

INCREASED SAFETY AND TRAFFIC FLOW AT THE LEVEL OF CHEAPER ROADWORKS: THE ASF SUCCESS ON THE A7 MOTORWAY

luc.borgna@asf.fr

THE A7 MOTORWAY CONTEXT

The A7 motorway is the North-South road which follows the Rhone Valley from Lyon to Marseille. The motorway is a major regional and European economic artery. The total absence of an alternative replacement route demands extreme care in maintaining the level of availability.

Along the section between Valence and Orange, the road bears average daily traffic of 76,000 vehicles/day, with 18% heavy goods vehicles (HGV). Summer traffic regularly exceeds 150,000 vehicles/day. Every year, the period during which traffic conditions allow for closing off lanes for road work grows increasingly smaller.

This road section started operations between 1967 and 1968. It is now nearly 40 years old and requires continual heavy renovation work.

Road geometry was initially composed of 3 3.50-meter lanes open to traffic and a 3-meter wide emergency lane. The road section was recently equipped with a central median with steel safety guard rails.

TRADITIONAL METHOD OF ROAD REPAIR

ASF, which operates this section, has long implemented a policy of limiting client disturbance to the greatest extent possible. This principle is clearly applied in work scheduling and execution. Application of policy principles in effect has led ASF to carry out all its road repair campaigns since 1992 at night.

Each night, road work could only start up when the traffic threshold went below 1,200 vehicles/hour, which occurred in the period after 9 pm and before 7 am the following morning, including the installation of marker posts and other traffic guiding means. This left a period of approximately 6 hours with which to lay the asphalt mix.

Work progress is approximately 1000 meters/night, and is often measured on by passing the central reserve disruption set up every 2 kilometers.

Quality problems are frequent and more difficult to rectify at night than during day work. Weather issues require nightly decisions over whether or not to set up road markers each evening. This requires very careful decision-making, for lanes must be reopened for traffic each morning.

ASF teams worked every night during a period of 40 nights, for 20 km. They had to install and remove complex road marker systems, and were thus exposed to traffic-related risks. During the construction period, vehicles drove on a single lane in each

direction, which prohibited any passing. The lanes were separated by 2 rows of road markers which did not preclude the possibility of head-on collisions.

Given this situation, the road markers could not be set up more than 2 km ahead, which reduced the acceptable traffic flow on the section, in order to avoid disturbances, to 1200 vehicles/hour.

DESCRIPTION AND COMMON USE OF THE BT4

Approximately ten years ago, heavy road marker systems ranked BT 3 or BT4 appeared on the market, physically dividing traffic flow during road work. These systems significantly increased safety for automobilists and for the road workers.

The drawback of these systems is that they are heavy and time-consuming to install, requiring longer road section closure times over longer periods of time. The traffic lanes are less wide, however, with the use of the emergency lane, 2 lanes are available.

Regulations and driver safety considerations nevertheless require that the white lines be moved laterally. This constraint then necessitates longer preparation and finishing phases during which black, yellow or white paint is applied to establish the road marking configuration for each phase. These phases are heavy and lengthy and once again reduce the time reserved for the construction work itself.

PRELIMINARY INSTALLATIONS

ASF had planned to conduct maintenance work on this section between 2005 and 2007. Following thorough in-house prospective discussion taking into account all the aforementioned factors and the current maintenance conditions, general management applied for and obtained a Ministerial Decision in 2003 to remove the central metallic barriers and replace them with modular concrete separators, and widen the emergency lane to 3.50 m over a 90-km road section.

From the start, ASF decided to invest in modular concrete separators which could perform two functions:

- provide a permanent H2-level holding wall
- serve as BT4-level work site protection.

This equipment accounted for an additional investment of approximately 10 M€ out of a total of 35.

Permanent widening of the emergency lane to 3.50 meters totally eliminated the need for lateral shift of the road marking, saving time on the work preparation and traffic resumption phases.

It should also be pointed out that the choices made in favor of this system have drastically reduced maintenance work, cleaning and refurbishment of safety equipment after accidents.

PRINCIPLES OF USE IN THE CONTEXT OF POROUS ASPHALT MIX

2 scenarios

As shown on the diagrams and the photograph below, there are several advantages for motorway clients: traffic lanes are wider than with the traditional yellow marking (3.50 meters on the right and 3.20 meters on the left). The work site progresses without impacting the traffic: the method which entails moving the protective BT4 units and the mobile traffic jam leaves 2 lanes open to traffic nearly continuously, both day and night, including when the traffic guidance systems are extended or shortened in 2-km increments. The only temporary paint marks which have to be done are the marks which guide vehicles into the transition zone. This painting is done at night in just a short time, during the lowest traffic hours, using adhesive strips. These strips are later removed without interrupting traffic, using the mobile traffic jam method.

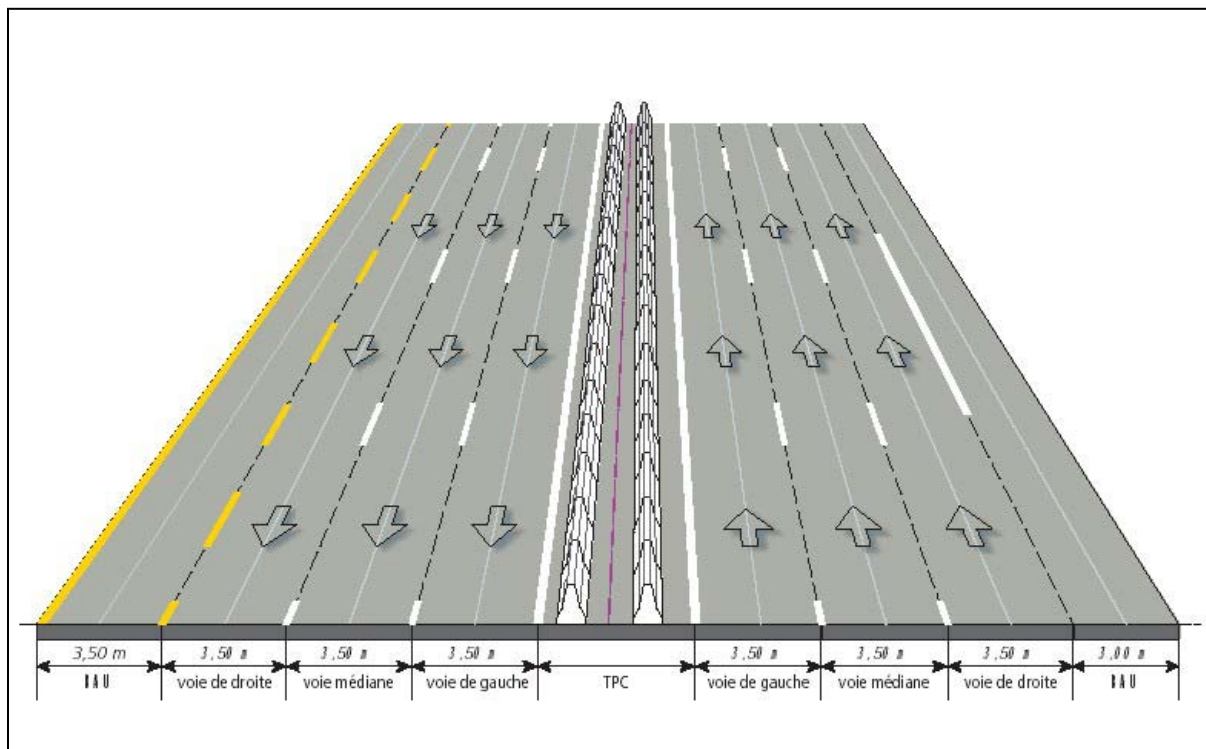


Fig. 1 : Roadworks paintings (in yellow) on 1 direction, before the setting up of a dual-way carriageway

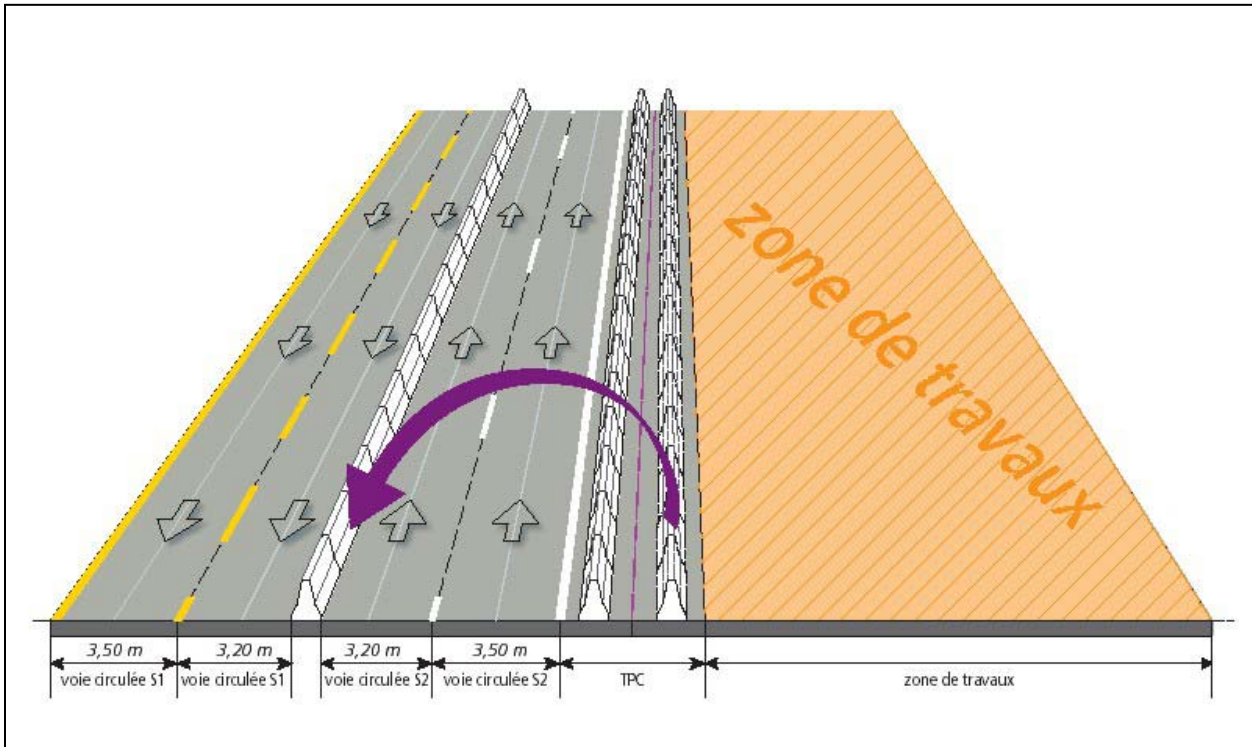


Fig. 2 : the dual-way carriageway is operational while the right one is under works



Fig. 3 : Illustration of Fig. 2

RESULTS ACHIEVED

This method, which was applied for the first time in the fall of 2005 in the Montélimar district, took less than one month to perform maintenance work on a 20-km section of road in both directions. Work consisted in an overall planing of the section, laying of cold asphalt mix on the full section (serving both as a tack coat and moisture barrier) and application of porous asphalt mix, 0/6 particle size distribution, 4 cm thickness. The work site took less than 4 weeks, despite the traffic constraints from a large interchange. Applications required 17 days and work progressed at the pace of 2350 meters/day with a single application station/day.

Work was conducted by the Trabet firm, which was the successful tenderer. The work conditions which were provided (daytime work, surface area reserved for the work site, reactivity) resulted in prices which were 30% lower than night-time work.

Furthermore, the savings in traffic guidance systems (no rental of barriers, no bringing on and removal from the site) resulted in recovering the entire investment involved in the choice of modular barriers instead of reinforced concrete guardrails poured on site.

The choice of this mode of operation for performing this work significantly improves client safety. Clients benefit from 2 suitable lanes open at all times in both directions, and from BT4-level safety equipment which protects from head-on collisions. This increased safety also benefits both ASF and sub-contractor personnel, as it significantly reduces the time and the level of exposure to risk.

To conclude, we would like to emphasize that in this mode of operation, the traffic lanes are 3.50 meters for the right lane and 3.20 meters for the left lane, instead of the 2.80-meter lanes commonly found in this type of marking.

Due to this fact, vehicle speed observed prior to encountering traffic problems is much higher than with traditional solutions. In normal circumstances, there is a high risk of occurrence of disturbances above 2400 vehicles/hour.

With this type of marking, and the new width of traffic lanes, ASF has observed flows greater than 3200 vehicles/hour for the non-diverted direction and 2800 vehicles/hour for the diverted direction. This clearly shows that the risks of traffic congestion, and thus of client disturbance, are significantly lower.

CONCLUSION

These highly positive results, obtained during the first work site using the innovative system, have provided in situ confirmation of the expected theoretical outcome. The approved investment and the experience acquired will be highly valuable in managing this motorway section, vital to the European economy and subject to increasingly heavy traffic and ever higher client demands.

In 2006, taking into account the traffic constraints related to a new interchange and the rest area of Montelimar, roadways were renovated over more than 46 km within 19 days only.