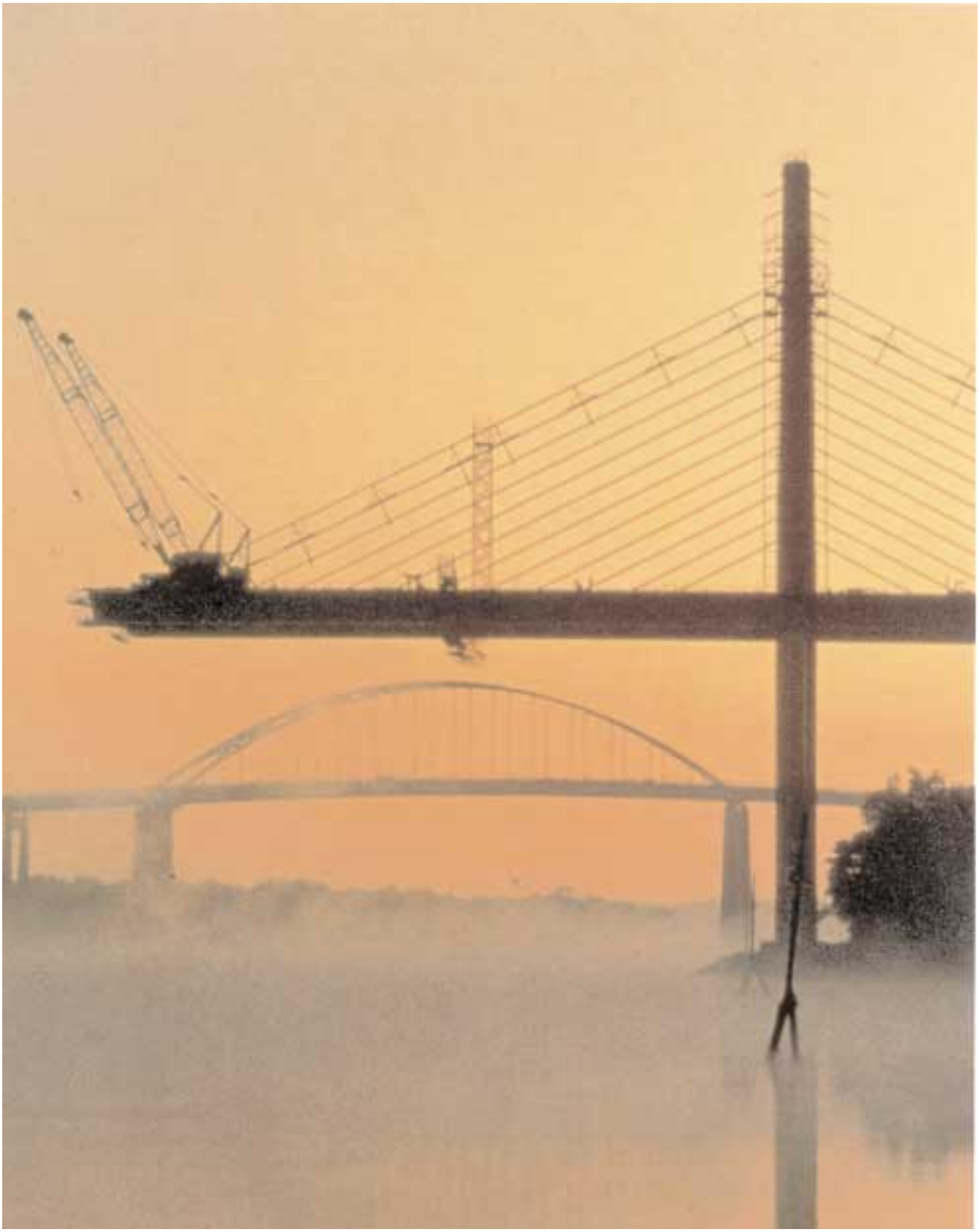
VSL NEWS

ISSUE TWO 1995

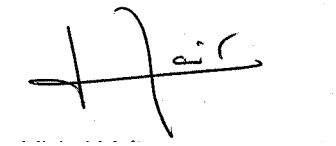


VSL in North America: a succesful combination of local expertise and group resources

The United States has always been a fantastic and exciting market in which to do business not only because of its size and vitality but also because of its technical and marketing requirements.

Since 1966, VSL Corporation has delivered outstanding service to the American Construction Industry. Today, America has drastically changed. With NAFTA, the GATT and the internationalisation of our business environments, the US market is closely intertlinked with the rest of the world. By taking advantage of the worldwide network of VSL's affiliates and the tremendous resources of the VSL Group, VSL Corporation has successfully taken up the challenge and is now well equipped to position itself as The Specialist Contractor in the Americas.

The enthusiasm of our clients on some particularly demanding projects such as the MGM-Bally's Monorail System, demonstrates that VSL Corporation's success lies in the combination of locally motivated and responsible people and the Group's technical resources.



Michel Maitre
CEO and Chairman of the Broad

VSL Corporation has always played a leading role in the development of post-tensioning and related activities in North America. From the outset in 1966, it has participated in some of the region's most exciting projects such as the Seven Mile bridge in the Florida Keys, the H3 North Halawa Valley Viaduct in Hawaii and the Muscone Center in San Francisco, California.

VSL Corporation has also developed several very successful areas of diversification, such as VSL Retained Earth™, which is one of the most widely used earth retaining systems in North America today.

In the last few years, to consolidate our leadership in this specialist market, we have set up a new organization and implemented innovative strategies:

A new organisation: In 1994, we moved the head office to Raleigh, NC and formed four profit centres to cover the United States: San Jose, CA; Dallas, TX; Springfield, VA; and Miami, FL. Projects in other areas such as Canada, Central America, Mexico, and the Caribbean being co-ordinated through the Raleigh office. At the same time, to ensure that our knowledge and technical expertise are being continuously improved and efficiently applied, we created in Raleigh a Technical Centre (one of three world-wide) staffed by a team of experienced multi-disciplined engineers and technical assistants. This investment represents a unique competitive advantage and enables us to offer our clients a wide range of work, optimised design and tailored construction methods.

Innovative strategies: Our goal is to be the leading American Specialist Contractor by:

- identifying projects at the earliest possible stage to suggest the best design, application or construction method,
- working closely with our clients to add the most value,
- taking advantage of the group world wide resources and technical capabilities.

The satisfaction of our clients and the dedication of our people confirm that the efforts we have produced in the last two years are paying off.

Andrew Payne
Regional Chief Executive Officer
Operating Unit III

Highlights of this Issue:

Front Cover:
The new Chesapeake & Delaware (C& D) Canal Bridge opened on December 2nd, 1995. Main Span 229 m. Stay cables and post-tensioning provided by VSL.

VSL adds value to north America's most prestigious bridge projects

H-3 North Halawa Valley Viaduct

The H-3 North Halawa Valley Viaduct on the Island of Oahu in Hawaii is composed of parallel elevated structures each approximately 1678 m long and 12.5 m wide. The structures are castin-place, post-tensioned, concrete box girders constructed by the cantilever method. The longest span is 40 m with each structure divided into six span frames. Kiewit Pacific Company (KPC) was awarded the contract in the summer of 1991. KPC used VSL alternative design which reduced the number of segments to be cast by a third. VSL designed and furnished three erection gantries that supported and advanced the form travelers. Segment lengths were 7.3 m.

VSL also did the structure redesign and provided the post-tensioning. The project was completed in early 1995.

Steve Ruel
VSL Corporation, San Jose, CA

Northumberland Strait Bridge

The bridge which crosses The Northumberland Strait at its narrowest point will have a total length of 12.9 km and will run from Jourmain Island, New Brunswick to Borden, Prince Edward Island. It will be 11 m wide from guardrail to guardrail which includes one traffic lane and one emergency shoulder in each direction. The bridge will be typically 40 m off the water with a 60 m high navigation span. The Bridge is a single cell concrete box girder consisting of a 1 275 m long approach on the New Brunswick side, a 11080 m long main bridge, and a 555 m long approach on the Prince Edward Island side.

The approach bridge spans are typically 93 m and are being erected in cantilever using an overhead gantry from segments which are being precast in a yard in New Brunswick. The main bridge is composed of 43 x 250 m spans which are being cast in a yard in Borden. The main spans will be built using just very five massive prefabricated elements, pier base, pier shaft, match cast segment, main girder, and drop-in girder. The heaviest and largest element is the main girder which weighs nearly 8000 t. All elements will be place offshore using Svanen which is a marine heavy lifting vessel.

The Bridge is a design, build and operate project and will be funded by toll revenue plus the annual ,ferry,, subsidies from the Canadian Government because the existing ferry will be eliminated.

The team responsible for the bridge consists of Strait Crossing, Inc., Northern Construction, GTMI (Canada) Inc., and Ballast Nedam Canada Limited. J. Muller International/Stanley J.V. is the designer.

The project will use 13000 t of prestressing steel in tendon configurations ranging from 6-4 to 6-43 and incorporates VSL CS-Anchorages 6-19 6-22, 6-31, and 6-37. Durability is a key issue in the very harsh North Atlantic marine environment. The project is being built entirely from 55 MPa silica fume concrete. Likewise, all post-tensioning tendons are being grouted with a special grout mix incorporating silica fume. Additionally, VSL PT PLUS Duct is being used for the transverse deck tendons and for the pier base tendons.

When the Northumberland Strait Bridge is completed in 1997 it will serve as a vital fixed link between Prince Edward Island and the Canadian Mainland.

John Crigler
VSL Corporation, Raleigh,NC

the Northumberland Strait Bridge under construction

Containments and Repairs showcase VSL expertise

Foxhall Condiminium Repair Nears Completion

The turnkey repair of the Foxhall Condominium is projected to be completed by the spring of 1996. Since the early 1980's VSL has been involved in hundreds of projects relating to the repair and retrofit of post-tensioned structures. By far the largest of these efforts is the Foxhall Condominium that has been undergoing repair since mid-1992. Originally constructed in 1972, the Foxhall is a 13 level concrete frame with a supported area of 34 200 m2 that houses 126 luxury condominium units.

This project started as a surveillance job where VSL investigated the condition of several tendons anchored in balcony slab edges. It quickly became apparent that a balcony precast to slab edge connection had been contaminated by water intrusion. This condition was typical throughout the structure and eventually resulted in VSL's repairing 2100 balcony edge anchorages. Another 1 100 tendons were repaired in other locations such as the roof, basement, and first floor plaza.

VSL had an excellent relationship with both the Foxhall Condominium Association and the Engineer, Robert Theobald & Associates, and was thus placed to assume the role of prime contractor when the need arose. As such, VSL had the responsibility for a variety of items outside the normal scope of work in a post-tension repair, such as slab waterproofing, power washing, masonry and brick erection, and exposed aggregate treatments.

Hank Cronin
VSL Corporation, Washington, D. C.

Hogback Reservoir

Construction is currently underway in Denver, Colorado, on the 16 million litre capacity Hogback reservoir. The overall dimensions of the structure are 54 m inside diameter by 7 m high.

The engineer of record, Bates Engineering Incorporated, required enhanced and maximum corrosion protection of the post-tensioning systems throughout the service life of the structure. Therefore, the CP+ monostrand system is being provided for the membrane floor, VSL PT PLUS duct with CS anchorages for the wall horizontally and floor ring beam, and VSL PT Plus duct with SO anchorages for the wall vertically and the flat plate roof.

The wall is cast in twelve individual segments including six with stressing pilasters; the membrane floor and roof are each cast in a single pour to eliminate the construction and serviceability difficulties associated with the construction joints.

The scope of VSL's services includes placing the post-tensioning systems and mild steel reinforcement in addition to supplying the post-tensioning systems.

Vaughn Phares
VSL Corporation Dallas, TX

VSL promotes bonded PT for buildings in USA

Hahnemann Parking Garage

VSL has received the 1995 Grand Prize for Engineering and Material Supply from the Concrete Construction Committee of Philadelphia for the Hahnemann Parking Garage. This project was the first multi-level, commercial structure to employ VSL PT PLUS plastic duct, bonded post-tensioning in the United States. Bonded post-tensioning was selected by the construction team for two primary reasons, cost and value. The cost of a state-of-the-art bonded post-tensioned commercial structure system was competitive with the un-bonded solution. The engineer preferred the bonded post-tensioned solution since it is the most effective protection against corrosion, and therefore, delivered the best value to the owner.

Dan Falconer
VSL Corporation, Philadelphia, PA

San Francisco Airport Parking Garage

Post-tensioning activity is nearing completion on this seven storey, 3,200 car garage. The structure is to provide employee parking as part of the airport's expansion planned over the next few years.

VSL's scope includes design and seismic analysis of the post-tensioned grouted beams and all installation. The main deck grid is 18.3 m by 7.3 m, with the 91.5 m long beams being stressed simultaneously from each end. Frame action provides the lateral load resistance for the 98000 m2 structure, and an expansion joint was adopted to separate the floors into two halves. Vehicle circulation is provided by spiral ramps cantilevering from circular walls at each end.

Work has proceeded ahead of schedule and has generated considerable interest in the use of bonded tendons for what would otherwise have been unbonded PT construction. The structure is expected to open in the second quarter of 1996.

Jim Trenerry
VSL Corporation, San Jose, CA

Aesthetics and function

VSL Retained Earth™ Walls

Retained Earth™ provides unlimited possibilities for architectural treatment giving architects and owners the flexibility to create structures that are unique, attractive and environmentally compatible.

Custom Raised Relief panels combined with smooth panels create striking random patterns that change throughout the day as shadows rotate and extend.

Custom Raised Relief

Raised Relief panels feature a raised centre portion which combines clean, sharp lines, bold relief and dynamic shadow effects.

Ashlar Stone panels simulate historic stone block masonry walls. The block pattern effectively masks the joints of the square panels.

The mountain panorama pattern was developed for use in the Rocky Mountain area. This square pattern features colored concrete with an exposed aggregate finish in the lower portions.

The rustication strip separates the «mountain and sky» in a randomly re-curring pattern.

William Neely
VSL Corporation, Raleigh, NC

Ashlar Stone

Mountain Panorama

Washington Dulles International Airport

Washington Dulles International Airport is currently undergoing a major facilities expansion in which the main terminal building is being doubled in size. The main terminal building, originally dedicated in 1962, features a striking suspended catenary roof. The new construction simply extends the original design out the East and West sides of the original building. The unique roof design provides a large (approx. 200 m x 52 m) column free space.

The roof consists of 25 mm thick lightweight precast concrete panels supported on structural strand cables that are draped into a caternary profile. These cables are anchored into a cast-in-place concrete edge beam which is supported by sloped cantilever columns.

The general construction contract was awarded to Mortenson in 1993.

Mortenson recognised the critical nature of the roof construction and VSL's unique capabilities in cable technology. In 1994, VSL was awarded the subcontract to design, fabricate, and erect the cable suspension system. There are a total of 128 structural strand cables which vary in size from 28 mm diameter to 33 mm diameter.

The roof profiles and slopes are an extremely sensitive part of the overall project. VSL's team of design and construction professionals have developed special equipment and methods to ensure successful and timely completion of the roof.

Don Kline
VSL Corporation, Washington, D.C.

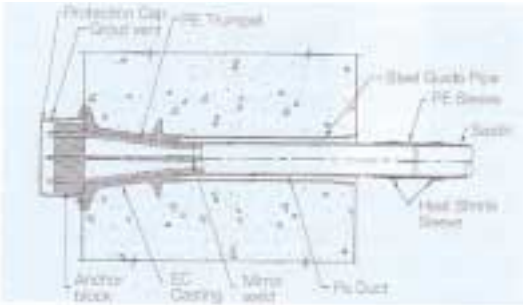
VSL external PT - making research a reality

Rambler Channel Bridge, Hong Kong

The rambler Bridge forms part of the Route 3 project and links Cheung Ching Tunnel on Tsing Yi island with the Kwai Chung Viaduct on West Kowloon. The 1.2 km dual three-lane expressway is composed of the 500 m long Rambler Channel Main Bridge, a 600 m long Eastern Approach Viaduct and a 110 m long Western Approach Viaduct.

The expressways are erected by an overhead launching gantry and use a precast-segmental balanced cantilever method of construction.

VSL's scope of works involves the supply, stressing and grouting of both internal and external tendons, and the supply of steel guide pipes and deviators.



Because of to the need to provide full encapsulation, inspectability and replaceablity of the external tendons, a special VSL ECR Anchorage was designed, produced and used for this project. To achieve this, a special PE trumpet was introduced.

The PE trumpet has a lip which is seated on the recess formed on the EC casting. When the tendon is stressed, the lip of the trumpet is compressed to provide an air tight seal between the anchor block and the casting. To complete the encapsulation of the tendon, a neoprene compression seal is provided between the protection cap and the casting, and at the other end, the PE trumpet is mirror welded to the PE duct.

Due to the need to grout tendons up to a length of 280 m, a special grout mix was used. This mix enabled grouting works to be carried out for a period of up to 3.5 hours. Using this mix, a grouting trial was satisfactorily conducted on a 60 m long tendon.

To ensure that the external tendons are replaceable, a removability test was successfully conducted in the presence of the project Engineers, Scott Wilson Kirkpatrick and the Honq Kona Highways Department. The test was conducted in accordance with the recommendations of Service d'Etudes Techniques des Routes et Autoroutes (SETRA).

In summary, the test requirements as stipulated by SETRA are:

- The test specimen must be at least 4.0 m long.
- The anchorages used should represent the largest size used in the project (in this case ECR5-31).
- The jacking force shall be at least 80% GUTS.
- The cement grout pressure shall be at least 0.6 MPa.
- The removability test shall be conducted at least 7 days after grouting.
- The presentation of results must clearly state:

  - the conformity of the testing procedure,
  - the means to extract the anchorages,
  - difficulties encountered, if any, during removal and
  - the results of visual inspection of the different elements after removal

The procedure for de-tensioning were:

- Remove the PE duct by disc cutter.
- Remove the grout by hammer and chisel to expose the bare strands.
- De-tensioning of the strands by heating (flame cutter).
- Extraction of the anchorages by chain blocks.

Post-Tensioning	**Data:**
Internal PT	830 t
External PT	385 t
Deviators	1188 nos.
External PT Parameters	(EC_R 5-31):
Minimum radius	3.00 m
Minimum straight length	0.75 m
Maximum tendon length	280 m
Friction Coefficient.	0.14

Brian Lim
VSL Hong Kong Ltd.
Hong Kong

VSL PT to reduce joints usage in large slab

Big W, Warwick, Queensland

The Big W Distribution Centre is located in Warwick, 160 km west of Brisbane, Queensland. This first stage of the Distribution Centre will provide 42000 m^2 of post-tensioned slab on ground, to be completed in 30 No. pours overa12-week period.

The client has specified post-tensioning to greatly reduce joints in the slab thus providing a substantial saving in lifetime maintenance costs for both the joints and plant (Stackers, forklifts). Fewer joints also reduce cost during construction.

VSL carried out the material supply, stressing and grouting works for the 160 mm thick slab. Post-tensioning to the slab consisted of S 5-4 tendons at 1 600 mm centres in both directions.

The post-tensioned slab provides excellent load carrying capacity to resist the high post loads from the storage racking and the forklift loads.

Post-tensioning of 42,000 m^2 of slab on grade greatly reduces jointing in the slab

Barry Story
VSL Prestressing (Aust.) Pty Ltd.
Brisbane, Queensland

VSL PT to reduce floor to floor heights

Salamanca Mews, Hobart Tasmania

Salamanca Mews is a private residential development of 56 apartments situated behind Salamanca Place in Hobart's historic Battery Point.

The project is Hobart's first major inner city residential development, uniquely located at the focal point of markets, restaurants, galleries, special events and tourist activities.

The apartments occupy three buildings of four and five storeys, with basement parking extending over the 4550 m2 site. The design was influenced by the need

PT Flat Plate Floor Construction.

View of Completed Development from Plaza Level

to minimise floor to floor heights leading to the use of 200 mm thick post-tensioned flat plate floors above plaza level, supported by 400 mm diameter columns on a grid of 8.25 x 8.5 m. Slabs were cast on fibre cement sheeting which formed the ceiling finish, and services were cast into the slab.

At plaza level a post-tensioned flat slab was used over the carpark. Stressing permitted waterproofing of the slab without the need for additional treatment.

Rod Burnell
VSL Prestressing (Rust.) Pty. Ltd.-Hobart

VSl Climbform in the Sky Tower Casino

Sky Tower, Auckland, New Zealand

The Sky Tower project is located in Auckland, New Zealand. It is part of the Sky City Casino development occupying one complete city block.

When completed, Sky Tower will be the sixth tallest tower in the world, 8 m taller than the Eiffel Tower.

The tower shaft comprises a 12 m outer diameter reinforced concrete wall which houses a services duct, stairwells, 3 passenger lifts and a goods lift.

The shaft is being constructed using a VSL Climbform climbing formwork system. Sky Tower is the first circular structure constructed by the system.
In addition to lifting static vertical wall formwork panels, VSL Climbform was chosen by the builder, Fletcher Construction, because it provided the best heavy duty construction access platform of all systems considered.

Features of the VSL Climbform include:

- Support of a concrete placing boom on the platform,
- Hinged access hatches allowing instal lation of precast stairs as construction advances,
- External trailing platforms for patching of tie bolt holes and general concrete finishing,
- Internal trailing platforms enabling early installation of lift rails and electrical and mechanical services,
- Site sheds and toilets supported on the platform.

The total lifted load during climbing of the external platform is 75 t. The programmed shaft construction period is 64 weeks, based on a 7 day cycle. The typical pour is 90 m3 with 20 t of reinforcing steel.

VSL was responsible for the design, supply and assembly of the Climbform, and supervision of the first 3 lifts of the system.

Brad Harman
VSL Prestressing (Aust.). Pty Ltd.

Sky City Casino development featuring the VSL Climbform

VSL close corporation between Technical Center and VSL Korea

Anyang-Dong Elevated Viaduct, Korea

Anyang-Dong Elevated Viaduct is a part of Seoul Outer Ring Expressway which will serve as a bypass road for ever increasing traffic in southwest Seoul. Total length of the bridge is 1 070 m, which comprises into FCM spans of 530 m and FSM spans of 540 m. Main spans are 160 m by in-situ FCM, and approach spans are typically 50 m by conventional scaffolding. The bridge has twin parallel boxes, where the width of each box is 19.3 m for 4 lanes. The main bridge has an S-shaped curve in plan, and the minimum radius is 500 m. The longitudinal slope is 3%.

The owner is Korea Highway Corporation (KHC). The main contractor is a Joint Venture between Samik Construction Co. and Woosung Construction Co. and the design was awarded to Dowoo Engineering Co. VSL Technical Center (Singapore) designed the main FCM bridge and VSL Korea designed the form-traveller. For the construction, VSLKO is performing the PT placing approach spans, and rebar/concrete and PT placing for the main FCM part. The tonnage of strand is 1 285 t for the main bridge, and 522 t for the approach bridge. Construction started in June 1993, and the completion is scheduled for October 1996.

J. K. Lee
VSL Korea Ltd

New Central Gymnasium, Osaka: Not for underground training

VSL Japan takes part in the Osaka New Central Gymnasium

This complex gymnastic facility has two (large and small) arenas. The main arena is covered with a concrete shell dome 110 m in diameter and 16 m in height and the sub arena is covered with a concrete shell dome 52 m in diameter and 8.5 m in height. The most outstanding characteristic of this project is that all

gymnastic facilities including these two arenas are located underground.To help secure the level of green zones - one of the most precious assets of modern cities - a city park will entirely cover the domes which will nicely integrate this gymnasium into the environment.

The dome shells are composed of pre-cast- prestressed shell panels and ring beams, on which cast-in-situ concrete and waterproofing system will be placed. The cross-sectional size of the periphery tension ring of the main arena is 3.0 m in width and 4.8 m in height, in which thirty E 6-42 post-tensioning cables (tensile ultimate of 1 117.2 t and stressing force of approx. 800 t each) are provided. These cables are stressed in three stages following the construction process of the dome, where the stressing is centralmonitored/controlled by a computer system.

The general contractor is a J. V. organization led by Obayashi Corporation,

Full scale model test up to a load of 1,060t

one of the top five bigest contractors in Japan, and post-tension related works are being carried out by P. S. Corporation and Fudo Building Research Co. Ltd, both are VSL Japan major sub-licensees.

The facility is scheduled for completion at the end of May, 1996.

Shusuke Sakata
VSL Japan

VSL Climbform in Mainland China

VSL Climbform in the People's Republic of China

The successful use of the VSL Climbform system in Hong Kong has led to the penetration of the rapidly growing construction market in Mainland China.

Development and Contracting company Kumagai Gumi awarded VSL the contract for the supply of a large Climbform to construct the core walls of the Di Wang Development, situated in Shenzhen city just across the border from Hong Kong.

The building is steel framed and has a total height of 385 m, with the service core rising 312 m from the basement to the 78th storey.

The Climbform system was 48 m long, 17 m wide and formed a core wall area of approximately 97000 m2 when the building's shear core was completed in Argil this year.

The Climbform was utilised on this project specifically because the two tower cranes accommodated within the inner cells were required to be free for the steelwork erection. Other major considerations were the Climbform's large working platform areas, as up to 90 t of reinforcement steel and 20 t of structural steel were being placed in each of the 390 m^3 concrete pours.

A strict safety requirement by the client was imposed and the Climbform successfully completed its 83rd concrete pour with a clear safety record after only 52 weeks of operation.

Stuart Pearson
VSL Hong Kong Ltd.

VSL CS-PLUS a must for railway bridges

Aare River Railway bridge, Switzerland

To cope with increased railway traffic- the existing steel bridge crossing the Aare River near Brugg (west of Zurich) had to be replaced. The new concrete superstructure with a total length of 234 m and spans of 48, 52, 64 and 70 m was constructed alongside the old bridge and then moved sidewards onto the original piers. For all post-tensioning the CS PLUS, VSL's CS anchorage in combination with PT PLUS plastic ducts, was applied: longitudinal cables with 19 and 22 0.6" strands were built in, transversal cables with four 0.6" strands in flat PT PLUS ducts in combination with SO anchorages were used.

The technically demanding project necessitated close co-operation among the consultant (Gerber + Partners), the main contractor (Preiswerk), the checking engineer (Prof. Peter Marti) and VSL (Switzerland) Ltd.

Mario Bevilacqua
VSL Switzerland

The railway bridge over the Aare river.

VSL Germany performed the PT of the Zeller Bridge in just 18 weeks

Zeller Bridge in Wurzburg, Germany

The Zeller Bridge was built at the start of the century across the river Main to shorten the commuting time for people living in the Zell village and working in factories in Wurzburg. The bridge, which was partially destroyed in the second world war and subsequently rebuilt, had to be widened to accommodate today's traffic. The foundations and the lower part of the piers of the old bridge, which consisted of five unreinforced concrete arches, could be reused for the new bridge structure. The 21.20 m wide and 191.70 m long new bridge was erected in ten sections using the incremental launch method. VSL supplied and installed 171 t of strand for longitudinal and transverse tendons. VSL's new CS-anchorages were used for the longitudinal tendons. Up to 36 tendons 6-22 were used for the post-tensioning during incremental launching. The four continuity cables 6-19 with a length of

194 m were pushed with bares dry strand over four high points at the piers using VSL's standard pushing equipment, powered by two EHPS 33 pumps. VSL's post-tensioning work was completed within 18 weeks to the full satisfaction of the main contractor Philip Holzmann - Held & Francke Bau AG in the beginning of July 1995.

Johann Kollegger
VSL Vorspanntechnik (Deutschland) GmbH

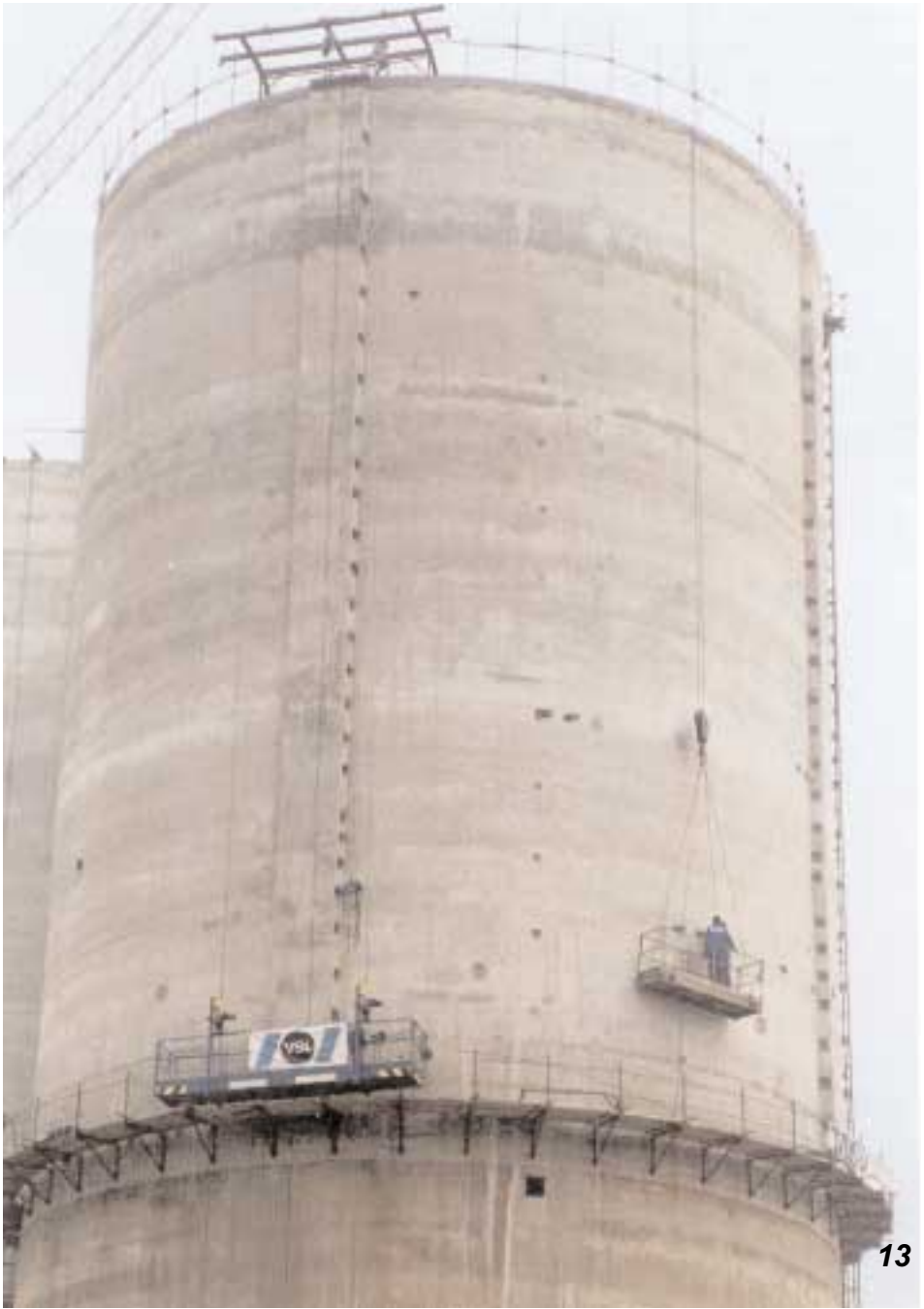
Pushing of the 193 m long tendons

VSL Silo Post-Tensioning: An Efficient Application

VSL's PT is very suitable for circular-concrete structures. In the Czech Republic VSL provided materials and installation of PT for four grit silos and two clinker silos. The grit silos are typically 50 m tall with the upper 30 m post-tensioned and 20 m diameter. The clinker silos are usually 45 m tall with the entire height post-tensioned and 30 m diameter. The ducts and anchorages are placed during the climb forming operation. Afterwards VSL carries out the strand installation, stressing of the tendons and the grouting in a very fast operation, enabling the general contractor to shorten considerably the silo construction time compared to the old wire-wrapping method of post-tensioning.

The circular PT is equally effective for water tanks and safety walls around petroleum storage tanks, etc.

Miroslav VEJVODA
VSL Systemy (CZ) s. r. o.
Czech Republic



VSL post-tensionning is well adapted to circular concrete structures

VSL performed the PT of the car park of the new terminal of the Roissy Charles de Gaulle Airport

Roissy Airport, France

In May 1994 VSL. was awarded the PT work of the car park of the new terminal 3 of the Roissy Airport by Bouygues Batiment. The work was split into a definite contract and a contingent one. Both contracts included two standard slab decks with typically 6-12 54 m long tendons connected to EC anchorages.

The driveway part of the car park is made of 360 prefab girders called , «pagaïe» because of their shape. Each girder carries two EC/H 6-7 cables of 13.90 m in length.

The cables and anchorages are prefabricated at the VSL France warehouse and then hauled to the precast girder manufacturer EPI. Once the girders are manufactured they are delivered by EPI to the Roissy airport. When the girders are in place, VSL carries out the tensioning and the injection of the cables before the slab is poured with concrete.

The car park of the new 3 B terminal of the Roissy Charles de Gaulle Airport

The first part of the contract was completed between June 1994 and February 1995. The project started in April 1995 and should end in March 1996.

Bruno Rueyres
VSL France

The first utilisation of the flat duct VSL PT PLUS in France

The Northern Lyon Bypass, France

As part of the Northern Lyons Bypass project, VSL has been contracted by S.C. BPNL to carry out the PT works of a viaduct over the Rhone river. The Viaduct is a curved precast in situ segmental structure with a span of 500 m - 58 m and 42 m for the approaches and 5 segments of 80 m each - and a width of 24 m to accommodate 2 x 3 lanes.

The total quantity of PT used is 580 t i,e. 70 kg of PT per m3 of concrete (BHP 60 MPa).

The deck is longitudinally prestressed with 19 0,6" strands. The external PT is removable. It includes 27 strands of 0,6 S and VSL ED 6-31 anchorage heads.

The transversal PT is performed by 750 cables SO/H 6-4 of 24 m per piece running inside VSL PT Plus flat ducts 72/21 which is the first utilisation of this type of duct in France.

The deck construction started in March 95 and should be completed by the end of April 1996.

Fredy Schweizer
VSL France

The BPNL viaduct over the Rhone river

VSL is the PT contractor of the world's largest floating barge

Nkossa Barge, France

The Nkossa vessel is the largest prestressed concrete barge in the world. The quantities of material used illustrate the gigantic size of this unique floating structure of 25 000 m3 of concrete built in a record time:

- 2 500 t of prestressing strand T 15,7 1860 TBR,
- 5 200 VSL anchorages, most of which being VSL's EC 6-19,
  150 000 ml of prestressing ducts made of thick steel tubes ranging from 80 to 114,3 mm of diameter,
  30% of them being curved in order to accommodate the vessel's dimension,
- avoid inserts and enable connection with the anchorages,
- and 800 000 litres of specifically prepared grout cement containing silica additives.

The barge will be exploited by Elf Aquitaine - the largest French industrial group - as floating support to produce oil at the Nkossa petroleum field in Congo. Bouygues and Bouygues Offshore have been responsible for it's design and construction and VSL selected as sub-contractor for the prestressing.

To tackle the extent of the work and the particularly short completion deadlines, VSL has brought in a large workforce and exceptional material means. At critical stages, as many as 150 men were working on the site round the clock. As for the prestressing materials, some 24 VSL's ZPE 460/31 and 14 VSL's ZPE 19 jacks teamed with 7 injection devices have been used at a time.

The especially high density of the non-stressed and prestressed reinforcements (respectively 200 kg/m3 and 100 kg/m3) made the positioning and installation

of the prestressing ducts an especially delicate operation.

Besides the prestressing, VSL has also supplied and installed the stressbars which will support the deck with its equipment and living cubicles as well as the chain anchors mooring points.

Moreover, VSL's expertise in heavy lifting, allowed it to carry out the telescopic lifting of the derrick positioned in front of the barge. The operation which involved lifting 70 t at a 40 m height, was particularly successful.

After an intensive and challenging job, this 220 m long, 46 m large and 16 m tall vessel put out to sea its 70 000 t for the first time on July 6th 1995 right on schedule leaving Platform 10 for Pier 190 in Marseille.

Francis Crozat
VSL France

PUBLISHED BY VSL International Ltd., P.O. Box 7124, CH – 3001 Berne / Switzerland, Tel 41 - 31 - 66 42 22, Fax 41 - 31 66 42 50
Editor: Therese Wenger

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NORTH EAST ASIA

HONG KONG
VSL North East Asia
Regional Office
Bank of America Tower, Suite 1407
12 Harcourt Road
Central, Hong Kong
Tel 852 - 537 93 90
Fax 852 - 537 95 93

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NORTH AMERICA

U S A
Corporate Office
VSL Corporation
1671 Dell Avenue
Campbell, CA 95008
Tel 1 - 408 - 866 67 77
Fax 1 - 408 - 374 41 13

USA
VSL Corporation NORCROSS, GA
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SWITZERLAND
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3421 Lyssach
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Fax 30 - 1 - 360 95 43

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Fax 47 - 4 - 56 27 21

VSL OFFICE PRAGUE
Václavské nám$e$sti
110 00 PRAHA 1
Tel 42 - 2- 2 - 236 69 92
Fax 42 - 2 - 236 73 59

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VSL France S.à r.l.
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91526 EGLY
Tel 33 - 1 - 69 26 14 00
Fax 33 - 1 - 60 83 89 95

SPAIN
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Fax 56 - 2 - 231 12 05

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Pretensado VSL del Peru SA, LIMA
Tel 51 - 14 - 76 - 04 23, -76 04 26
Fax 51 - 14 - 76 04 77

SOUTH AFRICA
Steeledale Systems (Pty.) Ltd.
JOHANNESBURG
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Fax 27 - 11 - 613 74 04

SWEDEN
Internordisk Spännarmering AB
DANDERYD
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Fax 46 - 8 - 753 49 73