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# Restoration of the structure in the KP 30+500 (M-611)

**Community of Madrid** 

Community of Madrid	CLIENT
2009	PROJECT DATE
Community of Madrid	LOCATION
Research & Restoration projects	FIELD OF ACTION

The GENERAL DIRECTORATE OF HIGHWAYS of COMMUNITY OF MADRID asked INES ENGINEERS for a study of "REHABILITATION OF THE STRUCTURE IN KP 30 + 500 OF THE HIGHWAY M-611".

The purpose of the project is to define the required repairs for the bridge, correcting those singularities of the capacity, which suppose a weakening in the durability and functionality of all the elements, so that the bridge remains in the best possible condition.

It should be pointed out that this structure was designed for very different operating conditions from the current ones (loads, traffic intensity, etc.). Moreover, after a different lifespan in each situation, the current state (materials, functional configuration) may have changed significantly from the original one. The document defines the tasks, the conditions required for the materials and for the work execution, its measurement, payment and control. All of this in order to reach the correct execution of the bridge repair, according to the Royal Decree RD 1627/1997 (24th October).

### **CARRIED OUT WORKS**

A structural assessment of all elements of the bridge has been carried out, considering the current rules, according to the documents "Proposal for a recommendation to asses the old steel road bridges" as well as "Actions Code to consider in a Road Bridges Project " of 1998, whose recommendations have been followed for the assesment of this bridge.

The structure has been inspected by a team of technical specialists in structures pathologies of INES Engineers.



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ines@inesingenieros.com www.ines.es/en The Project was carried out based on the realized inspection in December 2009. In the project, a therapy is proposed based on the detected damages and other problems located on the bridge.

The actions would be encompassed in the following groups:



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Tablero en retícula 1,20m x 1,20 m





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### 3. Actions on structure and superstructure:

• Scarifying the bituminous mix of the Waterjetting and sandblasting of steel pavement and removal of materials on the • Section steel elements with circular saw. deck

- Dismantling part of the steel banister.
- Removal of pedestrian surfaces.
- Removal of expansion-joints.
- Placement of the deck reinforcement.
- Placing the wing-walls reinforcement.
- Concreting the deck.
- Concreting the edge beam on wing-walls.
- Installation of steel parapet.
- Applying adherence irrigation
- Spreading and compacting the road surface on the deck.
- Installation of expansion-joints.
- Painted of road markings.

#### 4. Actions of drainage, drain and waterproofing:

- Placing of a flashing on both sides of the deck.
- Waterproofing the deck with a polyurethane paint.
- Executing the drains.





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2. Actions on concrete elements:

Chipping of the concrete in the deteriorated sections.

1. Actions on structural steel elements:

• Cut and remove of badly preserved steel

• Regeneration of steel structure through

• Placement and tighten of high resistance

• Cutting the steel elements of the deck.

• Protection paint in all steel elements.

the bridge with anti-graffiti paint.

• Placement of steel elements on the deck

• Protection the most accessible areas of

the restoration of the cut elements.

elements.

rivets.

screws.

cantilevers.

- Reconstruction of the concrete faces using a thixotropic mortar.
- Demolition of the masonry parapets and chipping of the concrete upper side of the wing-walls.
- Execution of anchorages in the wingwalls for the parapet
- Painting the walls to protect them from the carbonatation process.



