

A region on the move

Five years ago a report from the World Bank noted that infrastructure in most of Latin America and the Caribbean (LAC) had improved over the previous ten years. It also noted that a sharp fall in investment in the sector was hindering economic growth, poverty reduction, and the region's ability to compete with China and other dynamic Asian economies. Not any more.

While China and India power ahead with huge infrastructure development of all types, including highways, companies are now constantly quoting the BRIC countries as areas where they see massive potential. India and China (IC) have been joined by Brazil and Russia (BR) as development opportunities.

Indeed, in Brazil, which at the start of the year swore in Dilma Rousseff as its first woman president, it is interesting to note that the huge rise in the middle-class population. Along with in emerging countries such as India and China, and Brazil is prompting a big increase in car sales. By the end of 2010, it is estimated that 3.45 million vehicles were sold in Brazil (some 10% higher than in 2009), meaning that like China (the world's biggest automobile market ahead of the USA) Brazil overtook Germany to become the fourth biggest car market in the world.

However, with a population of 192 million Brazil has a low vehicle density of just one vehicle per seven residents compared to much higher levels in the developed world, while this leaves room for growth it must be remembered

Travelling in one of the world's most diverse regions is not always easy, but spectacular engineering feats will make life easier as *Patrick Smith reports*

Taking shape is the spectacular Baluarte River Bridge in Mexico, which will be the highest cable-stayed bridge in the world. (Pic: PERI)

that as the nation's economy has grown strongly in recent years, it remains one of the most unequal societies in the world.

After taking the oath of office, President Rousseff promised in a speech to protect the most vulnerable in Brazilian society and govern for all.

Only recently, Fernando Gentil, director of the Brazilian branch of US private equity firm Darby Overseas Investments, claimed Brazil's infrastructure sector is unlikely to be seriously affected by the \$30 billion federal budget cut announced by the government in February.

He said: "Looking at the big picture, it's a good decision. As a private investor, I expect its impact on infrastructure investment to be mediocre.

"Look at national development bank BNDES. It's one of the largest credit providers and continues to function with or without budget cuts."

For 2011, Brazil's government has earmarked a total of 171 billion reais [\$102.6 billion] for infrastructure, of which 40.2 billion reais [\$24 billion] will come from PAC [Brazil's Growth Acceleration Plan for the period 2011-2014, which is designed to inject 950 billion reais/\$550 billion into the Brazilian economy].

BNDES president Luciano Coutinho has said he expects private bank lending to improve during 2011. On average, only 20% of Brazil's infrastructure investments come from project operators, while the remaining 80% are funded by financial institutions.

One of the two complex pylons with heights of 156m and 169m respectively, being built as part of the Baluarte River Bridge. (Pic: PERI)

► A further measure of investment in the country is Rio de Janeiro's hosting of the 2014 World Cup and 2016 Olympic Games. The telecommunications industry alone will need to invest an estimated \$55 million in projects related to the sporting events, while the government has earmarked \$1.8 billion for the World Cup, although the total spend is estimated at \$11.5 billion, and the estimated infrastructure cost for the Olympics is \$12 billion (probably more).

And while Brazil is only one of 20 nations that make up Latin America, it has a major influence on the region and has proved a huge magnet for investors and all the major construction equipment companies eager to supply regional demand by locating there.

Indeed, early in February Chinese manufacturer Sany Group's first excavator (SY215) rolled off the line at the Brazil Industrial Park, São Paulo. The park is Sany's fourth overseas base, and the company has announced a planned total investment of US\$200 million dollars with the facility's annual sales volume estimated to reach \$500 million dollars within five years and \$2 billion dollars within ten years.

Equipment from such plants is being used to construct the infrastructure projects that are daily being announced throughout the region, and these include Latin America's largest infrastructure initiative, the \$5 billion-plus Panama Canal expansion.

This is just one project in Latin America, with its constituent countries expected to invest over \$450 billion in infrastructure activities between 2011-2015.

The canal expansion is a ten-year project to double the capacity of the Panama Canal, a system of man-made channels, locks, dams, and artificial lakes that connect the Pacific Ocean to the Atlantic Ocean across the Isthmus of Panama. Since its completion in 1914 the canal has allowed shipping to cross the 80km wide isthmus at the narrowest part of the Americas.

In early January, Belgian company Dredging International's D'Artagnan, the most powerful self-propelled heavy-duty cutter suction dredger



in the world, arrived at the canal, and the latest addition to the Panama Canal Authority's (ACP) expansion dredging fleet then made its way to the Pacific entrance, where it will expand the existing Pacific entrance from 192m to 255m and deepen it to 15.5m below the mean water springs.

The ACP has tendered a consultancy to complete designs for a new long-span cable-stayed bridge on the Atlantic side of the Panama Canal.

The consultant will deliver final designs, construction specification and estimated construction cost, which is not to exceed US\$350 million.

ACP will reportedly award the tender at the end of April, and aims to tender construction of the bridge in February 2012.

The structure must have a vertical clearance of 75m above the canal, taking into account the possibility of a fourth set of locks, with a lifespan of 100 years.

The project also includes designing access roads on either side of the canal, as well as other bridges that may be required as part of those roads.

In another ongoing project, Brazilian contractor Serveng Civilsan is working on a section of the Anhangüera Highway, which is being upgraded between kilometres 13-19 by highway concessionaire CCR Autoban, working under ARTESP (Agencia de Transporte do Estado de São Paulo) on a project that includes the building of three new cloverleaf interchanges, the upgrading of two others, and the construction of 14km of sliproads.

ARTESP is investing a total of 270 million

reais (\$150 million) in the upgrades.

Anhangüera Highway is one of the most important highways in the State of São Paulo, and one of the busiest roads in Brazil, as it connects São Paulo (the state capital and Brazil's biggest city) to the Campinas region, one of the economic hubs of the country.

Serveng Civilsan is using a Dynapac CA 250-II vibratory compaction roller to lay the base course for the sliproads at one of the new cloverleaf junctions. The roller is working on a contract that covers 15.5km of the highway, where under a 43.9 million reais (\$24.39 million) budget highway concessionaire, CCR Autoban is building an interchange that will ease the flow of traffic where Mutinga Avenue (one of the main thoroughfares of the Pirituba and Santo Domingo districts in São Paulo) is bisected by the Anhangüera Highway.

The soil in this locality is a mix of cohesive soil and silt, with 25% fine material, and to compact this to the required layer depth of 20cm, Serveng is using the Dynapac CA250-II compactor fitted with a 2.13m wide padfoot drum. Working at the high-end amplitude of 1.6mm, the compactor is able to achieve 100% of the required compaction with a total of eight passes.

However, it is not only Brazil that is investing heavily in infrastructure: Mexico, Colombia and Chile are among others spending billions on highways.

Indeed in Mexico, which in 2010 had Latin America's second highest gross domestic product behind Brazil and ahead of Argentina, Colombia, Venezuela, Peru and Chile, a spectacular engineering feat is underway as part of a new highway through the Sierra Madre Mountains.

When completed in 2012, the Baluarte River Bridge will not only be the highest bridge in North America but the highest cable-stayed bridge in the world surpassing even the magnificent Millau Viaduct in France.

It has been described as the crown jewel of the greatest bridge and tunnel highway project ever undertaken in North America.

Known as the Durango-Mazatlán Highway, it will be the only crossing for more than 800km between the Pacific coast and the interior of Mexico.

The \$1.2 billion, 230km four-lane route of the new highway is parallel to the famous so-called Devil's Backbone, a narrow, dangerous road of twisting and terrifying turns that follow the precarious ridge crest of the peaks of the Sierra Madre Occidental Mountains. In parts, the road almost spirals back into itself. [While this is dangerous, the 61km long North Yungas Road, located high in the Andes Mountain of Bolivia, is regarded as the world's most dangerous road. Leading from the seat of government La Paz to Coroico, it is legendary for its extreme danger. At one time some 200-300 travellers were killed annually along the route].

The Durango-Mazatlán project, which in one section has 28 tunnels and 14 bridges, is part of the national infrastructure plan to connect the country's Pacific coast to the Gulf of Mexico and

also aims to position Mexico as a vital link for Asia-US trade by serving as a competitive option to the Panama Canal.

The Baluarte River Bridge will avoid the need to travel the Devil's Backbone, and will be 1.124km long with a central span of 520m. At its highest point, it is a gravity-defying 390m above the River Baluarte from which it takes its name. The bridge's largest supporting pillar is 153m high, with a base measuring 18m x 30m.

The main 520m span of the 20m wide bridge is supported by two pylons (the tallest is 169m), and German company PERI planned and supplied a cost-effective formwork and scaffolding concept for the construction of the different bridge piers. Its ACS self-climbing formwork used for the pylons allows crane-independent climbing in all weather conditions which accelerates construction progress quite considerably.

Work being carried out to widen the BR 101 in Brazil, the country's second major highway, and the longest at nearly 4,600km



The work is being carried out by the business group formed by Tradeco Infrastructure, Operation Tradeco International Technical Innovations in Foundation, Aceros Corey, VSL (Suis), VSL Corporation Mexico, VSL International and Impulsora Integral.

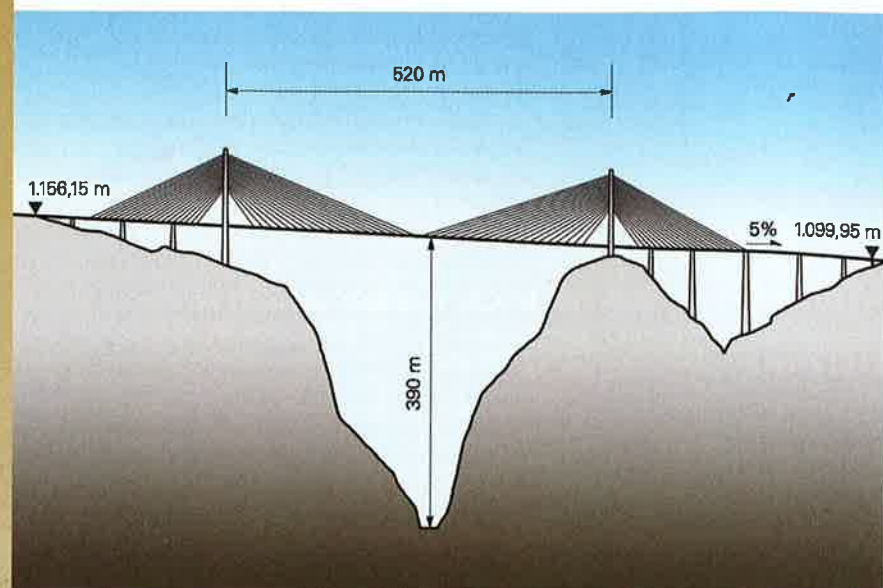
The development, which was awarded the tender, will allow users to run at a speed of 110km/hour, and it is estimated that the bridge will carry an average of 2,000 vehicles/day.

This is just one of many projects in Mexico. The federal government has built and modernised more highways and country roads than in any previous administration, including over 11,000km of highways, with an investment of over \$130 billion pesos (\$10.7 billion) by the government and private investors.

The highway network in Mexico is one of the most extensive in Latin America, with all areas of the country linked by it: the most traveled highways link three of Mexico's most populous cities (Mexico City, Guadalajara, and Monterrey in the form of a triangle.

“ At its highest point, it is a gravity-defying 390m above the River Baluarte from which it takes its name ”

A drawing of the Baluarte River Bridge (Pic: PERI)



While extensive, the system is poorly maintained because of lack of government funds, and this has seen the government granting concessions to companies to build toll roads.

Mexico's President Felipe Calderón Hinojosa said that in 2010, the federal government invested 54 billion pesos (\$4.45 billion) in highway infrastructure alone, which is equivalent to building another 50 roads.

"We are investing heavily in infrastructure, which is why I say this will be the administration of infrastructure.

"Moreover, as a result of private investment, we have opened up nearly 1,000km of top quality highways, such as Arco Norte, a superhighway connecting the Pacific to the Gulf, meaning that drivers will not have to go through Mexico City," he said.

Meanwhile, Colombia also has an ambitious highway construction programme, although there have been questions over delays with regard to some projects, including construction of the \$394 million La Linea Tunnel, part of the 800km Corridor Bogotá-Buenaventura.

This ambitious highway includes the tunnel section between the cities of Calarcá, Quindío and Cajamarca and Tolima and will cross beneath the locally famous Alto de La Linea in the central range of the Andes mountains, and ease traffic on National Route 40, one of Colombia's main east-west road connections. It links the capital Bogotá with Cali and the Pacific port of Buenaventura, and when completed will be the longest tunnel in Latin America at 8,580m, with its western entrance 2,420m above sea level and the eastern entrance 2,505m above sea level.

Construction of the pilot tunnel started in September, 2004 and both sides of the pilot met in August 2008. Construction work was originally scheduled for completion in 2013.

Other major projects in Colombia include the third stretch of the Ruta del Sol Highway, one of Latin America's top five projects and the largest in Colombia valued at over \$2 billion, and the first section of the Autopistas de las Americas Highway, where severe weather conditions in have delayed work on the \$580 million dual carriageway that will link Colombia to Venezuela.

Consortium Vías de las Americas SAS PSF is carrying out the work and the heavy rains will also increase the cost of this work because of the need to repair damage as well as to ensure that the highway will be safe from flooding.

When completed, the two-lane, 1,000km Ruta del Sol will connect Bogota to the Port of Santa Marta, along the Atlantic Coast.

In Chile, tenders for 12 major infrastructure projects with a total value close to \$8 billion have been announced by the Ministry for Public Works (MOP).

Key projects include the \$1.2 billion Autopista Central Highway in the capital Santiago; a new road to the city's international airport worth \$480 million; and the \$172 million Autopista Nahuelbuta Highway.

Meanwhile, plans for key urban highway

connections are still under discussion for Santiago, with an alternative route for the Costanera Highway being proposed by representatives for Santiago's La Florida district.

The road will connect the La Florida district with the city centre and Ruta 78 to the west of Santiago, and the new proposal differs from those proposed in 2009 by the Chilean Government and contractor OHL.

The previous route involves the destruction of green spaces and could create severe traffic bottlenecks within La Florida district, according to detractors of the plan. A tunnel on the original route would also have intersected with a possible extension to the Metro system.

A solution to the new link must be found soon, as the Costanera Central project is a high priority with the district's population expected to grow from 400,000 in 2009 to 550,000 by 2015.

A further opportunity for would-be investors in Latin America to see what is on offer is likely to come at the 9th Annual Latin American Leadership Forum, which will present the top 50 infrastructure projects that will drive the region's growth.

According to the organisers, CG/LA Infrastructure (www.cg-la.com), projects presented at the forum have a cumulative value in excess of \$50 billion "offering tremendous business opportunities for the public and private sector."

The forum, being held in Rio de Janeiro from 9-11 May, is multi-sector "providing a clear picture of the Latin American infrastructure market and strong business development value to all companies doing business or seeking to be involved in the region."

And with infrastructure development due to rise significantly across Latin America, UBM has organised Global Infrastructure Forum Latin America (www.globalinfrastructureforum.co.uk), which will be co-located with Concrete Show 2011 in São Paulo from 1-2 September, 2011. ■

Brazilian contractor Serveng Civilsan is using a Dynapac roller on a section of the Anhangüera Highway, one of the most important highways in the State of São Paulo

