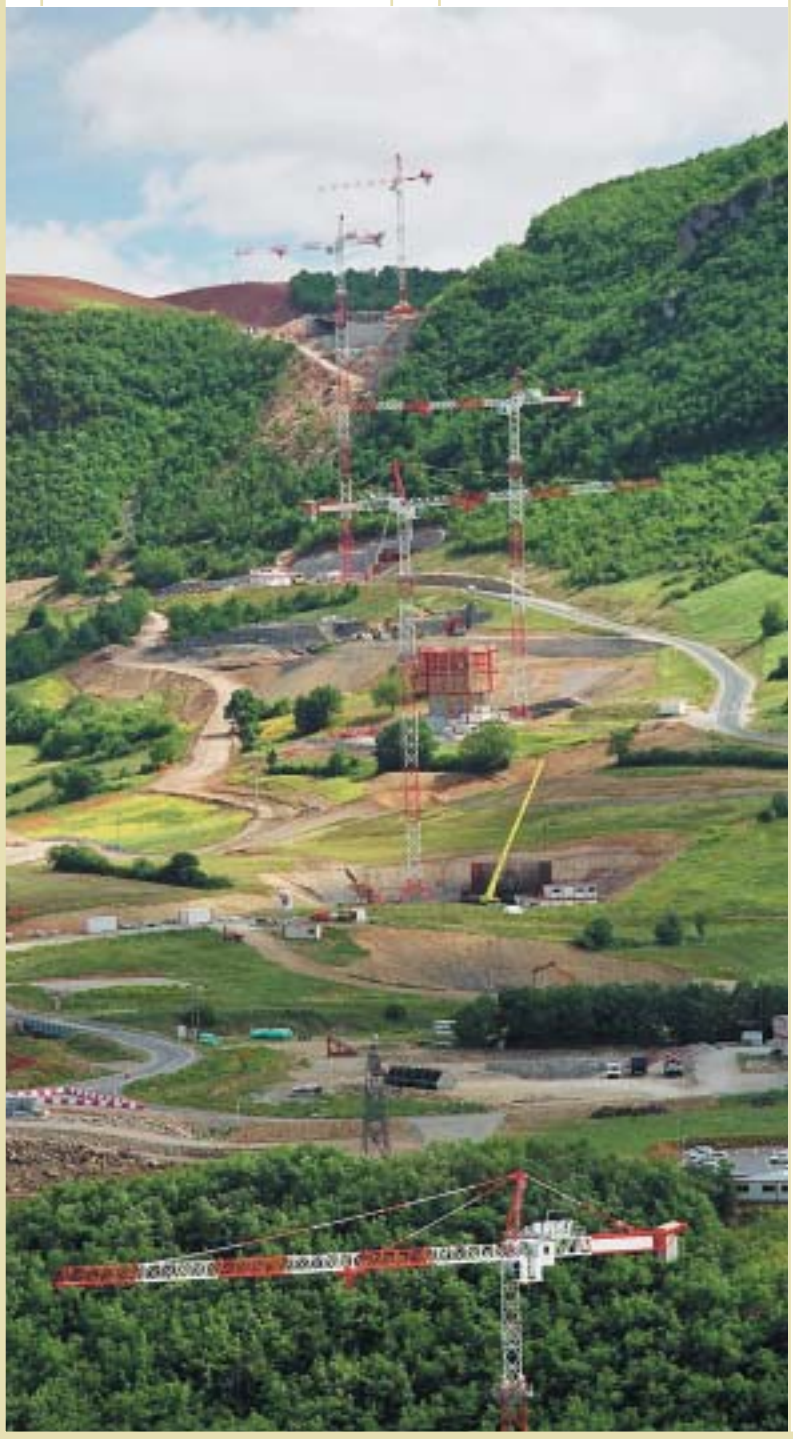
Le journal du
viaduc
n° 07/02 2
ÉDITÉ PAR LA COMPAGNIE EIFFAGE DU VIADUC DE MILLAU

Six cranes like six markers



The viaduct is now drawn in the Millau sky. Six cranes already mark the positions of the piers. These are not structural elements, but are like markers traced by the architect's pencil.

Jean-Pierre Martin, who is supervising the worksite, prudently admits with some satisfaction: "We are on schedule". Work will begin last on pier P4, for wich the wells have been determined and all the calculations made. The teams from Eiffage TP have just finished assembling the metal framework for the base of pier P3 and have begun to concrete it. The foundations for pier P5 are finished. Pier P6 is already at the fourth level, about 16 metres high. Pier P7 has begun to rise. To summarise, work on the shafts of six piers has already started and 23,000 cubic metres of concrete have been poured. Immediately above the growing piers, six cranes already outline the future profile of the viaduct between the Causse Rouge and the Causse du Larzac.

Faced with the scale of the project and the tight schedule, the organisation of the work on site must run perfectly. Between the earthmoving workers, surveyors, electricians, assembly workers, formworkers, masons, metal reinforcement workers, crane operators, consulting engineers, surveyors, etc., eight hundred people have already participated on the site. The assignment for some of them has been accomplished. Three hundred are presently at work. The teams from the morning shift, who work from 7 a.m. to 2 p.m., are immediately replaced by the afternoon shift that lasts until 9 p.m. Everything happens very quickly. The 2,000 cubic metres of concrete needed for the base plates of the piers are poured in less than thirty hours. The viaduct worksite functions precisely as calculated for operating with maximum efficiency.

Centralise production

The assembly process for the steel reinforcement cages, which the workers are making operational, is exemplary in this respect. They will soon be mass-produced as though in a small factory. Rather than having to assemble the metal cages at the base of each pier, it has been decided to centralise production in one point. "This allows us to respect the planned rate of

To be continued on page 2

Jacques Godfrain: "The viaduct puts us in a winning mood"

The mayor of Millau, who is also a member of the French National Assembly, believes that the viaduct will bring new vitality to the way of thinking at Millau: a will to win. "Is it true that we're going to be in the book of records?" a local inhabitant asked him recently. Jacques Godfrain feels that behind this question lies a sense of pride, and he is convinced that something important is happening. "This exceptional construction project is going to make the people of Millau known throughout the whole world", he says. "Wherever they go, people will talk to them about the viaduct. They are going to feel proud once again in having something unique, and this will motivate them to surpass themselves".

It is true that the town has known its hours of glory. As the global capital of the glove industry, the skills of the Millau artisans were famous throughout the world. Wearing gloves is less fashionable nowadays, but the outstanding quality of its leatherwork still draws the most famous couture houses to Millau.

The viaduct is a skilful civil engineering project and the mayor of Millau wants to emphasise craft skills. Jacques Godfrain would like people to refer to Millau as "the town of skilled craftsmanship", and he plans to develop the exceptional artistic expertise present at Millau and to organise cultural events around this theme. The viaduct could be the symbol: the modern representation of what is unique in a work of art. Travellers will stop and go down into the valley to admire what man has constructed. "It's a bit like the Eiffel Tower, a lot of people look at it from below.

People will go down into the valley to get an overall view and to see how it has been possible, at Millau, to blend the art of a work of architecture into the natural surroundings". ■

Profession: formworker

The head of the formworker team, François Rodriguez, comes from the Creuse region and this is the first time he has worked on such a civil engineering construction. He is responsible for a number of formworkers on top of the P6 pier. "It's a unique worksite, and I can't wait to be at the top and see the first launching of the deck. I hope to stay here as long as possible. When the piers are finished, most of us will leave Millau because the deck is in steel. Only one team of formworkers will stay until the end to carry out the finishing work in concrete. I hope to be one of them and to see Millau from the top" he tells us.

His formworker teammate, Guy Traini, stresses the high-quality finish to the work required for such a huge construction." The concrete that makes up the piers will be left just as it is when the formwork is removed, so this must be perfect. If the formwork panels are oiled too much, they leave marks; if they are not oiled enough the concrete sticks to them. The piers must be turned out of the mould perfectly and be squeaky clean! Once it has been poured inside the formwork panels, the concrete has to be vibrated as thoroughly as possible without leaving any honey-comb patterns or air bubbles which could affect the mechanical resistance of the construction and its final appearance".

The Millau Viaduct is a real emotional experience for the two men as for many of their team-mates. "This viaduct has been talked about for so long that we hoped to work on it one day. All around us, everything is beautiful. You can see rabbits, partridges and flowers that we are not allowed to gather…! But in any case, we are not here for that"! ■

François Rodriguez and Guy Traini, formworkers.

Continued from page 1

The foundations of pier 5 are finished

production and limits the work area around each pier in order to protect the environment", explains Jean-Pierre Martin.

Another team is working on a new installation to facilitate the work next to the C8 abutment (the southernmost of the viaduct). "Here we are in the process of building the future hangar for the deck assembly. This will include a travelling gantry to help with handling the steel sections which need to be joined together".

The C8 abutment should be finished during August, and the team currently working on it will then switch to the C0 abutment. This is a little smaller and a somewhat different structure but has an identical function as a launch ramp for the deck. The crane and all the equipment will be transferred from the C8 abutment so that work can begin on the C0 abutment almost immediately. Here again, it is all a question of timing and efficient management. ■

A metal reinforcement worker: a grip of steel

Metal reinforcement workers are the men who build the skeleton of a civil engineering project before it is clad in concrete. Every construction is subject to multiple stresses, since the wind, its own weight and many other factors cause it to come under pressures from different directions. Concrete is able to withstand loads, in other words it can withstand being compacted, but it is not designed to resist traction or shearing forces, which explains why steel rods, assembled together, are placed inside a concrete construction in varying quantities. This is what is called reinforced concrete.

The steel rods for the viaduct are manufactured in Italy and at Bourg-en-Bresse in France before being assembled together into cage-like structures weighing up to eight tons. As far as the head of the metal reinforcement workers Edgar Thirion is concerned, the skill lies in first studying the drawings of the reinforcements provided by the engineering design office. "You have to be able to visualise the studies in 3D, and then prepare the steel rods accordingly to be assembled together with wireclips. There is no room for error! Not one of the 4,200 pieces of the puzzle required for a foundation plate can be left out because once the cement is poured, nothing can be done about it".

Edgar Thirion, patron des armaturiers.

The reinforcement workers assemble veritable cathedrals in metal to enable the viaduct to be constructed.■

Editorial

Nine months already

It is nine months ago today, July 10th, that the French State awarded the concession of the Great Viaduct to the Compagnie Eiffage du Viaduc de Millau ... and the baby is doing well.

Thousands of hours of calculations and drawings are taking shape in front of our eyes. Already three piers are reaching for the sky. The southern abutment is almost finished. Twenty-three thousand cubic metres of concrete have been poured, and the fine quality facings and exceptionally pure lines are emerging from behind the self-climbing formwork.

The masonry teams are complete, or almost. The benchmark worksite is operating at full capacity. Our team leaders on the site have joined the project from all horizons, with passion and a pride to be "part of it". They are now faced with the task.

Some of them, both men and women, have already been adopted by Millau. Everybody appreciates the beauty of the site and the warm welcome. We are keeping to our commitments: not one tent or trailer on the Causse. We are participating in the renovation of the real estate fabric with a feeling of confidence sustained by the dynamic nature of the welcoming bodies.

In a few weeks time, the first metal box frames will arrive and an assembly plant will be set up on the Larzac. Welders and painters will follow the earthworkers with the objective of a first launching at Christmas.
To be continued...

Jean Guénard
Chairman, Compagnie Eiffage du Viaduc de Millau

Expertise

Rescue work at a height of 200 metres

They are talking enthusiastically about the coming of the viaduct in the Millau fire station. It will be quicker and more efficient to carry out emergency missions. For the station commander Jean-François Marcel the viaduct means "less traffic on the roads, less time wasted looking for alternative routes to bypass traffic jams, and so much safer".

For the moment, the work site has not added to their work. Those in charge of the construction site and the fire brigade have had a perfect working relationship since the start. Members of the fire brigade have visited the work site to familiarise themselves with the area and should there be an accident will be guided by the construction's own safety team. Commander Marcel has made a new recruit from the work site. Yohan Deffing, a young apprentice surveyor, volunteered to serve with the fire brigade on his arrival in Millau. "We therefore have someone ideally qualified if ever anything happens up there", he says. "Yohan has been on a five-week training course just like all volunteer firemen, and is required to attend further regular and compulsory training. He knows how to set up emergency procedures, give oxygen or a cardiac massage".

The viaduct work site offers new training possibilities for the GRIMP unit of the fire brigade that is specialised in reconnaissance and intervention under dangerous conditions. These professionals are able to remove a wasp nest from a crane cabin at a height of 80 metres, or to rescue people in difficulty on a rockclimbing expedition. However, the unique characteristics of the viaduct have encouraged them to add to their experience, and they practise how to help someone feeling faint 200 metres above the ground. It is also the opportunity to test new materials for preventing the brake on a rappel cord from overheating or how to descend from exceptional heights, much higher than those experienced when rescuing hang-gliding enthusiasts in the region.■

Jean-François Marcel, Commander of the Millau fire brigade.

Transportation

The power of 600 horses for Millau

Each box girder section weighs an average of 60 tons and is 17 metres long.

They will arrive from the south. To avoid the Millau inhabitants having to put up with the inconvenience of exceptionally large convoys, the trucks coming from Fos-sur-Mer with the ready-assembled box girder sections will bypass the town and take a new road which has been specially created leading to the viaduct construction site to the north and south. "It will be a spectacular procession", says François Dzimira, in charge of transportation at Eiffel.

This new route winds uphill following the topography of the terrain. The gradient can be as steep as 13% and certain bends are difficult to negotiate. "Our expert drivers will fortunately have transport appropriate for this kind of performance. Their 6 x 4 heavy-goods vehicles (6 wheels of which four are driven) develop the impressive force of 600 horse power! It is not excessive. Each one of the 173 box girder sections weighs an average of 60 tons and is 17 metres long, 4.20 metres wide and just as high".

The trucks will be loaded at Fos as from the end of July, and will take three or four days to travel on national and departmental roads to the site. They will follow a route mapped out by the DDE and AIOA (interdepartmental civil engineering works organisations), "as is the case for all materials transported to the viaduct construction site. These two bodies know the national road network perfectly and the pitfalls – roads which are too narrow, bridges which are too low etc. – which exceptional convoys like ours might encounter". The transport of the separate elements for the box girders from the Lauterbourg production plant to Fos has been running without a hitch since early April (see article page 3). The deck sections will be transported from Lauterbourg to Millau as from the end of August. The viaduct is quite definitely on the right track. ■

A work site which respects nature

The water, the air, the noise, everything is regularly checked on the viaduct worksite and in the surroundings. A team assigned to environmental protection has established strict procedures to ensure that nature is respected under all circumstances. In addition, there are several outside supervisory bodies including SETEC, the independent management company for the project.

You might think Sandrine would like to see the viaduct sprout up from the ground like a flower on the Causse. However, whatever they say, there is nothing natural about moving millions of tons of earth, pouring hundreds of thousands of cubic metres of concrete or building metal cathedrals. “But there is more to the work site than that!”, replies Sandrine firmly.

Sandrine Gaumet and her team are responsible to Alain Poilliot for the protection of the environment throughout the whole construction area. They must miss nothing, and you may come across Sandrine and her assistant in the surrounding villages busy measuring, listening, looking and taking notes. What is she doing? She is controlling the water, the air and the noise level.

All the springs near the work site have been recorded. Whether they are used for drinking water by animals, or by people for watering their gardens or by certain inhabitants for creating fresh water reserves, it is out of the question that any of these springs should be polluted by an oil leak. Precautions are therefore taken in advance. No surface liquid from any work area is allowed to reach ground water, not even the water from the sky. Nothing must get past, neither the falling rain, nor a leaking barrel, nor the slightest accidental spill. The ground in all work areas has been made impervious to liquids so that surface fluids are kept from any contact with the subsoil. All waste liquids are recovered in a watertight drainage ditch from which they are pumped into tanker trucks and taken to the water treatment plant where they are stringently purified before being returned to their natural environment.

Jean-Pierre Martin, directeur du chantier, Sandrine Gaumet et Alain Poilliot, responsables de la protection de l'environnement sur le chantier.

Protection from hazardous materials

Supposing in spite of all these precautions a barrel of formwork removal oil rolls out of the impervious area and spills accidentally. “Emergency procedures are then set in motion”, explains Sandrine. “Absorbent clay is immediately spread over the area. Then all the soil from the damaged area is scraped up and put into watertight containers. Pollution tests are made, and then everything is treated”.

The men have received training. They know where the barrels of white absorbent powder are kept, in all work areas, that foams on contact with any liquid, instantly trapping any pollutants. All that needs to be done then is to scrape up the contaminated foam with snow shovels. It is both simple and quick. Other precautions are taken: tanks are double walled and hazardous materials are protected, from the rain for example.

The quality of the air is also the object of particular attention. Test strips, which capture any particles in the air, have been put up near the work site. These are sent off to a laboratory and analysed. All tracks leading to the site are sprayed with water and swept so that no dust is caused when the trucks use them. The concrete production units have been entirely covered over to prevent any dust from blowing about.

A work site of course also creates extra noise that has to be limited. The site is in the open countryside, but people in the neighbouring villages could be inconvenienced during the formwork and concrete pumping operations. The environmental team is responsible for recording the usual noise levels in the valley and comparing the results with the work on site. “That is why you might see me in the fields near the houses”, explains Sandrine. “I’m busy measuring the noise levels and recording everything I hear. The laboratory which analyses the results must be able to identify every sound peak, and know whether it is caused by a dog barking or by a vehicle on site”.

Picking flowers is prohibited

Another important point is that all waste materials are sorted, treated and disposed of. A practical guide for sorting waste has been distributed to everyone working on the site. It is forbidden to burn any vegetation. It has to be sent to a compost centre able to recycle it. Any metal has to be placed in containers and sent to scrap merchants. The natural humus from the earth works has been stockpiled so that it can be put back on the worksite when the project is finished, such as on the flat areas created for the site offices or the workshops for example. Surplus concrete is shaped into cakes and sent to a quarry as inert waste. Everything is controlled, and the types of waste matter, their quantities and their destinations recorded. Nothing escapes attention, including the special medical waste from the infirmary.

Finally, a code of conduct for safeguarding nature has been implemented. The worksite is in a protected natural area, so the fauna and flora must be kept from any irreparable harm. It is quite out of the question to lie down in the meadows for an impromptu picnic, or even to pick wild flowers because some of them are rare species.

Constructing a viaduct also involves the protection of nature. ■

Manufacturing

Zero tolerance factor at the Fos-sur-Mer production plant

“As at June 28th, 15 box girder sections are ready. We are one day ahead of schedule”! Mounir Zamouri, who supervises the manufacture of the central box girder sections (enormous steel parallelepipeds weighing up to sixty tons designed to support the cable stays of the viaduct and which constitute its backbone) can be justly proud of the work accomplished.

“Timing is tight. We have to assemble 152 box girders in eighteen months”. This means a steady rhythm of two box girders a week. The separate elements for each box section, two side panels, a base, a top and the lower anchorage points for the cable stays, arrive at the Eiffel production facility at Fos-sur-Mer from the Lauterbourg and Maizières-les-Metz plants. They are stored in an area as big as half a football pitch, before being transferred onto two custom-built assembly frames.“ On the first frame, we assemble the pieces of each box section, and on the second frame, we weld them all together. It requires a goldsmith’s precision”. The bed of the frame for example, which supports the base of the box section, is perfectly flat.

There is a tolerance factor of one millimetre over a surface measuring 24 x 5 metres. In other words, a zero tolerance factor since the admissible variance is so minute. “The other control measurements are just as rigorous”. Once assembled, the box girder sections are laid out in a herringbone pattern in the departure area. “By the end of July, 26 units will be ready as planned to be transported”. The 6 x 4 heavy transport vehicles (see the article “The power of 600 horses for Millau”) will then be able to begin taking them on the final leg of their journey. ■

A goldsmith’s precision for assembling the box girder sections.

Point of view

Comments from Millau inhabitants

Michel Lavabre, a doctor

Michel Lavabre, a doctor at Millau, also works on the viaduct site. "I am the link between the staff on the site and the Millau medical services. When somebody needs to visit a specialist, I make the appointment for him". Doctor Lavabre also sees patients on site. "I have an office and a nurse. The fact that the work is going to last a long time allows me to follow my patients over an extended period and so give them more in-depth treatment. The pathological risks connected with the site are not unusual except for the work carried out at heights. But they are experienced people, and the safety precautions are well taken into account."

Patrice Ziolo, Géant hypermarket

Patrice Ziolo runs the Géant hypermarket and is impatient for the viaduct to open. "Today we are penalised by the traffic jams. They close off one side of the town to us. During the summer, people hesitate to come on Saturdays, whereas during the rest of the year it is our busiest day. They are afraid of being blocked for hours." The hypermarket manager believes that business will develop as a result of the viaduct. "People are going to stop at Millau for pleasure. They are going to want to enjoy the town and stay a few days. However, there also has to be some advertising about the town to make ourselves known. It's important, because we're going to be on the main route between northern Europe and the holiday resorts in Spain."

Christiane and Joël Atger, newsagents

Christiane and Joël Atger are responsible for the newsagents at Millau. As for many Millau inhabitants, the viaduct is becoming a reality. "Before you had to imagine it, and we talked about it. Now it's here, and we can see it. There are cranes. It's beginning to go up." Because of the traffic jams, the Atgers had to move house and come to live in Millau. "It had become more and more difficult to make the journeys." The construction of the viaduct has already brought new customers. "It's noticeable. Some newspapers are selling better such as the national papers. Many management staff also buy magazines." The newsagents also distribute the "journal du viaduc". "People appreciate information about the viaduct. They want to know how the worksite is progressing. I even know some people who collect everything that is published about the viaduct", points out Christiane Atger with a smile. "But", she adds, "as inhabitants of Millau, we have to be dynamic to make the most of it." ■

Backstage

Traffic control

François Blanchet, an engineer with the Compagnie Eiffage du Viaduc de Millau, can barely conceal his love for the area, even when speaking in technical terms. He regularly illustrates his words by turning towards the site and never fails to point out the beauty of the surrounding plateaux. One of his missions on the viaduct has been to evaluate the potential traffic volumes on the A75 motorway, not only immediately the viaduct opens but also thereafter by analysing the expected socio-economic development of the region in conjunction with the planned opening of additional roads between now and 2025.

François Blanchet, engineer with the Compagnie Eiffage du Viaduc de Millau.

The mathematical formula for estimating the potential traffic volume is based on actual counts made on other French motorways and adjusted to take into account the increasing density and improvement of the French road network. By 2025, for example, the N88 will have two extra lanes and will join the A75 north of Millau. It is likely that motorists from Germany will be tempted to drive via Lyons and Saint-Etienne to reach the south of France and Spain.

The study has also allowed for what is called induced traffic, which in other words means the extra number of vehicles that will be generated by the very existence of the viaduct and the motorway. "Indeed the very existence of a motorway causes a systematic increase in the economic activity along its route", explains François Blanchet. "When allowing for this in our calculations we had to increase our estimates of the traffic volume using the viaduct".

Millau, a town for stopping over

The viaduct will free Millau from the traffic driving through the town during the summer which today makes it so difficult for the inhabitants and tourists to move about freely. The viaduct should not however be a sealed passage bringing nothing to the region. Everybody should benefit from it. Even the heavy goods vehicles: a saving in time, economies in diesel fuel and less tiring for the drivers. Consequently, Millau could become a town to stop over at because it is halfway on the route between Paris and Spain. "When you consider that trucks can be driven for only eight hours at a stretch and that here we are roughly eight hours from Paris, it is quite reasonable to think that truck drivers could choose Millau as the place to stop and rest". In conclusion, "the A75 and the viaduct which have European roles will bring travellers to the Aveyron region under the best possible conditions, while improving the daily lives of the inhabitants of Millau at the same time". ■

Promoting industrial tourism

Sylviane Truchetet, director of the Millau Tourist Office.

There are a great many picturesque sites in the area. However industrial tourism is a type of tourism that is increasingly popular. "People like to go to see industrial production sites", says Sylviane Truchetet, director of the Millau Tourist Office. "The viaduct draws people and excites their curiosity. A lot of people come to see us to ask questions". The Roquefort site is a proof of this, with more than 200,000 tourists a year. The scale model of the viaduct is on display in the Millau Tourist Office with explanatory panels. The viaduct work site is now open to the public. "The Tourist Office welcomes visitors at the Cazalous viewing area", says Sylviane Truchetet. "The visit lasts fifty minutes. There is also a plan to create viewing areas of the site in the village of Peyre, and at Brunas on the Cavalerie road". The areas have been chosen with care for their remarkable vantagepoints, offering several different views of the viaduct..■

Visiting the site

The viaduct site can be visited. You can go up to the Cazalous viewing area where hostesses will meet you and explain how the viaduct is being built. It is free. You can also visit the worksite if you want to, but there is a charge. The itinerary passes in front of each of the piers, with a guided commentary. For more information, contact the Tourist Office (33 (0)5 65 60 02 42) or Frédérique Alary from the Compagnie Eiffage du Viaduc de Millau (33 (0)5 65 59 26 52).. ■

Information newsletter published by the Compagnie Eiffage du Viaduc de Millau
4, rue de la Mégisserie
12100 Millau.
Tél. : 33 (0)5 65 59 26 52
Publishing Director:
Marc Legrand.
Chief Editors:
Sandra Weigand (Eiffel),
Pierre Marodon
(Eiffage Construction).
Photo credits:
M.Jamme (Camara), Eiffel,
Eiffage Construction, DR.
Printers:
Imprimerie des Chênes verts,
Millau.
Concept and design:
Agence François Blanc, Asnières
Annick Gillonnier,
Thierry Massiet.
Dépôt légal : 3rd trimestre 2002