

# PBL GROUP NEWSLETTER



WE STRENGTHEN YOUR STRUCTURES

Volume 3, Issue 1

January 2009

## Message from the CEO



Dear Readers,

Another good year is leaving but yet another better year is coming. We wish to thank you all for supporting our business throughout the year 2008 and make it another successful year.

PBL is now 20 years old since October 2008. PBL have grown up and devel-

oped steadily and become one of recognized organizations in the post tensioning business worldwide.

We will continue to build up our development which will bring benefit to our post tensioning system users. We also welcome to consider any requirement from our customers and users to

meet their satisfaction and effectiveness of our products.

We will keep you informed of new development and our activities through PBL newsletter.

We hope you will enjoy reading PBL newsletter and get valuable information about post tensioning application and development.

Finally, wish you all the successful and prosperity year for your business and career in 2009.

Happy New Year to all.

**Prapat Boonlualoah**  
CEO & Managing Director

### Look out for the upcoming publication

- LATEST PT DESIGN TECHNOLOGIES
- SEMINARS AND WORKSHOPS
- STATE-OF-THE-ART DESIGNS
- UPDATES AND FOLLOW-UPS FROM THIS ISSUE
- PBL SOCIAL EVENTS

## Tech9 : Special Projects

Tech9 Engineering Solutions Pvt Limited has acquired a technical collaboration with an experienced group in post tension technologies M/s PBL group Limited, Bangkok Thailand, which has 20 years of experience in

*“The team of Tech9 is its strength which has a combination of leaders with more than 25 years in Indian Construction Industry.”*

multi discipline engineering in both design and construction.

In a short span of 10 months of incorporation Tech9 acquired a large number of projects in various parts of India with its core reputed team and expertise.

Tech9 would like to present the special projects as follow:

### CLINKER SILO'S



**View of Silo Construction at Miryalguda**

### Inside this issue:

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# PBL GROUP NEWSLETTER

## Tech9 : Special Projects

Clinker is a base-raw material used for cement production. For storing clinkers in huge quantities Silo's built in various cement plants by using circular pre-stressing as more strengthening technology to resist internal pressure on walls.



**View of Slip Form Spider from Inside**

Depend on various storage capacities circular diameter and heights of Silo's are decided.

### Construction Stages of Silo:

- Lower level-section is constructed with conventional shuttering.
- Slip Form : is erected above lower level with circular spider-supports from inside.
- Construction of Silo is done uninterrupted during days and nights till the entire height of concrete is completed. Tech9-deputes personnel for day and night shifts to take care of PT tendon installations carefully.
- Tendons are placed to alternate ribs of Silo.



**View of Silo During Slip Form**

- Tendon vertical spacing is gradually increased proportionate to height of Silo.
- Stressing is done simultaneously from both ends of RIBS by using multistrand stressing jacks.
- Pressure grouting is done for all the tendons with plain cement mortar with 0.40 water/cement ratio.

The following are Silo job details which are under construction and post tensioning system work are done by Tech9, India.

Job Description	Cleint	Dimension	Scope	Status	System
Silo at Miryalguda	GDC	25 m High/ 45 m dia	74 Ton PT	Completed	PBL MF 1205
Silo at Bellary	GDC/ ACC	25 m High/ 45 m dia	75 Ton PT	Ongoing	PBL MF 1205
Silo at Tandur	GDC/ PENNA	45 m High/ 20 m dia	54 Ton PT	Ongoing	PBL MF 705
Silo at Wadi	GDC/ ACC	25 m High/ 45 m dia	75 Ton PT	Ongoing	PBL MF 1205

## HIGH WAY BRIDGES

### Green Land Flyover-ROB at Hyderabad:

Project requirement and proposal by government: for the purpose of widening of 4 lanes road over bridge to 6 lanes road bridge by constructing additional 2 lanes road and modifications to existing superstructure at Begumpet Railway

*“For the purpose of widening of 4 lanes road over bridge to 6 lanes road bridge by constructing additional 2 lanes road and modifications to existing superstructure...”*



**View of PBL MF1205 Anchor**

Station Yard, this post tensioned bridge is proposed. The both side approaches for this flyover were completed by PSC girders previously.

### Sequence of construction at casting yard:

- Preparation of casting bed.
- Installation of one side shuttering and vertical and horizontal alignments.
- Installation of rebar cage.
- Installation of tendon ducting 75 mm dia into the cage and profiling as per drawings.
- Fixing of live end anchor plate castings PBL MF1205 and fixing end shutters, inserting strands.
- Alignment of tendons final checking.
- Concreting



**View of Girder after Concrete**

- Stressing of tendon's from both ends with multistrand stressing jacks after confirming compressive strength of concrete.

## Tech9 : Special Projects

- Grouting of tendons.
- Fulfillment all necessary records as per consultant requirements.

After grouting the girders were shifted to site and erected by using heavy cranes on railway portion pier caps.



View of Girder after Stressing

### Project Description

Location : Begumpet Hyderabad, India

Scope of Work for Tech9 :

Post Tensioning of PSC Girders

Number of Spans : 02 Railway crossing portion

Length of Girder : 21.80 m-12 Girders

System : PBL MF1205 Multiple stressing system adapted

Number of Tendons : 4 in each girder

Type : PSC girder

Started Date : 01-09-2008

Expected to Complete : 10-11-2008



View of Girder after Grouting

Owner : Municipal Corporation of Hyderabad

Client : HUDA, STUP Consultant, South Central Railway

Contractor : M/s JMC Projects India Limited

Consultant : M/s Pragati-Hyderabad

Proof Consultant & Supervisor :

M/s L&T Ramboll and STUP Hyderabad

### • Strengthening of Hill Slopes

### Strengthening of hill slopes at DURGA TEMPLE VIJAY-AWADA-INDIA



View of Tech9 Scope of protection Works Completed and Road Widening also seen

Durga temple is a famous religious place situated on hills of the city Vijayawada, AP about 250 km from Hyderabad in India. In the part of improvement of present road connection to the hill temple authorities decided for widening of existing roads. During the widening rock blasting done to remove the excess earths thus heavy rock got loosened at various

*“Tech9 submitted a proposal by anchoring mono strands into hard rock area connecting various lengths of strands in vertical and horizontal directions by meshing up with strong wires meshes.”*

heights. Temple authorities invited Tech9 to submit a methodology to strengthen and stabilize the hill slopes.



Hill Slopes before Strengthening /Stabilizing

Tech9 submitted a proposal by anchoring mono strands into hard rock area connecting various lengths of strands in vertical and horizontal directions by meshing up with strong wires meshes. After completion of strand anchoring into the hard rocks, grouting done to the major gaps of rocks to avoid slipping of small boulders.



Strands Anchored at Top of Hill to Hard Rocks with Mono Strand Barrel System

### Construction sequence:

- Location hard rocks at the top and bottom of hill slopes.
- Fixing of mono strand by drilling and filling epoxy into hard rocks.
- Assembly of strands (epoxy coated for corrosion protection) and sleeved in HDPE pipes.
- Launching of strands

## Tech9-Special Projects



**Pull Out Test of Mono strand anchor up to 140 KN**

- Placing of weld mesh for preventing smaller size boulders from falling.
- Anchoring and stressing of strands on top-bottom for vertical and either sides for horizontal directions. Loads applied up to 70-80 KN on each strand.
- Grouting of rock gaps with cement mortar.
- Re-stressing if necessary done.



**During grouting of Hill Rock Gaps**

### Project Description

Scope : 65 m from road level to a width of 50 m approx.

System : Mono barrel system 0.5"

Started Date : 01-07-2008

Completed Date : 10-10-2008

Client : Endowments Department  
Government of AP

### POST TENSION IN RESIDENTIAL APARTMENTS

#### Janapriya Arcadia and Metropolis:

M/s Janapriya Engineers is a renowned builder and promoters in southern India and proposes to build mass residential apartments in different parts of Hyderabad city.

Janapriya Arcadia located at Kowhur (near Alwal), Hyderabad, is the perfect home for those

who search for peace and serenity in the midst of the hustle and bustle of city life. Its wide, green expanse rejuvenates you, and makes the pollution and hectic schedules that surround you seem far, far away.

*“During the course of construction, post tensioning is expected to be among one of the leading construction technologies to be implemented therein in order to meet the rapid construction schedules.”*



**Janapriya Arcadia Project Lay out Plan of 4 Blocks**

Janapriya Metropolis located in the warm confines of Moti Nagar, Metropolis provides the perfect urban home for those who find comfort in

having both their personal and work spaces within reach.

A 12 acre, 1,525-apartment project, Metropolis brings the best of Hyderabad closer to your heart and home.



**Janapriya Metropolis Project Layout of 8 Blocks**

During the course of construction, post-tensioning is expected to be among one of the leading construction technologies to be implemented therein in order to meet the rapid construction schedules. Tech9 Engineering solution Pvt Limited in technical collaboration with M/s PBL Group, Thailand is a specialist civil engineering firm has been engaged in carrying out the post-tensioning of flat plate slabs in ARCADIA and METROPOLIS projects.



**PBL Mono Strand Bonded Tendon system**

PT Slabs and initially designed at 175 thick flat plates. Later modified to a thickness of 150 mm. While working

## Tech9-Special Projects

on the more economics of the project Tech9 proposes for a slab thickness up to 115 mm. The designs checked and mock up slabs executed at site with bonded mono strand system.



**Rotary Concrete Placer for Slabs**



**PBL Mono Strand Bonded Tendon System Introduced in Block-A**

### Project Description

- **Janapriya Arcadia**

Number of Block : 4

Approx. PT Area : 88,000 m<sup>2</sup>

Project Duration : 30 months

Client and Owner : M/S Janapriya Engineers Syndicate, Hyderabad

Consultant : M/S Satyavani Project and Consultants Pvt Limit

Structure & Super Structure : RCC walls and post tensioned slabs without beams and column protrusion.

System : PBL SF305, SF105 bonded system were adapted

Status : Block-B phase nearing completion. Block-C and A are in progress



**View of PT Slab Edge with Mono Strand Bonded Tendon System**

- **Janapriya Metropolis**

Number of Block : 8

Approx. Pt Area : 100,000 m<sup>2</sup>

PT Slabs : Initially designed at 175 thick flat plates. Later modified to a thickness of 150 mm. Now working of reduced thickness up to 115 mm.

System : PBL SF305, SF105 bonded system were adapted

Status : Block-7 & 8 are in progress

Contributed by: Mr. B. V. Nagarajkumar who is a Operation Director of Tech9 Engineering, India

## Millennium Residence-Bangkok



**Artist Impression of Millennium Residence**

City Developments Limited (CDL), a real estate and hotel business unit of Singapore's Hong Leong Group, is investing in hotels, residences and shopping malls in Thailand as the group sees big potential for the tourism and retail industries here. CDL has holdings in the Millennium Residence Project in the heart of

Bangkok, which consists of luxury 604 condominium units worth over 10 billion baht covering a plot of more than 12 rai comprises four 51 to 53 storey "orchid petal shaped towers", covering a plot of more than 12 rai located between Sukhumvit 16-20.

The Millennium Residence @ Sukhumvit will have unparalleled panoramic view of Bangkok's skyline, and also including Benjakitti Park and Leak and glimpses of the Chao Phraya River.

The civil & structural and mechanical & electrical designs for this 150,000 square meter development have carried out by Meinhardt Company. Special features of this project are the 3-petal plan shape giving all units wrap-around views, a 25 meter high void at ground level ensuring even the first floor apartments have unobstructed views above surrounding building and a vast landscaped garden grove linking the buildings to a central clubhouse and parking facility.

*"Millennium Residence Project in the heart of Bangkok, consists of luxury 604 condominium units worth over 10 billion baht covering a plot of more than 12 rai comprises four 51 to 53 storey "orchid petal shaped towers" "*

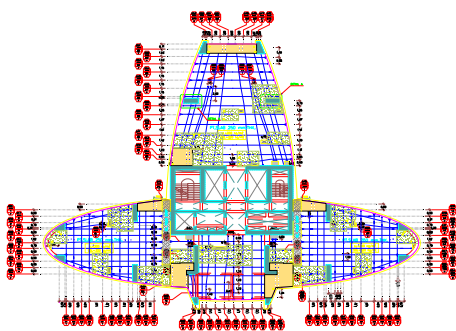
## Millennium Residence-Bangkok

A key challenge for the design team was to control wind sway accelerations within acceptable limits using wind tunnel testing and complex 3-D structural analysis programs.

*“A key challenge for the design team was to control wind sway accelerations within acceptable limits using wind tunnel testing and complex 3-D structural analysis programs.”*

The main contractor, Ritta Co., Ltd., awarded PBL to offer the design review, supply and install the post tensioning system for the tower structure consists of 4 buildings of 51 to 53 storey with total area of almost 100,000 square meter all together.

In order to accelerate the construction and at the same time to reduce restraint force at the rigid core each floor have been divided into 4 zones by means of pour strips.



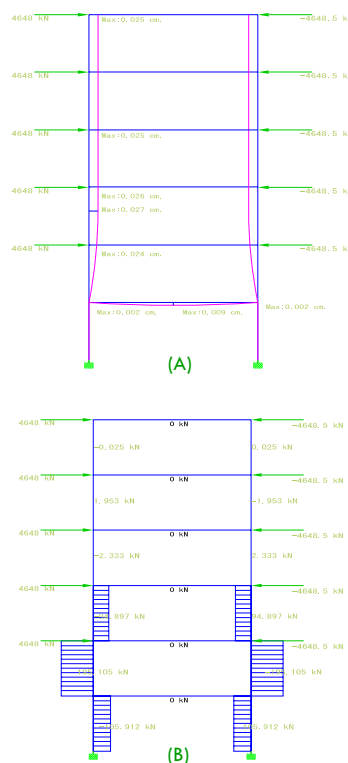
**Typical Floor Plan Tendon Layout**

As required by structural designer PBL has been requested to check for forces, stresses and other parameters for various conditions of loading during construction stage and under service life of structure including wind load, earthquake load, transfer beam deflection and differential column shortening effect. Some of the aspects

that have been taken into the design check were:

- **Column and wall restraint**

The restraint effects due to column and wall restraint have been checked for the lower floor up until the effects become insignificant. We found out that after 5 floors above this effect started to diminish.



**Column Restraint Effect Analysis Results (A) Deformation, (B) Shear**

- **Stresses induce in slab due to deflection of transfer beams**

The transfer beam deflection were determined for various load cases for recalculating the effect on PT slab stresses and strength.

- **Column differential shortening effect**

The effects of column shortening have been determined quantitative by using



**Stressing of PT Slab under Progress**

SAP 2000 software. The values so obtained have been used in determining the effect of stresses in slab and found out that the stresses induced were still within allowable limits as stipulated in the design code.



**PT Tendon Installation**

Punching shear was also thoroughly analysis from the result of column shortening and other load cases.

The post tension work has been completed successfully and the cycle time for each floor could be achieved at 6 days per floor. However, it should be noted that the crane service must have been always available to facilitate movement and delivery of materials and equipments on site and the management of each construction activity must be closely monitored.



**Millennium Residence under Construction**

## Progress of Bang Phli-Suk Sawat Expressway with Burapha Withi Expressway



**Portal Frame after Tensioning and Grouting while the Scaffolding for the Next Frame**

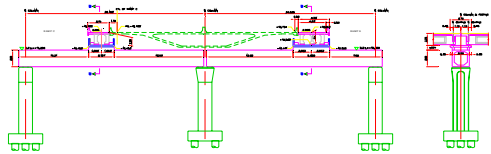
In our last issue we have introduced to our readers on the Connection of Bang Phli-Suk Sawat Expressway with Burapha Withi Expressway Project.

At present the PT work for one of the single span frames has already been finished while one of the two span frames has just been finished up to grouting stage.

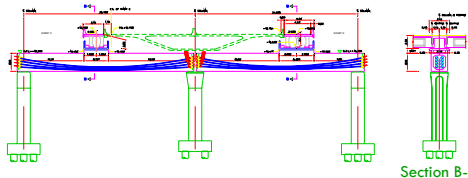
was 1.80 x 2.60 m (w x d). There was 4-2206 tendons that were tensioned up to 467 ton force through the whole system of PBL M2206 anchorage set with 500 ton stressing jack and hydraulic pump unit.



**Spring over Cut Strand Protruding End Prior to Covering with Protection Cap at Dead end Anchorage Set**



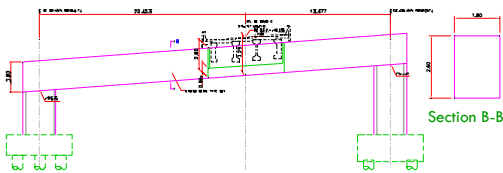
**Two Span Frame**



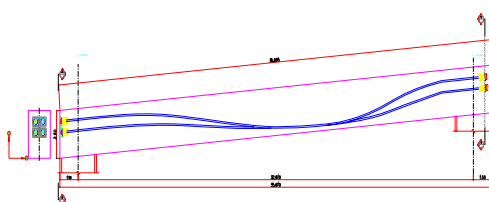
Both type of dead end anchorage were used: one being composed of dead end anchorage, wedge, spring,, protection cap, cross bar and screws which the other one being simply bulb end. All the beams were allowed by the Consulting Engineer to be stressed at one end. Certain beams would be required for both ends stressing which we could use both 500 ton and 450 ton stressing jack and hydraulic pump unit.

**Vertical Profile of Cross Beam PT Tendon for Two Span Frame**

As for the two span frame the beams rest on 3 columns situating at 26.163 m and 24.835 m apart. Both the horizontal and vertical profile were designed in such a way that they were symmetrical for each beam. The beam size was 2.50 x 3.00 m (w x d) accommodating 8-1506 tendons tensioned up to 318 ton. PBL M1906 anchorage sets were used for this beam and the 450 ton stressing jack and hydraulic pump unit was used for tensioning of the tendons.



**Single Span Frame**



**Vertical Profile of Cross Beam PT Tendon for Single Span Frame**

The single span frame was sloped down to one side as it situated at the curved ramp of the road way. The vertical profile was not symmetrical as there was a support for longitudinal girders at the lowest vertical profile location. The beam was designed also for horizontal profile. This frame was 25.62 m long and the beam size

*“The vertical profile was not symmetrical as there was a support for longitudinal girders at the lowest vertical profile location.”*



**Dead End Anchorage Showing Protection Cap Being Held Temporarily Prior to Fixing with Screw at Cross Bar**



**Tensioning of Single Span Frame at 467 ton Stressing Force with 500 ton Stressing Jack**

At present 1 of the 2 single span frame and 1 of 10 two span frame were completed successfully.



**Beam on Left Side of Portion Frame after Concrete Casting**

Contributed by: Mr.Patibhan Ariyadej, who is currently the Project Director of PBL Group Ltd.



**PBL Group Ltd.**

WE STRENGTHEN YOUR STRUCTURES

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## Adapt Builder Seminar in Bangkok

For over two decades, engineers worldwide have relied on ADAPT's industry leading software solutions to achieve the highest levels of design productivity and accuracy in

ADAPT-Builder links with the industry standards program ADAPT-PT (for post-tensioned floor) and ADAPT-RC (for non-prestressing floor).



**ADAPT's Engineer Giving Lecture to Participants**

ADAPT-Builder. The seminar was organized by PBL Group Ltd. on 1<sup>st</sup>-5<sup>th</sup> September 2008 at PBL head office, Bangkok where the participants from PBL Group and other countries e.g. Lebanon, Cambodia and India attended this seminar.

Mr. Prapat Boonlualoah, CEO and Managing Director of PBL Group Ltd. also presented the design of post-tensioning buildings by using ADAPT Software.

On the occasion of ADAPT seminar, all participants took chance to visit job sites and tour around Bangkok.



**Participants Visiting Job Site at "Jasmine Condominium Project", Bangkok**

*"ADAPT Software has been the most popular and recognized software for the design of post-tensioned concrete since 1981. Now ADAPT is as widely used for the design of conventionally reinforced concrete structures."*



**Lecturer and Participants after the Seminar**

their projects. The ADAPT-Builder Suite is an integrated collection of specialized software for the analysis and design of structural concrete slabs, foundations, beam frames and beams.

ADAPT-Builder features the ADAPT-Modeler module to create authentic 3D visualization of the structure. Calling the ADAPT-Floor Pro module, the program performs Finite Element Method (FEM) design of the floor using its automatic mesh generation. Post-tensioning of any shape can be placed anywhere. It reports the location, amount and length of reinforcement where needed.

ADAPT Software has been the most popular and recognized software for the design of post-tensioned concrete since 1981. Now, ADAPT is as widely used for the design of conventionally reinforced concrete structures.



**Mr. Prapat Giving Lecture to Participants**

As part of ADAPT's ongoing commitment to the global concrete design community and the advancement of the application of prestressing technologies, PBL Group Ltd. invited Mr. Dhruba Mukhopadhyay who is Technical Engineer of ADAPT International Private Limited, India visited to Thailand for training



**Mr. Prapat Presents Souvenir to Mr. Marwan Nakfour from Mega Prefab, Labenon who is one of the Participants after the Seminar**