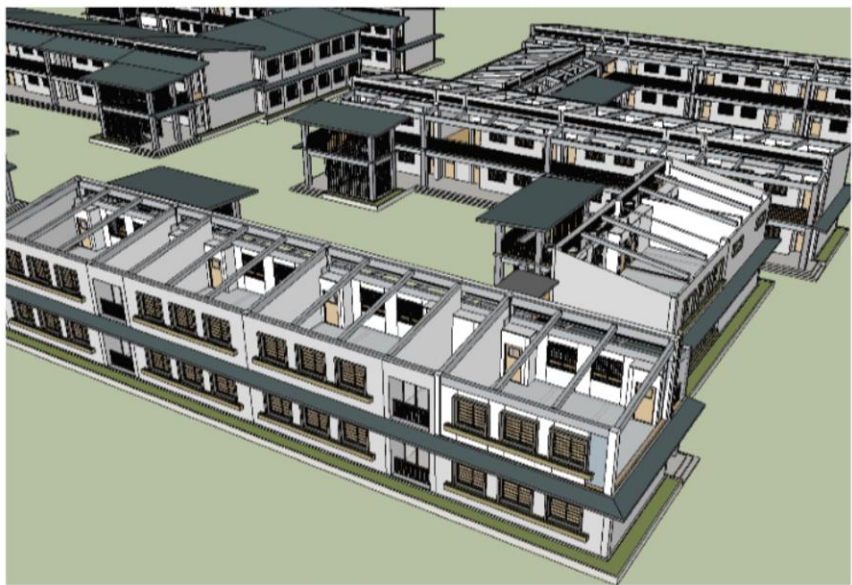
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◆ 体系概况 Systematic Overview

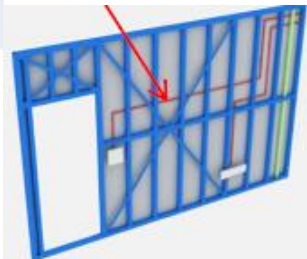


“GS-Building” 体系
GS-Building System



钢结构: 1300t
Steel Structure: 1,300T

钢结构框架 Steel Structure Frame



维护结构体系
Enclosure System

墙体: 轻钢龙骨
Wall: Stud wall
楼板: 钢筋桁架楼承板
Slab: Steel truss bearing slab
屋面: 铝镁锰屋面板
Roof: Magnesium board



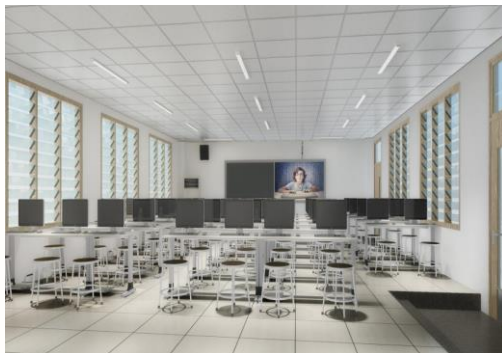
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◆ 建筑效果 Architectural Effect





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◆设计理念 Design Concept



巴布亚新几内亚莫港建筑形态特征
Architectural features of Port Moresby, PNG





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◆设计理念 Design Concept



Green prefabricated architectural design is adopted based on local geographic and climatic conditions and local architectural features of big roof and building on stilts.



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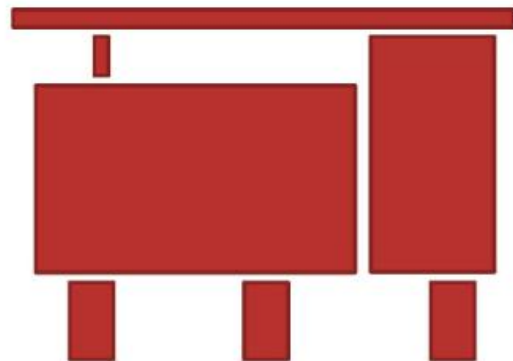
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◆设计理念 Design Concept



- Green technologies of saving land, energy, water and materials and indoor environment management are used. Via various design strategies, the building itself is optimized in terms of ecological aspects and environmental protection. We are not only bringing a school there, we are also bringing advanced technologies of Shenzhen.



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◆ 功能分区 Separation of Functions



图例

- 教学区 (静区)
- 运动区 (动区)
- 幼教区 (配套区)
- 教师公寓区 (配套区)

Legend

- Teaching area (Quiet area)
- Sports area (Dynamic area)
- Kindergarten (Auxiliary area)
- Staff apartment (Auxiliary area)



➤ Functional zones are properly separated with good combination of dynamism and quietness, so as to provide students with fair environment for learning and resting.



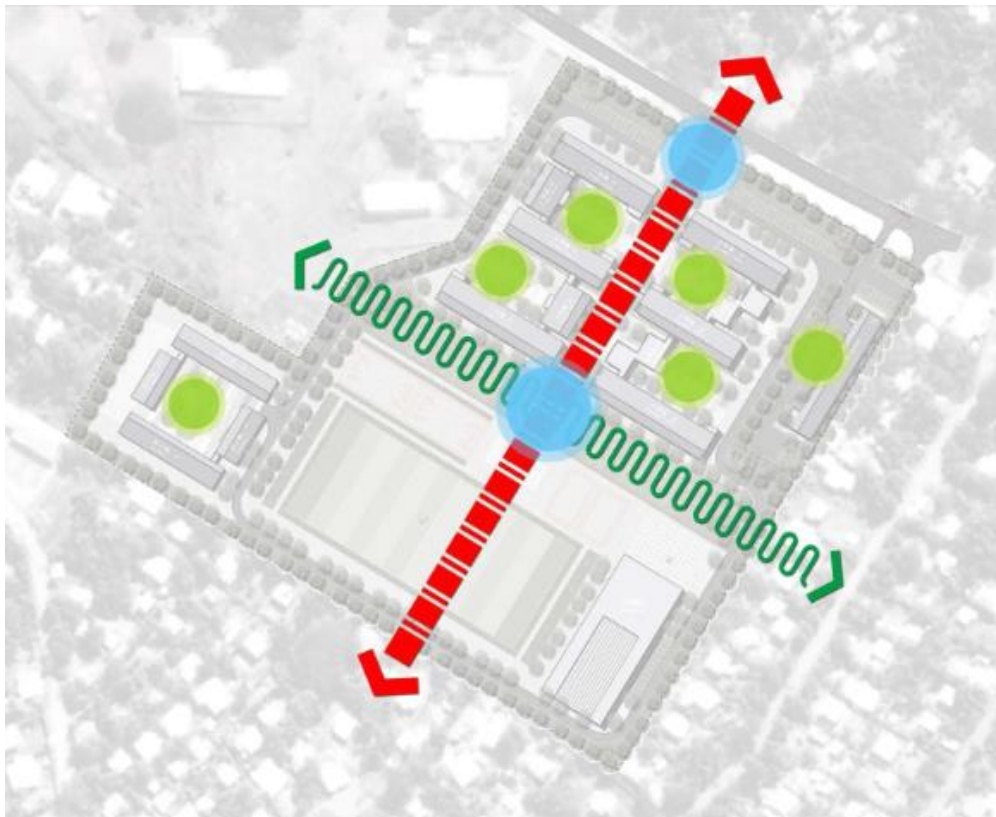
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◆ 空间布局 Spatial Arrangement



图例

- 主轴线
- 次轴线
- 主要景观节点
- 次要景观节点

Legend

- Main axis
- Secondary axis
- Primary landscape node
- Secondary landscape node

- “Double axis and four sectional” spatial arrangement.
- Double axis: teaching area axis and ecological landscape axis.
- Four sections: teaching, sports, auxiliary primary and secondary school area, and auxiliary staff apartment area.
- Multiple nodes: nodes surrounded by various courtyards and activity areas.



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◆ 交通流线 Traffic Flow Line



图例

- 城市道路
- 校园车行流线
- 校园人行流线
- 人流聚集区

Legend

- Municipal road
- Vehicle line
- Walk line
- Crowd area



- The spatial arrangement of internal and external vehicle flow, walk flow and crowd area are designed, with full consideration of land features of the school.



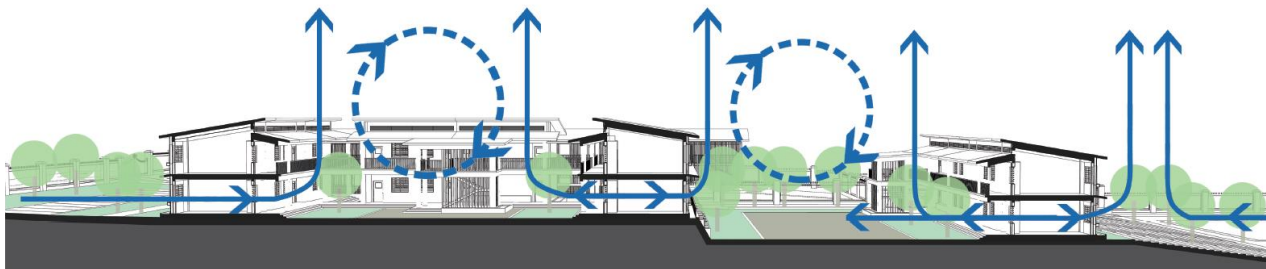
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◆ 绿色生态节能 Green Ecological and Energy Saving



入口半围合广场
Half enclosed square



教学楼庭院
Teaching area yard



建筑底层架空
Elevated ground floor

-
- In terms of design, sloped roof effectively reduced solar radiation on the roof so as to reduce heat conductivity in building space.
-
- Classroom façade is arranged with high shutters, and natural vertical wind is formed in the courtyard so indoor and outdoor air circulation is created.



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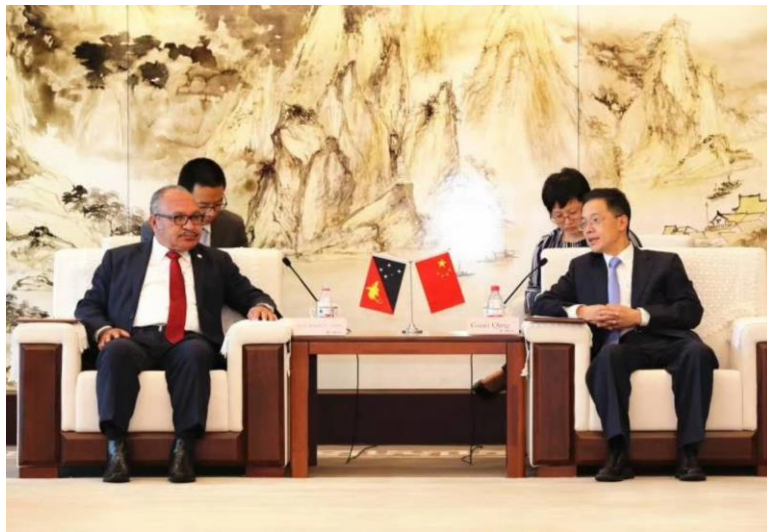
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Inspiration



- ◆ 对两国友好交流合作模式的启发
- ◆ Inspiration to the friendly communication and cooperation of two countries



中國建築
CHINA STATE CONSTRUCTION



- Papua New Guinea School and Bus Stop Shelter EPC Project is an important element of *Memorandum of Friendly Communication and Cooperation and Annual Communication and Cooperation Plan*; a new mode for cooperation is explored based on the construction of this School and Bus Stop Shelter Project.



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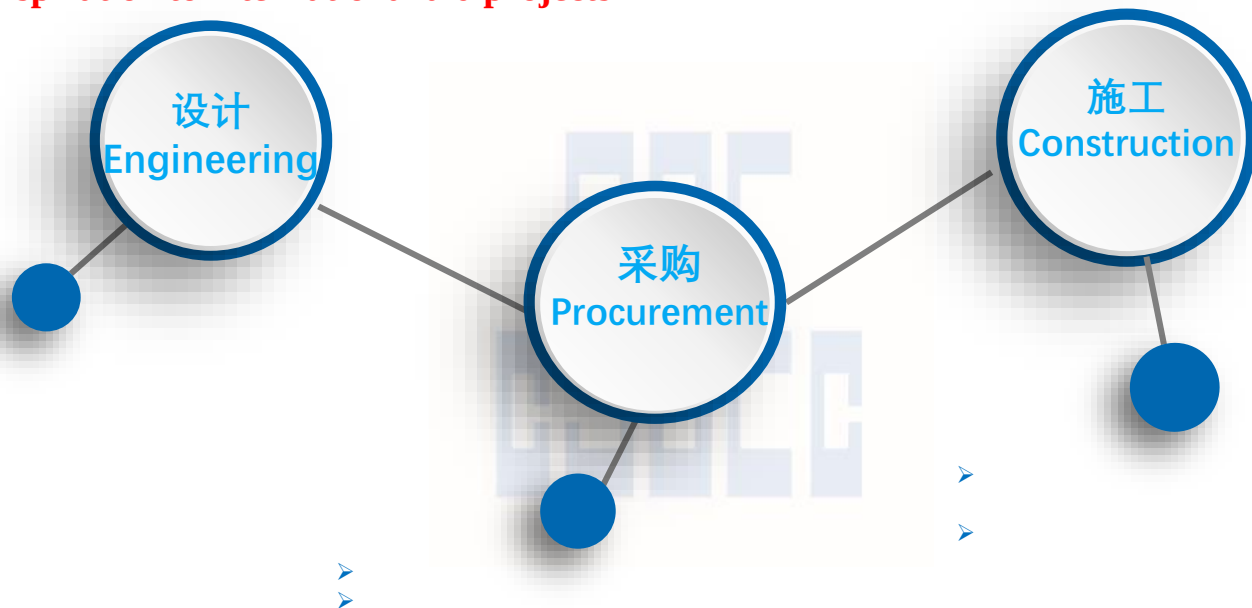
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Inspiration



- ◆ 对国际援建类项目运作模式的启发
- ◆ Inspiration to international aid projects



- Regarding overseas aid project, the incorporation of EPC contract conditions have provided a feasible mode for effective management. This project as a typical overseas EPC aid project embodies high referential value.



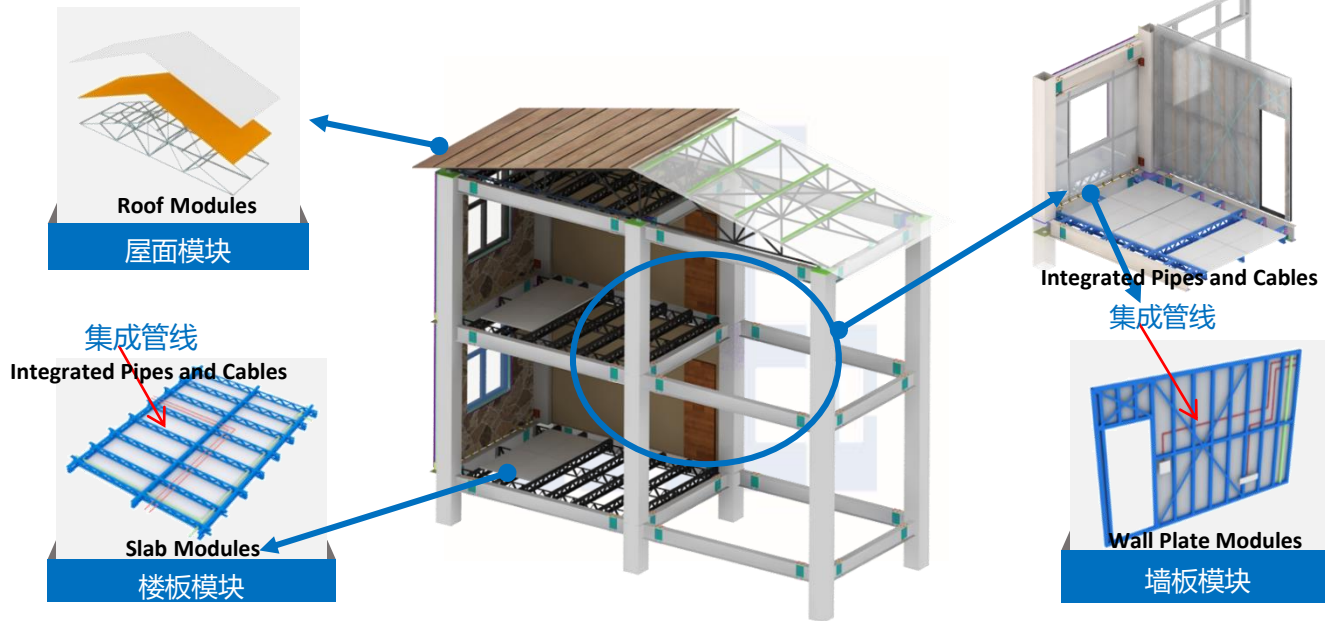
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Inspiration

- ◆ 对绿色装配式智能建筑的启发
- ◆ Inspiration to green, smart and prefabricated building.



- The Project is a green integrated building system using industrialized, integrated and modularized building methodology. As an prefabricated green smart building, it can foster new industries, stimulate the development of related business sector, and elevate the overall standard of local prefabricated building.



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Inspiration



- ◆ 对中国-巴新两国友谊关系的影响
- ◆ Impact to friendship between China and PNG



- 学校开工以来，得到了双方政府的大力支持，巴新总理奥尼尔、中国驻巴新大使薛冰双双出席项目开工典礼，APEC事务部长多次莅临项目指导工作，进一步奠定了中国与巴新两国之间的友谊发展。
- Since its commencement, the Project has been strongly supported by governments of the two countries. PNG Prime Minister O'Neill and Chinese Ambassador to PNG Xue Bing attended the commencement ceremony of the project, and APEC Minister visited the project many times, all of which have further enhanced the friendship between the two countries'.



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Inspiration



- ◆ 对绿色装配式建筑行业的影响
- ◆ Impact to the industry of green prefabricated building

编号 S/N	内容 Description	类型 Type
1	《一种集成装配式钢结构建筑》 Integrated Prefabricated Steel Structure Building	发明专利申请号：201510753428.8 Patent for Invention Application No.: 201510753428.8
2	《一种集成装配式钢结构建筑》 Integrated Prefabricated Steel Structure Building	实用新型专利申请号：201520883719.4 Patent for Utility Models Application No.: 201520883719.4
3	《一种集成装配式楼板》 Integrated Prefabricated Building Slab	发明专利申请号：201510752398.9 Patent for Invention Application No.: 201510752398.9
4	《一种集成装配式楼板》 Integrated Prefabricated Building Slab	实用新型专利申请号：201520884488.9 Patent for Utility Models Application No.: 201520884488.9
5	《一种集成装配式外墙板》 Integrated Prefabricated External Wall Plate	发明专利申请号：201510752720.8 Patent for Invention Application No.: 201510752720.8
6	《一种集成装配式外墙板》 Integrated Prefabricated External Wall Plate	实用新型专利申请号：201520883762.0 Patent for Utility Models Application No.: 201520883762.0
7	《一种模块化内隔墙板》 Modular Internal Partition Plate	发明专利申请号：201510752205.X Patent for Invention Application No.: 201510752205.X
8	《一种模块化内隔墙板》 Modular Internal Partition Plate	实用新型专利申请号：201520883742.3 Patent for Utility Models Application No.: 201520883742.3

公司积极推动装配式绿色建筑行业的继续发展，积极参与中国国家、行业发明专利的申报及相关标准规范的编制，已实现标准输出。

Our Company keeps propelling the continuous development of prefabricated green architecture, vigorously participates in the application of national and sectoral patent for inventions and compilation of relevant standards, and has realized quasi-output.



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- ◆ 对学生教育环境的影响
- ◆ Impact on the educational environment of students



原学生学习环境恶劣 Previous Poor Educational Environment



改建后教室内部 Interior of Classroom after Reconstruction

- 新学校建成以后，预计可容纳学生2700人，其中配置小学部26班、中学部16班、幼儿园10班、多功能厅、教职工公寓12间及室外活动场地等，教学及学生上课条件大大提升，极大缓解当地教育资源匮乏的窘境。
- The new school after completion can accommodate 2,700 students including 26 primary school classes, 16 secondary classes, 10 kindergarten classes, multi-function hall, 12 staff apartments and outdoor activity area. The teaching and learning environment of students have been largely improved, and the poor local educational condition will be largely relieved.



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Inspiration



- ◆ 对当地文化的影响
- ◆ Impact on local culture



- 民生项目的建设也获得了当地民众的大量支持，项目部员工和当地kila kila村民建立了良好的关系，在巴新和中国双方重大节日的时候，双方也会互相庆贺，亲如一家。两国文化得到高度的融合。
- The Project with its pro-livelihood nature is also highly supported by local people. A sound relationship between Project personnel and local villagers of Kila Kila has been established. At the time of major PNG and Chinese festivals, people of two countries will celebrate together like a family, which is conducive to the cultural exchange of the two countries.



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- ◆ 透明公开的互动渠道
- ◆ Transparent and open interaction channel



权威报纸post
Major News Paper "Post"



权威报纸national
Major News Paper "National"

- 项目积极与外界媒体建立联系，依托于当地权威报纸post和national作为对外宣传平台，及时对外发布项目部的重大事项。
- The project have been actively building relations with the media; major local news papers Post and National are media platforms that help publicize key events of the Project.



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- ◆ 透明公开的互动渠道
- ◆ Transparent and open interaction channel



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华南-巴新学校项... 简报 文档 模型 任务 成员 设置

全部成员 24

公司及大区

专业分包

▼ 总承包项目部

安全部

班子成员

综合办

商务部

技术部

工程部

未分组成员

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林歆	项目副书记	18665903264
刘向阳	项目执行经理	13759184645
马帅	项目经理	18675573368 371619841@qq.com
马帅	项目经理	mas@cscec.com
彭康林		18624383167

马帅

个人信息

姓名: 马帅

职务: 项目经理

组织: 总承包项目部 / 班子成员

邮箱: 371619841@qq.com

手机: 18675573368

ID: 6338617191383815002

签名: 未设置签名

空间管理员

Glodon/ACCOUNT

- ▶ 借助Glodon/ACCOUNT平台, 及时发布项目进展信息及动态, 以项目为核心, 连接项目各参建方团队在统一的平台上共享项目信息, 完成即时的沟通协作和高效的文件评审。
- ▶ Progress information and activities of the Project are posted using Glodon/ACCOUNT, which sets the Project at the core and connects all participating teams of the project on a unified platform for sharing information on the Project, so that timely communication and efficient review and approval of documents are enabled.



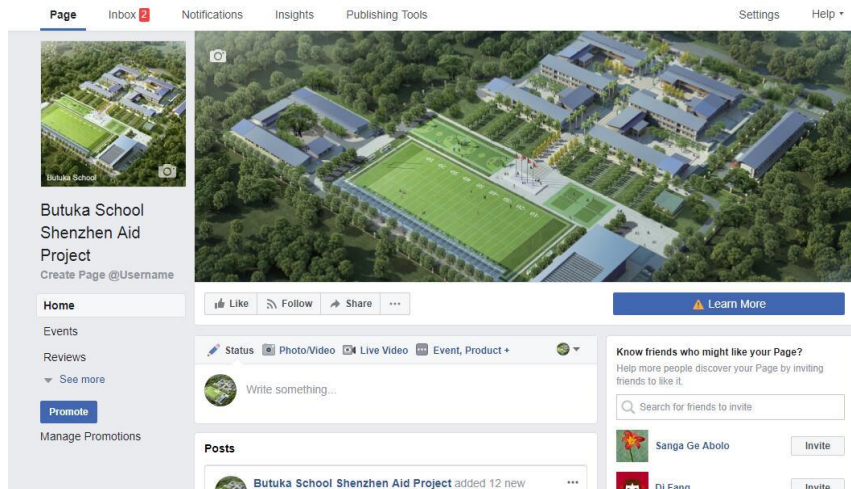
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◆ 透明公开的互动渠道

◆ Transparent and open interaction channel



项目部Facebook平台
Facebook of the Project



APEC事务部部长Justin W Tkatchenko个人平台
APEC Minister Justin W Tkatchenko's personal page

- 项目部建立facebook平台，及时发布项目动态并与公众进行交流和沟通，吸纳来自社会各界的建议和指导。巴新政府APEC事务长Justin W Tkatchenko也在个人facebook平台上及时发布项目的相关动态。
- The Project has set up its own Facebook page for timely publicizing the Project's status, communicating with the public, attracting advice and instructions from various sectors of society. PNG APEC Minister Justin W Tkatchenko also timely posts events related to the project on his personal Facebook page.



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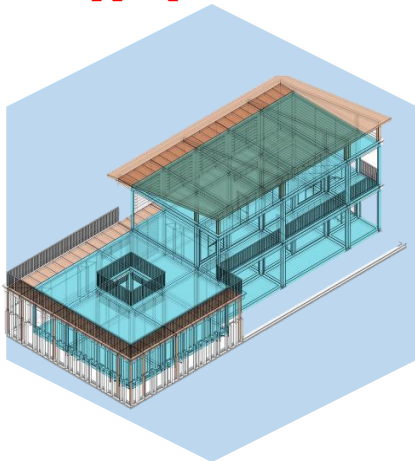
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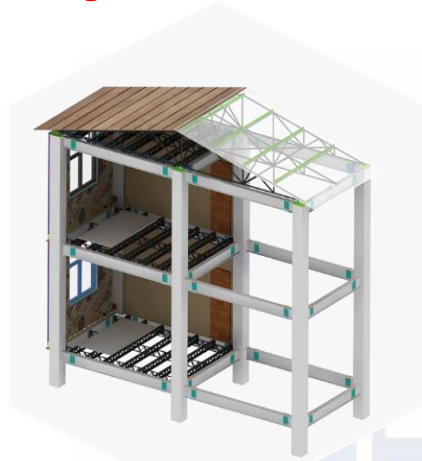
Feasibility



- ◆ 合理设计方案选型
- ◆ Appropriate selection of design scheme



三维模块化
3D Modular



GS-Building体系
GS-Building System



前期样板实践
Sample Practice

- 项目前期进行了三维模块化装配式、传统钢筋混凝土形式、GSbuilding等几类设计方案比对，最终选定GSbuilding形式，建筑部品化率、预制装配率高，解决了集成度低、环境污染、高成本、低效率等难题。
- Earlier comparisons between 3D modular prefabrication, traditional reinforced concrete and GS building were made, with GS Building finally selected for its advantages in high levels of component ratio and prefabrication ratio. This solved the difficulties of low integration, environmental pollution, high cost and low efficiency.



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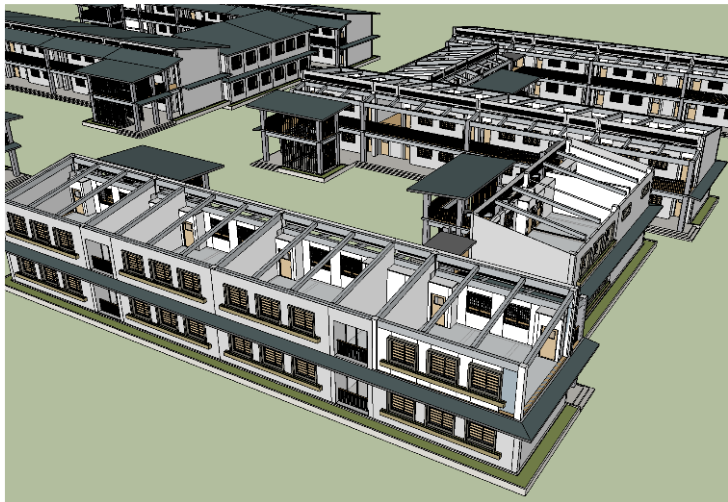
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Feasibility



- ◆ 合理设计方案选型
- ◆ Appropriate selection of design scheme



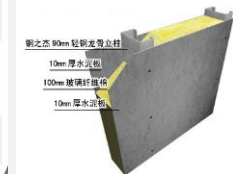
GS-Building体系
GS-Building System



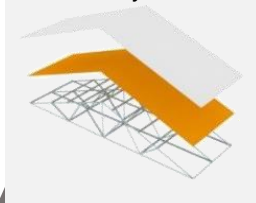
钢结构框架
Steel Structure Frame



楼板体系
Slab System



围护体系
Enclosure System



屋盖系统
Roof System

- 结构分解为钢结构主体框架、楼板体系、围护体系、屋盖系统，集成水电、饰面等装饰装修内容，主体结构采用全螺栓连接。
- The structure is divided into steel main frame, slab system, enclosure system, roof system, integrated water and electricity system, and finishing and decoration systems like veneer etc. The main structure is fully connected with bolts.



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Feasibility



- ◆ 项目分析及方案制定
- ◆ Project analysis and scheme preparation

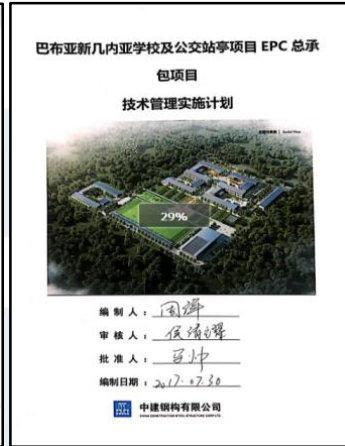
Standardized management
规范管理为纲



项目方案
Project Planning

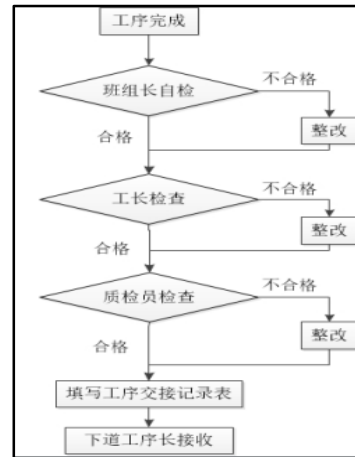
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评审方式：□会议讨论 □文件传递 □网上评审			
项目名称：巴布亚新几内亚学校及公交站亭项目 EPC 总承包工程 脚手架施工专项方案			
项目编号：ZJ002020-2017-008 版本号：B			
编制人：[Signature] 审核人：[Signature] 批准人：[Signature]			
编制日期：2017年09月03日			
部门/人员	评审意见及建议（可附页说明）	签名	评审时间
项目技术主管	同意	[Signature]	2017.9.3
项目安全主管	同意	[Signature]	2017.9.3
项目生产主管	同意	[Signature]	2017.9.3
项目商务主管	同意	[Signature]	2017.9.3
项目质量主管	同意	[Signature]	2017.9.3
项目材料主管	同意	[Signature]	2017.9.3
项目设备主管	同意	[Signature]	2017.9.3
项目其他	同意	[Signature]	2017.9.3

项目方案评审
Evaluation of
Project Planning



技术管理实施计划
Plan of Technical
Management

Procedure Management
管控流程为魂



管控流程
Control Procedure

- 为实现此设计体系，项目针对各阶段、各专业工序制定了详细的施工方案30余项，分析了项目存在的各项施工重难点及应对措施，实行严格管控。
- To implement this design system, the Project Management Department prepared over 30 detailed construction schemes for various stages and disciplines, whereby each construction difficulty and counter-measures are analyzed and controlled.



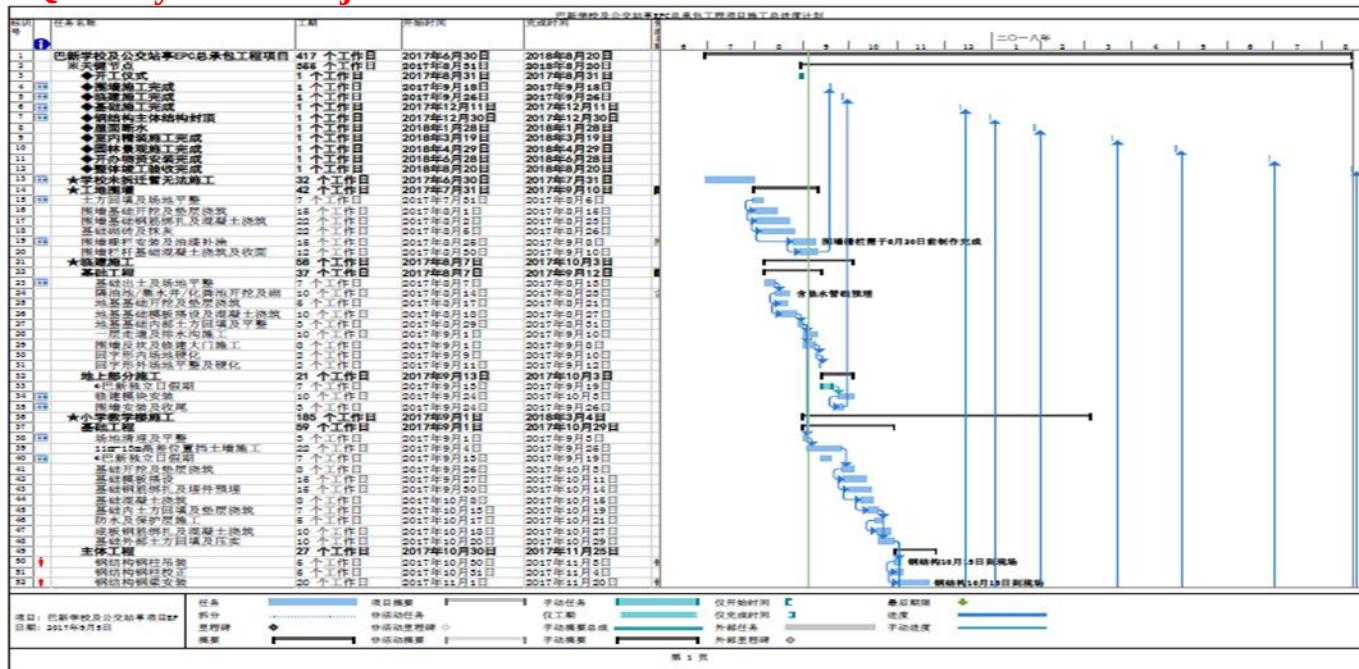
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Feasibility

- ◆ 量化整体目标
- ◆ Quantify overall objective



- 针对项目的具体实施规划，从设计、加工制作、运输、安装施工、工期把控等各阶段进行了分析和量化把控。
- To implement the planning of the Project, analyses and controls are undertaken on various stages including design, fabrication, transport, installation and management of construction period.



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Feasibility



- ◆ 适于各类经济系运用
- ◆ Suitability for all price levels



旅游中心
Tourism Center



高端酒店
Upmarket Hotel



创客中心
Entrepreneurial Center



大型赛事
Big Events



公共设施
Public Facilities



私人住宅
Private Residence

- 本装配式结构体系通过不断的创新改造与技术升级，未来也可广泛应用于旅游中心、高端酒店、创客中心、大型赛事、公共设施、私人住宅等建筑类型。
- In the future this prefabricated structural system through continuous innovation, reforming and technical upgrading maybe used in tourism centers, upmarket hotels, entrepreneurial centers, event venues, public facilities and private residences.



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Duplicability



- ◆ 成本效益
- ◆ Cost Effectiveness

框架方案 Frame Plan	类别 Type	单位 Unit	工程量 Quantity	单价 Unit Price (CNY)	合价 (元) Total Price (CNY)	方案合计 (万元) Total Price (10,000 CNY)
I	钢结构 Steel Structure	吨 Ton	1,300	14,500	18,850,000	1885
II	混凝土 Concrete	立方米 m ³	6,100	2,400	14,640,000	2257
	钢筋 Reinforcement	吨 Ton	650	12,200	7,930,000	
支撑方案 Support Plan	类别 Type	单位 Type	工程量 Quantity	单价 Unit Price (CNY)	合价 (元) Total Price (CNY)	方案合计 (万元) Total Price (10,000 CNY)
I	钢筋桁架楼承板 Steel Truss Bearing Slab	平方米 m ²	4,600	310	1,426,000	142.60
II	钢筋 Steel Bar	吨 Ton	69	12,200	841,800	185.38
	模板 Formwork	平方米 m ²	4,600	220	1,012,000	

- 1500t 6100 650t 372
- Quantity of steel structure used is 1,500 tons, saving 6,100m³ of concrete, 65 tons of steel bars and 3.72 million CNY in cost as compared with traditional reinforced concrete structure.
- 4.5% 42.78
- Installation of formwork and binding of reinforcement at site are avoided, and waste of steel bar is cut down by 4.5% which means a cost reduction of 427,800 CNY.



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Duplicability



- ◆ 成本效益
- ◆ Cost Effectiveness

墙体方案 Wall Plan	类别 Type	单位 Unit	工程量 Quantity	单价 Unit Price	合价 (元) Total Price (CNY)	方案合计 (万元) Total Price (10,000CNY)
I	轻质隔墙 Light-Weight Partition	平方米 m ²	11,200	520	5,824,000	582.40
II	砌块 Masonry	立方米 m ³	2,300	1,800	4,140,000	714.00
	混凝土 Concrete	立方米 m ³	1,250	2,400	3,000,000	

屋面方案 Roof Plan	类别 Type	单位 Unit	工程量 Quantity	单价 Unit Price	合价 (元) Total Price (CNY)	方案合计 (万元) Total Price (10,000CNY)
I	铝镁锰屋面系统 Magnesium Roof System	平方米 m ²	12000	455	5,460,000	546.00
II	混凝土 Concrete	立方米 m ³	1320	2400	3,168,000	652.80
	防水 Waterproof	立方米 m ³	12000	280	3,360,000	

-
- In PNG local partition method is filling concrete in masonry blocks. In comparison masonry quantity is reduced by 2,300m³, including 250m³ of concrete reducing the cost by 1,311,600 CNY.
-
- Quantity of new type short vertical side magnesium roof system amounts to 12,000m², reducing concrete weight by 1,320 m³, and cost by 1,068,000CNY.



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Duplicability



- ◆ 节能减排效益
- ◆ Benefit in Energy and Emission Reduction

类别 Type	单位 Unit	工程量 Quantity
节煤 Coal Saved	吨 Ton	430
节地 Land Saved	亩 Chinese Acre	3.28
减少CO2排放 CO2 Reduced	吨 Ton	1,280
减少SO2排放 SO2 Reduced	吨 Ton	235
减少NO2排放 NO2 Reduced	吨 Ton	2.68



1280

235

2.68

430

3.28



In terms of green construction, energy saving and emission reduction, the energy saving indexes of every 10,000 m² are 430 tons of coal, 3.28 Chinese acres of land, 1,280 tons of CO₂, 235 tons of SO₂ and 2.68tons of NO₂.



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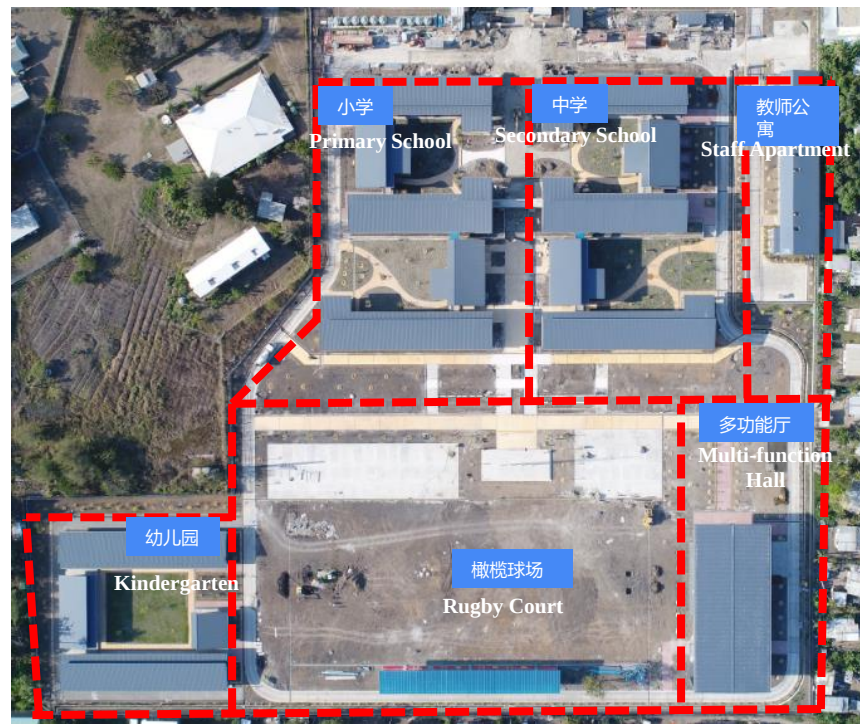
Achievement Demonstration



- ◆ 完成度
- ◆ Rate of Completion



开工前现场全景照
Panoramic Site View at
Commencement



7月22日现场全景照
Panoramic Site View on
22nd July



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Achievement Demonstration



- ◆ 各单体完成度-幼儿园
- ◆ Rate of Completion - Kindergarten



Location of Kindergarten



Real Picture of External Wall



Real Picture of Classroom Ceiling



Real Picture of Toilet



Real Picture of Corridor



Installation of Facilities

-
- The Kindergarten has been fully completed.



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Achievement Demonstration



- ◆ 各单体完成度-小学部
- ◆ Rate of Completion - Primary School



小学位置
Location of Primary School



走廊实景
Real Picture of Corridor



外墙板实景
Real Picture of Wall Plate



卫生间实景
Real Picture of Toilet



教室实景
Real Picture of Classroom



课桌椅安装
Installation of Facilities

-
- Primary school has been fully completed.



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Achievement Demonstration



- ◆ 各单体完成度-中学部
- ◆ Rate of Completion - Secondary School



中学位置

Location of Secondary School



外墙实景

Real Picture of External Wall



走廊实景

Real Picture of Corridor



多媒体教室

Multimedia classroom



走廊吊顶

Ceiling of Corridor



卫生间实景

Real Picture of Toilet

-
- Secondary school has been fully completed



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Achievement Demonstration



- ◆ 各单体完成度-教师公寓
- ◆ Rate of Completion – Staff Apartment



Location of Staff Apartment



Real Picture of Staff Apartment



Real Picture of Bedroom



Real Picture of Living Room



Real Picture of Kitchen



Real Picture of Shower Room

-
- Staff apartment has been fully completed.



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Achievement Demonstration



- ◆ 各单体完成度-多功能厅
- ◆ Rate of Completion – Multi-Function Hall



多功能厅位置

Location of Multi-Function Hall



航拍圖

Aerial Photo



室內安裝

Interior Finishing

-
- Multi-function hall has been fully completed.



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铁骨仁心 钢构未来

Achievement Demonstration



- ◆ 各单体完成度-室外工程
- ◆ Rate of Completion – Outdoor Works



消防通道
Firefighting Passage



升旗台
Flag Platform



橄榄球场看台
Tiered Spectator Stand of Rugby Court



室外休息石凳
Exterior Stone Bench



幼儿园绿化
Greening of Kindergarten



中学庭院绿化
Greening of Secondary School Courtyard

- Outdoor works have been fully completed



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Achievement Demonstration



- ◆ 公交站亭
- ◆ **Bus Stop Shelter**



-
- **Bus stop shelters have been fully completed.**



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Social Influence



- ◆ 带动国际交流
- ◆ Stimulating International Exchange



- PNG APEC Minister Tkotchenko, and Governor of National Capital District Parkop brought a delegation to visit Shenzhen, and had in depth communication with senior Shenzhen government officials, during which they expressed high commendation to all participants of the Project.



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Social Influence



- ◆ 促进两国文化间的交流融合
- ◆ Stimulating cultural exchange between the two countries



The project personnel who are united themselves for overcoming adversities have also established deep friendship with local people and won a high reputation from various sectors of society.



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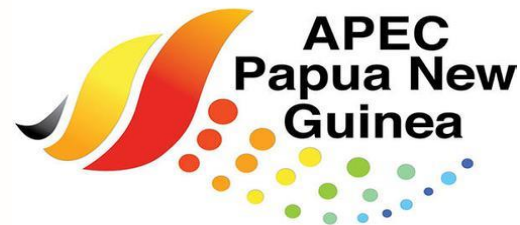
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Social Influence



- ◆ 助力APEC会议
- ◆ Supporting APEC Summit



- 2018 11 APEC APEC
- In November 2018, APEC Summit will be held in PNG Capital Port Moresby, and currently the Project Department is vigorously arranging for the event in order to help improve the image of PNG during the visit of State Leaders.



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Building the future with the heart of humanity and the will of steel



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CSCEC STEEL

Appendix 1 Patent Application and Standard Preparation

Patent completed:

No.	Content	Category
1	<i>"A Kind of Integrated and prefabricated Steel Structure"</i>	Invention patent application No.: 201510753428.8
2	<i>"A Kind of Integrated and prefabricated Steel Structure"</i>	Utility model patent application No.: 201520883719.4
3	<i>"A Kind of Integrated and Prefabricated Floor"</i>	Invention patent application No.: 201510752398.9
4	<i>"A Kind of Integrated and Prefabricated Floor"</i>	Utility model patent application No.: 201520884488.9
5	<i>"A Kind of Integrated and Prefabricated External Wall Panel"</i>	Invention patent application No.: 201510752720.8
6	<i>"A Kind of Integrated and Prefabricated External Wall Panel"</i>	Utility model patent application No.: 201520883762.0
7	<i>"A Kind of Modular Interior Partition Panel"</i>	Invention patent application No.: 201510752205.X
8	<i>"A Kind of Modular Interior Partition Panel"</i>	Utility model patent application No.: 201520883742.3

Standard being prepared:

No.	Content	Category
1	<i>"Technical Specification for Integrated Box House"</i>	Industrial standard
2	<i>"Evaluation Standard for Steel Structure Industrial Buildings in Shenzhen"</i>	Local standard
3	<i>"Exterior Protection System Parts Standard of Green Building"</i>	Enterprise standard

Appendix II Key points and difficulties in construction existing in the project

Key points and difficulties in engineering	Key points and difficulties in civil construction
1. General contracting management of the engineering	1. Control differential settlement, accurately calculate purchase amount, supply frequency, construction speed, etc., and conduct dynamic control during the construction process.
2. Construction schedule management	2. Quality control of concrete casting, selecting measures, materials and machines & tools that are durable, easy to maintain and disassemble.
3. Construction site layout and management of multi-professional cross construction, achieving the maximum level of land saving and material saving.	3. Quality control of concrete appearance, adopting advanced water-saving construction technology during the construction to avoid uncontrolled watering and maintenance.
4. Application of green, energy-saving, environmental protection, intelligent and other new technologies	Key points and difficulties in steel structure construction
5. Procedures settlement of transnational transportation and schedule control	1. Optimizing the steel structure fabrication and the control of installation method. Large steel structure should be fabricated in factory and assembled on site; It should be installed by segmental hoisting, overall lifting, sliding, jacking, etc. Reducing the amount of material used in the scheme.
6. Unfavorable climatic factors such as rainy season and typhoon	2. Quality control of steel structure members manufacturing, using intelligent robots for cutting and welding processes to achieve material saving and efficient working.
7. Personnel security management under unstable social factors	3. Rational arrangement of member placement on site, reducing the secondary handling of members and reducing the waste of site resource occupancy.
Key points and difficulties in mechanical and electrical construction	Key points and difficulties in housing enclosure structure construction
1. Pipeline laying, utilization and maintenance of energy-saving equipment.	1. Fabrication precision control of enclosure structure members and reducing material wastage.

2. Inter-machine debugging of mechanical and electrical equipment	2. Finished product protection during the transportation of enclosure structure and reducing material waste.
Key and difficult points of garden construction	3. Installation accuracy control of enclosure structure
1. Construction quality control of landscaping	4. Waterproofing of enclosure structure