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WELL-PREPARED PROJECTS

A PIARC COLLECTION OF CASE STUDIES

TASK FORCE 1.1 WELL-PREPARED PROJECTS

STATEMENTS

The World Road Association (PIARC) is a nonprofit organization established in 1909 to improve international co-operation and to foster progress in the field of roads and road transport.

The study that is the subject of this report was defined in the PIARC Strategic Plan 2020– 2023 and approved by the Council of the World Road Association, whose members are representatives of the member national governments. The members of the Taskforce responsible for this report were nominated by the member national governments for their special competences.

Any opinions, findings, conclusions and recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of their parent organizations or agencies.

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Front cover © Task Force 1.1 Well-Prepared Projects

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TASKFORCE 1.1 *WELL-PREPARED PROJECTS*

AUTHORS/ ACKNOWLEDGEMENTS

The authors of this report are the active members of Taskforce 1.1 on well-prepared projects. All have made significant contributions to share case studies to exemplify some aspects of good practices currently performed in their countries. Warm thanks to all members for their rich contributions: our task force started almost exactly with the pandemic situation and with it, an array of constraints. Despite this difficult situation, team members kept the work rhythm for almost two years, and more importantly, we develop together a warm context of engaged members. Team members are listed below in alphabetic order.

Country	Family Name	First Name
Canada-Quebec	AUBRY	Monique
Canada-Quebec	BÉDARD	Annick
Chile	GALAZ	Uriel
China	GAO	Xing Lin
France	DEMARRE	Michel
Mexico	POON HUNG	Clemente
Poland	KAROLAK	Magdalena
Romania	BORBELI	Cristian Daniel
Spain	GONZÁLEZ FABRE	Miguel
Sweden	SIMU	Jörgen
United Kingdom	FURNEAUX	Chris

Special thanks go to the members who offer their translation capabilities to make this collection of cases available in the three PIARC official languages: Chris Furneaux for English, Michel Démarre for French, and Clemente Poon for Spanish.

Thanks for the comments received from the General Secretariat.

Task Force 1.1 Well-Prepared projects (2020-2021) chairwoman and secretaries are:

- Chair: Monique Aubry (Canada-Quebec)
- English-speaking Secretary: Chris Furneaux (UK)
- French-speaking Secretary: Michel Démarre (France)
- Spanish-speaking Secretary: Clemente Poon (Mexico)

EXECUTIVE SUMMARY

2022R12EN

WELL-PREPARED PROJECTS

A PIARC COLLECTION OF CASE STUDIES

This collection of case studies includes 17 cases from 10 different countries participating in this task force, plus one case dedicated to the use of the SOURCE platform in the preparation of transportation projects. It comes after our first report delivered earlier in 2021 in which we reviewed the overall processes and practices taking place in the 10 countries[1]. The objective of this collection is to provide a variety of highly relevant examples from the real life. Each case outlines good practices in place in a country with a focus on a particular aspect of the project preparation.

The case studies provide short accounts with illustrations and pictures to make the reading easy and attractive for any decision-makers and experts searching for good practices in the preparation of their transportation projects.

After Taskforce 1.1 (T.F. 1.1) was set up early 2020, its members met for the first time in February 2020 and discussed the Terms of Reference (ToRs; attached in Annex 1) and a future workplan. A list of active members is attached in Annex 2. The pandemic did not allow anymore face-to-face meetings, nevertheless the taskforce was able to organize internal Teams meetings almost monthly, as well as several other events. In particular:

- a workshop was organized by Canada Quebec on 11-12-13 November 2020, dealing with risk management and the use of innovative technologies;
- a webinar was organized with SIF (Sustainable Infrastructure Foundation, which operates the SOURCE platform), to familiarize TF 1.1 members with the platform;
- TF 1.1 organized a webinar in the PIARC Covid-19 series on June 3rd, 2021, dealing with the "Impacts of Covid on road projects : financing, procurement, transparency and due diligence".

T.F. 1.1 published their first report early 2021: "How countries undertake Well-Prepared Projects; a review on ten countries – A PIARC Literature Review". The ten countries participating were those of T.F. 1.1 members, namely, in alphabetic order : Canada-Quebec, Chile, China, France, Mexico, Poland, Romania, Spain, Sweden and the United Kingdom. It is worth mentioning that all these countries are either High-Income or Upper Middle-Income countries, with no representative from Lower Middle-Income countries.

This report presents the main results of the second phase of T.F. 1.1 work, which consisted in drafting case studies of Well-Prepared Projects. These case studies were prepared by the same countries as in the first phase, plus the Sustainable Infrastructure Foundation, which prepared a case study related to the application of SOURCE software in Bangladesh (the only Lower Middle-

[1] "How countries undertake Well-Prepared Projects; a review on ten countries – A PIARC Literature Review"
Available on PIARC website at: https://www.piarc.org/ressources/publications/13/b6e9598-35552-2021LR03EN-PIARC-Countries-Review-Well-Prepared-Projects.pdf

Income country represented in our collection). Some countries presented more than one case study.

To align with the ToRs, T.F. 1.1 members were requested to indicate the degree of relevance of their proposed case study with respect to the main drivers identified for improvement, namely bankability, acceptance, accountability, and transparency, by using the following star-ranking system:

- No star: not relevant
- One star: somewhat relevant
- Two stars: relevant
- Three stars: highly relevant

(Accountability and transparency were grouped under “governance”).

The results of this ranking exercise are as follows as shown in Table 1:

- Acceptability: 46
- Bankability: 21
- Governance: 39

Case studies	Criteria for well-prepared projects		
	Acceptability	Bankability	Governance
Canada-Quebec, Ile aux Tourtes Bridge	* * *		*
Canada-Quebec, Turcot Project	* * *		*
Chile	* *		* * *
China	* * *	* * *	* * *
France, RN 19	* * *		* *
France, A 79	* * *	* * *	* *
Mexico	* * *	* *	* *
Poland	* * *	*	*
Romania, Craiova -Pitesti	* * *	*	* * *
Romania, Ploiesti-Buzau	* * *	*	* * *
Romania, Bucharest bypass	* * *	*	* * *
Spain, Road Safety	* * *	*	
Spain, Construction and Demolition Waste	* *	*	* * *
Sweden, E20 West	* *	*	* * *

Case studies	Criteria for well-prepared projects		
	Acceptability	Bankability	Governance
Sweden, E10	* *	*	* * *
UK, A120	* *	*	* *
UK, A 487	* * *	*	*
SOURCE[2] case study in Bangladesh		* * *	* * *
TOTAL NUMBER OF STARS	**46**	**21**	**39**

Table 1 List of case studies and their contributions to the criteria of well-prepared projects

The case studies presented are diverse in their scope, some deal with real road projects, while other focus on key aspects of project preparation (e.g., use of BIM technology, use of the SOURCE platform, road safety, waste management, procurement).

A detailed analysis has allowed first, to sort out the findings drawn from the case studies according to various items that are common to most of them, and second, to identify those that can be considered as key components of a good project preparation. Moreover, because the limited number of case studies dealing with Low and Middle-Income Countries (LMICs)[3] may have introduced a bias, and other items should be considered specifically for these countries, we have mentioned these possible shortcomings as and when we felt it appropriate.

We found that for a project to qualify as Well-prepared, the following three overarching items must be addressed:

- Stakeholder management
- Risk management
- Communication management

Regarding Stakeholder Management, the report makes a distinction between public entities, which are usually consulted based on existing administrative legal procedures; and private entities or individuals, who need to be consulted on an ad hoc basis. Involving all stakeholders from the early stages of the project, and continuously during its preparation, is a strategy that pays dividends for both the project and the public; it allows the project owner to identify the public's concerns, expectations, and values and to meet their needs. It is a great help to get feedback from stakeholders, guide decision-making, build consensus and make the project acceptable and transparent.

Risk Management has become a must in road project preparation. As far as the bankability of projects is concerned, it is necessary to improve risk management to reduce as much as possible

[2] SOURCE is managed by SIF (Sustainable Infrastructure Foundation), financed by Multilateral Development Banks under the aegis of the United Nations

[3] We have included in the "LMIC" category : Low-Income Economies (GNI per capita of $1,045 or less) and Lower-Middle Economies ($1,046 to $4,095).

uncertainties surrounding completion time and cost. As mentioned above, stakeholder management is key to prevent and/or mitigate risks at project preparation stage. But in addition to this, it is necessary to consider the risks identified in the first part of TF 1.1 work[4], namely technical risks such as those resulting from insufficient technical investigations at design stage; geotechnical risks; unexpected ground conditions; and omissions in the design and in tender documents. Risks associated with traffic safety also need special consideration. Finally, risks associated with the resilience of infrastructure have gained great significance more recently, they are currently being analyzed in detail by ad hoc PIARC Technical Committees, as well as in the Calgary Congress taking place in February 2022.

Communication management has received special consideration: while it is acknowledged that communication should be open and transparent, and continuous all along the project design phases, it needs to be dealt with great care and the help of specialists, since communication techniques are constantly evolving.

In addition to the three main topics identified above, some other are discussed in the report, which may also be significant: institutional arrangements, procurement, human resources, and the time dimension.

Finally, new tools can help in advancing better project preparation, such as the BIM (Building Information Modeling). A special mention is made of the platform SOURCE, which should be better known among road authorities, with a special focus on developing countries and LMICs.

However, limitations apply to these key findings:

- This report does not include countries in the middle-lower and lower income levels.
- For the purposes of this report, the project starts at the moment the political decision is taken to build a road infrastructure, up to the tender phase for the construction work.

[4] See footnote 1 above.

CONTENTS

1. INTRODUCTION

This collection of case studies aims at providing real life examples of well-prepared projects. This report comes after a first one describing the overall processes and practices taking place in the 10 countries represented in this taskforce[5]. The objective here is to provide a rich account on how these processes and practices are put in action in the real life.

There are 18 different cases from the 10 countries and each case provide a rich account with a focus on one particular aspect relevant for the preparation of transportation projects.

This report is structured as follows. Chapter two recalls some basic definitions in relation with our topic of well-prepared projects. Chapter three presents the methodology followed to document the 18 case studies. Then, chapter four, the most voluminous, contains the 18 case studies placed in English alphabetic order of country. Chapter five brings to the attention a reflection on the overall directions given by these cases for the preparation of project. Then the report concludes on the accomplishment of this taskforce and on future opportunities to pursue the work on well-prepared projects.

[5] See footnote 1 above

2. DEFINITION OF WELL-PREPARED PROJECTS

Within the scope of the Terms of Reference of this taskforce, we adopted the following characteristics as proxy for a definition of a well-prepared project: acceptance, bankability and governance, specifically ethics and transparency. These three characteristics are more or less linked together. Our intention is not to bring a clear-cut definition for each one, but to accept some sort of overlap among them, as found in the reality.

The definitions used by the taskforce are presented below.

2.1 ACCEPTANCE

Acceptance refers to the achievement of as wide a consensus as possible on the implementation of a project. While it is seldom possible to reach unanimity among all stakeholders ("NIMBY syndrome", not in my backyard), it is indispensable now in all countries to achieve such a reasonable consensus and avoid authoritarian decision-making, regardless of the development level of the country, since:

- industrialized countries have developed legal frameworks that allow for all types of stakeholder consultation and recourse; and
- developing countries often rely for their projects on International Financing Institutions that scrutinize environmental and social aspects of a project before financial approval.

2.2 BANKABILITY

Bankability refers to the capacity of the country to obtain adequate financing for the project. If the project is financed on budget resources, it needs to obtain the relevant appropriation from the Ministries involved. If the project is financed by International Financing Institutions, it must meet their requirements. But the concept of bankability is even more important when the project is financed with some sort of private financing (Public-Private Partnerships or concessions) by private banks and/or sponsors.

2.3 GOVERNANCE

Governance brings together the two aspects mentioned in TF 1.1 Terms of reference, namely accountability and transparency.

3. METHODOLOGY: COLLECTION OF CASE STUDIES

The overall methodological approach for collection of case studies was based upon the three criteria identified in the Terms of Reference for this task force on the preparation of projects : acceptability, bankability, and governance (equity and transparency). As mentioned above, a first report was produced in line with these three criteria to document the process and practices undertaken in each of the 10 participating countries for the preparation of their projects. Yet, each team member was asked, first, to identify a project that would illustrate at best the criteria. Then, the identification of cases and their analysis was discussed at team meetings to get the overall optimal content in the collection of cases.

An individual case study template was developed and discussed in team meeting. Adjustments to the template were done consequently. Structure of case studies is as follows:

Proposed structure of each case study:

- Visual identification regarding the criteria for well-prepared project
- Preamble, when appropriate
- Country and implementation organization
- Costs (in USD or Euros, if possible)
- Subject
- Project description and summary
- Key results / Accomplishments
- Barriers / Obstacles
- Lessons Learned
- Contact (the person who documented the case study)
- References, if any
- Annex, if needed.

In addition, each case study is identified for its contribution to the criteria it best illustrates that is acceptability, bankability, and governance (equity and transparency). For this purpose, a template was developed to indicate the contribution of a case study in a three-stars system for assessement, as shown in table 2. This table is added at the beginning of each case study. One case study may contribute to more that one criteria.

- No star: not relevant
- One star: somewhat relevant
- Two stars: relevant
- Three stars: highly relevant

Acceptability	*	*	*
Bankability	*	*	*
Governance	*	*	*

Table 2 Template on the contribution of a case study to the characteristics of well-prepared projects

4. CASE STUDIES

In this chapter, we present the 18 case studies that have been chosen for their illustrative potential in regard to well-prepared projects under one or more of their most important criteria of acceptability, bankability, or governance (equity and transparency). Case studies are presented in English alphabetical order of countries.

An overall perspective is provided in Table 3 to present the overall contribution of case studies to the criteria for well-prepared projects based on the three-star sytem of assessment. The total represents the total number of stars given to each of the 18 case studies. One can observe that the most important criteria illustrated in case studies is acceptability. This is an indication of the importance of this criteria in the overall approach on the transportation projects. This result is in line with the global orientation given by the United Nations in their 17 objectives for sustainable development goals where economic growth, as for transportation projects, should address social needs (UN web site). Second criteria in importance is governance, including accountability and transparency. The main interest under this criteria is in relation with procurement. Indeed, there is an interest for countries to search for new forms of procurement. Finally, we have very few case studies dedicated to bankabiity. It is probably due to the lack of contribution from LMIC countries in the taskforce.

Case studies	Criteria for well-prepared projects		
	Acceptability	Bankability	Governance
Canada-Quebec, Ile aux Tourtes Bridge	* * *		*
Canada-Quebec, Turcot Project	* * *		*
Chile	* *		* * *
China	* * *	* * *	* * *
France, RN 19	* * *		* *
France, A 79	* * *	* * *	* *
Mexico	* * *	* *	* *
Poland	* * *	*	*
Romania, Craiova -Pitesti	* * *	*	* * *
Romania, Ploiesti-Buzau	* * *	*	* * *
Romania, Bucharest bypass	* * *	*	* * *

Case studies	Criteria for well-prepared projects		
	Acceptability	Bankability	Governance
Spain, Road Safety	* * *	*	
Spain, Construction and Demolition Waste	* *	*	* * *
Sweden, E20 West	* *	*	* * *
Sweden, E10	* *	*	* * *
UK, A120	* *	*	* *
UK, A 487	* * *	*	*
SOURCE[6] case study in Bangladesh		* * *	* * *
TOTAL NUMBER OF STARS	**46**	**21**	**39**

Table 3 List of case studies with most important characteristics

The rest of this chapter is organized in English alphabetical order. For ease of reading, each case starts on a new page.

[6] See footnote 3 above

4.1 ÎLE-AUX-TOURTES BRIDGE RECONSTRUCTION PROJECT (CANADA-QUEBEC)

Acceptability	*	*	*
Bankability			
Governance	*		

Country: Canada, Quebec

Implementation organization

Ministère des Transports - Quebec

Costs (in USD, if possible)

Not available; project still in planning stage at the moment of writing this case

Subject

Acceptability – Good stakeholder management in the early stages of public projects allows for risk reduction

Project description and summary

The Île-aux-Tourtes Bridge is a two-kilometre piece of infrastructure that spans Lac des Deux Montagnes in the Montreal metropolitan area of Quebec. It is a vital segment of Autoroute 40 for the 87,000 vehicles (10% trucks) that cross it every day. It is also an integral part of the Trans-Canada Highway, which connects Quebec to Ontario and the rest of Canada. The current bridge was opened in 1965 and is now reaching the end of its service life.

In 2018, after examining a variety of major intervention options to determine the optimal long-term solution, the government of Quebec decided to rebuild the bridge. The project involves building a new bridge to the north of the existing structure. Like the existing bridge, the new bridge will have three traffic lanes in each direction. It will include wider shoulders, public transit accommodation (buses can use the shoulder lane), and a multi-use path. The project will also include architectural enhancement of the structure. The construction zone will cover approximately 4.5 km, and the project will include removal of the existing structure. The project is being executed using the design-build-finance (DBF) method.

Key results / Accomplishments

- Risks were identified and assessed from the outset, which quickly brought to light a range of challenges, including such important issues as **adjustments to project scope during the preparation phase and acceptability of the project to all stakeholders.**
- Stakeholders were engaged from the beginning of the project. The first consultations were held in 2014, before the solution had even been decided upon, which allowed stakeholders to share their concerns early on in the process. Those consultations provided data for the opportunity assessment, which led first to the choice of solution and then to the development of a project aligned with the needs that had been identified. **A total of nearly 100 meetings, four public events, and two online surveys were prepared**.

As a result:

- We were able to develop a vision statement and architectural directions in conjunction with experts and members of the public. Since an understated, contemporary visual design was preferred, the architectural concept for the future bridge was developed accordingly. The public's needs and expectations were identified through the consultations, so they could be taken into account in developing the architectural concept.

- We decided to raise the current bridge height to account for current and future navigation needs, based on feedback from local yacht clubs that pointed to issues when sailboats pass under the existing bridge.

- We decided to redirect runoff from the bridge to less sensitive areas and use the Envision framework to address the many environmental concerns raised during the meetings.

- We added a multi-use path and infrastructure connecting it to existing bike paths to address the needs identified with respect to active transportation.

- We set clear project boundaries for stakeholders to avoid unrealistic expectations.

Barriers / Obstacles

- Pandemic: We identified alternative consultation methods.
- **Divergent stakeholder needs and expectations**: Certain priorities conflict with others and compromises are often necessary. For example, in order to protect a cultural or historical site we may need to site the bridge in a location where it encroaches on areas of high ecological value.

Lessons Learned

- By **quickly** identifying the project's potential risks, we were able to identify mitigation measures such as stakeholder management, which is key.
- Involving stakeholders from the early stages of the project is **a strategy that pays dividends for both the project and the public**. Consulting with the public early on has benefits for the project initiator because it identifies the needs, concerns, expectations, and values of the stakeholders to

guide decision-making. Quickly looping in groups and individuals affected by the project enables us to prepare a project they find acceptable and that meets their needs. Working proactively in this way fosters transparency and saves the sponsor from having to "sell" the project when the time comes to present it to the general public and deal with unanticipated criticism.

- **Stakeholder concerns shared over the years have remained essentially the same**. Of course, they become more specific and evolve as the project advances, but all in all it is easier to control risks when we are aware of them. Understanding expectations from the beginning is key to sound project management because it is easier and less expensive to incorporate changes early on in the process.
- **Consulting with stakeholders gives us a different perspective**. It also provides new ideas for the project that can improve the user experience based on user feedback and improve project integration by fostering close coordination with local players and other projects in the works. By participating in the process, stakeholders feel more connected to the project and that ultimately helps make it better.

Contact (the person who documented the case study)

Mélanie St-Cyr, Director

References

- MELCC Environmental Assessment Registry: https://www.ree.environnement.gouv.qc.ca/projet.asp?no_dossier=3220-02-001 (French only)
- MTQ website: https://www.transports.gouv.qc.ca/fr/projets-infrastructures/reseau-routier/projets-routiers/CMM/pont-ile-aux-tourtes/Pages/Pont-Ile-aux-Tourtes.aspx (French only)

4.2 TURCOT INTERCHANGE PROJECT (CANADA-QUEBEC)

Acceptability	*	*	*
Bankability			
Governance	*		

Country: Canada, Quebec, City of Montreal

Implementation organization:

Transport Quebec

Costs (in USD, if possible)

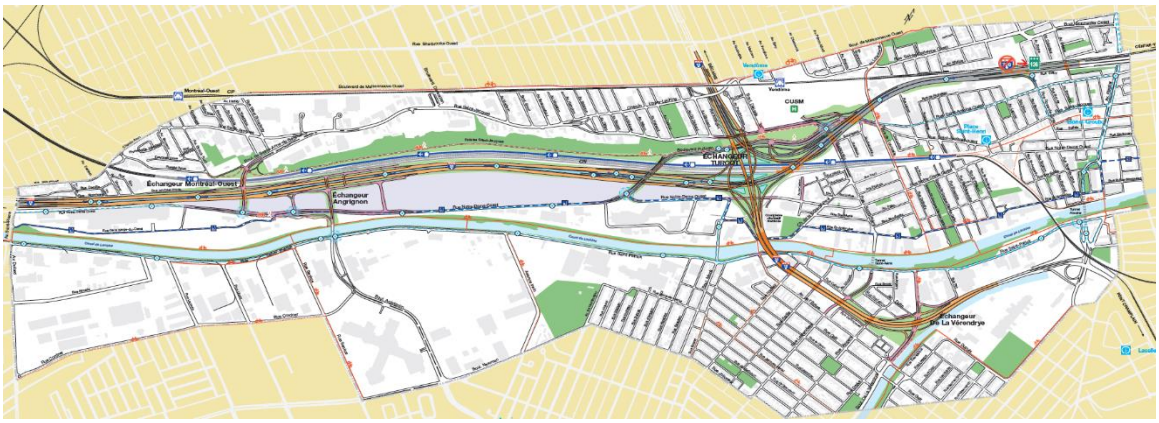
CAD 3.67 billion

Subject

Rebuilding the Turcot interchange

Project description and summary

The Turcot interchange is a major traffic hub in Montreal, Canada's second largest city. It connects Autoroutes 15, 20, and 720 and provides access to the Champlain Bridge. As one of the largest interchanges in Quebec, it is travelled by more than 300,000 vehicles daily and provides a vital connection between the airport and downtown Montreal. After 50 years of service, the Turcot interchange needed to be rebuilt. The project included rebuilding the Turcot interchange, the Angrignon, De La Vérendrye, and Montreal-Ouest interchanges, and the adjacent stretches of Autoroutes 15, 20, and 720.



The reconstruction was done beneath or alongside the old structures. Autoroute 20 and the railway tracks were moved north, into the section between the Turcot and Montreal-Ouest interchanges, so that the Turcot Yards could be redeveloped later around the strategic thoroughfare Rue Notre-Dame.

This strategy reduced construction nuisances by:

- Shortening project completion time
- Minimizing lane closures on the main highway network to keep tens of thousands of vehicles from using the surrounding streets
- Maintaining traffic flow during construction

The project execution strategy included **two phases of construction: a preparatory phase and the main infrastructure phase.** Once the initial business case was developed for the project, the government decided to use the conventional method for the preparatory work and the design-build model for the main infrastructure.

Key results / Accomplishments

Given the scope of the Turcot project, its impact on users and residents, and the project management approach taken, **the project team had to develop and improve its communication management and stakeholder management practices.** The team set up a communication management system centred on local residents and the general public, forming an environment quality team as well as multiple good neighbour committees. The committees were bilingual to reach as many people as possible and met in different neighbourhoods affected by the project. At the same time, the project team created a stakeholder management system to integrate Ministère des Transports activities with those of its partners. In this way, Ministère des Transports was able to work in concert with its many partners during the design stage and to manage traffic and construction impacts:

- The City of Montreal and five of its boroughs (Le Sud-Ouest, Côte-des-Neiges–Notre-Dame-de-Grâce, Verdun, LaSalle, and Lachine)
- The Cities of Montreal West and Westmount
- Exo
- Société de transport de Montréal
- Canadian National and Canadian Pacific
- Parks Canada
- Ministère de l'Environnement, Quebec
- Other federal and provincial ministries affected

These collaborations, the creation of citizen committees, and the extensive information made available on the project website all testify to Ministère des Transports's commitment to transparency. By coordinating and incorporating communication management and

stakeholder management right into the project, Ministère des Transports was able to improve the quality of the project.

Barriers / Obstacles

The Turcot project was the first reconstruction project of this scale carried out in such a dense urban setting. In addition to the technical challenges there were the issues of impact before, during, and after the construction on both users and residents. **Ministère des Transports developed its expertise as the project progressed, especially in terms of communication and stakeholder management.**

The project's complexity and size meant planning and execution took place **over a 15-year** period, which led to changes in the vision and requests from partners. Over the years, the project team had to adapt to changing needs while keeping their sights set on the original plan, schedule, and budget.

The especially large scale of the project—with its four interchanges, two bridges, and relocation of a 7 km rail corridor—required the project team to coordinate with and adapt to partners characterized by different institutional realities.

Lessons learned

The Turcot project was **an excellent learning experience** that led to three main takeaways regarding stakeholder management. The first was the need for Ministère des Transports to take **a long-term approach** that incorporates stakeholders. The second had to do with the **importance of conducting stakeholder management in parallel with communication management, to maximize value creation for stakeholders.** Some aspects of stakeholder management are exclusively technical, such as managing utilities. The third takeaway is the importance of **incorporating stakeholders early** on in the planning and continuing to engage with them throughout the project in a structured way. This fosters early engagement that subsequently evolves in accordance with the phases and specifics of the project. **These three observations inform an active approach to project risk management because they reduce the number of stakeholder-related changes mid-project.**

Contact (the person who documented the case study)

Not available.

References, if any

No reference.

4.3 IMPLEMENTATION OF BIM METHODOLOGY IN ROAD INFRASTRUCTURE PROJECTS (CHILE)

Acceptability	*	*	
Bankability			
Governance	*	*	*

Country: Chile

Abstract

The objective of this project is related to the implementation of the BIM methodology in road infrastructure projects developed by the government of Chile through the Ministry of Public Works (MOP)[1]. The main objective of this agreement is to increase the productivity and sustainability of the construction industry, through the incorporation of processes, work methodologies and information and communications technologies throughout the life cycle of the projects, which enable, facilitate and promote the modernization of the sector.

This case will present the progress to date, the stages considered, the problems visualized and the costs associated with this implementation.

Organization

The technical implementation of this technology in road infrastructure projects depends directly on the MOP, who through the Directorate of Roadworks (DV)[2], will implement this methodology in the generation of their projects. The creation of the Committee (BIM -DV) [3] is defined, whose objective is to promote the BIM methodology as a standard in the development and execution of road infrastructure projects developed by the MOP through the DV.

This committee will report directly to the National Director for Roadworks (DNV)[4], who will report on the progress of the implementation.

Description and scope of the project

This first version has been built based on the analysis of the Bridges projects of the Directorate of Roads (DV). The document, therefore, has been created for use within the framework of this typology of DV projects and should not be used under any circumstances for projects of other directions or typologies.

The stage in which we find ourselves describes the terms of reference (TR) and / or deliverables linked to BIM that will be required in the tender for Bridge Projects of the Directorate of Roads, which must be included in the Bidding Rules.

For the definition of BIM-linked deliverables, four key concepts are used within this document:

- **BIM Uses**

  BIM uses are "methods of applying BIM during the life cycle of a building or infrastructure to achieve one or more specific objectives".

- **Type of Information (TDI)**

  Types of Information, or TDI, are fifteen (15) groups of data that may be contained in the entities of model

- **Information Level (NDI)**

  Information Levels or NDI are the degrees of depth that both the geometric and non-geometric information contained in the entities of the BIM models can have, according to the State of Progress of the Information of the Models that is required.

- **State of Advancement of Model Information (EAIM)**

  These are the different consecutive phases of definition of the data contained in BIM models, and are directly linked to the progress over time of the project (definition according to BIM Standard for Public Projects).

Cost of implementation

The cost of this implementation will be charged to the tendered project, commissioning the selected consultant to carry out a BIM Execution Plan (PEB) of Offer on the Design (based on the BIM Standard for Public Projects), which must respond to this SDI BIM, through the following information:

- Basic information of the project.
- Objectives of the use of BIM in the project.
- BIM uses in conjunction with the technological infrastructure and skills of the team to develop them.
- Companies participating in the project with their managers.
- General deliverables and their formats in accordance with the project program.
- General collaboration strategy.

Level of process in implementation

The expected progress to date in the implementation of TDRs for use in new road infrastructure projects (bridges), is at the level of parameters defined for their implementation:

BIM uses: It is expected that during the development of the project the fulfillment of the general objective and the specific ones will be ensured, through the use of at least the following BIM Uses:

- Lifting of existing conditions.
- Estimation of quantities and costs.
- 3D Coordination.
- Design of specialties.
- Design review

Type of Information (TDI): Ten (10) Types of Information (TDI) have been defined for the development of the Project Design:

- TDI_A: General Information of the project.

- TDI_B: Physical and geometric properties.
- TDI_C: Geographical and spatial location properties.
- TDI_D: Specific information requirements for the manufacturer and/or builder.
- TDI_E: Technical specifications.
- TDI_F: Requirements and cost estimation.
- TDI_I: Site and environmental conditions.
- TDI_K: Regulatory Compliance.
- TDI_L: Phase requirements, time sequence and scheduling.
- TDI_M: Logistics and construction sequence.

Information Level (NDI):

Three (3) Information Levels (NDI) have been defined that should be used in the different stages of the call in the entities of the BIM models:

- NDI_1 General initial information
- NDI_2 Approximate basic information
- NDI_3 Detailed information

Status of Advance of Model Information (EAIM).

The phases defined must be consistent with the scopes within the call. The following table explains those corresponding to the project stage:

Design Information			
DC	**DA**	**DB**	**DD**
Conceptual Design	**Preliminary Design**	**Basic Design**	**Detailed Design**

Difficulties encountered

The main difficulties encountered in the implementation of this methodology can be classified into internal and external: Within the external difficulties we have mainly the low number of consulting companies that meet the requested requirements (TDR) to be able to participate in the bidding processes of projects including BIM methodology. This situation could raise the prices of consultant bids which will ultimately influence the final cost of the project.

With the internal difficulties we have mainly two, first of all the training that must be carried out to the personnel in charge of supervising projects that include BIM methodology, in that sense it will have to consider the realization of training courses for the personnel in charge of supervising road infrastructure projects that include BIM methodology in their TDR.

Additionally, the other internal difficulty has been to define the levels of demand in the delivery of information and the way to present the results that will finally be demanded of the Consultant when delivering the finished product, this work has taken a long time and has become more complex due to the need to coordinate structural, architectural, environmental, cultural and also economic issues.

Lessons learned

The greatest lesson learned to date is that clear stages and limits must be set regarding the steps to be implemented and the times associated with these stages, since in this particular implementation, it has cost a lot to coordinate the requirements and needs of all those involved in the project that will finally include BIM methodology.

Attachments

- BIM INFORMATION REQUEST FOR STAGE BIDDING SYSTEM: DESIGN.
- CARD OF IFC ENTITIES FOR BRIDGES.

Contact and references

Website (in Spanish): www.planbim.cl/biblioteca/documentos/

4.4 HONGKONG-ZHUHAI-MACAO (HZMB) BRIDGE CASE (CHINA)

Acceptability	*	*	*
Bankability	*	*	*
Governance	*	*	*

Country: China

Implementation organization: The Hong Kong-Zhuhai-Macao Bridge Authority (The HZMB Authority[7])

Name of the project: Hong Kong-Zhuhai-Macao Main Bridge

The 55-kilometer-long Hong Kong–Zhuhai–Macau Bridge (HZMB) consists of a series of three cable-stayed bridges, an undersea tunnel, and four artificial islands. It made its debut following six years of planning and nine years of construction. The 29.6-km main bridge is located in mainland waters and under the operations of the HZMB Authority – a management body jointly founded by governments of Guangdong province and Hong Kong and Macao Special Administrative Regions. The main structure (or the main bridge) is made up of three bridges, two artificial islands, and one tunnel, with a total length of 29.6 km.

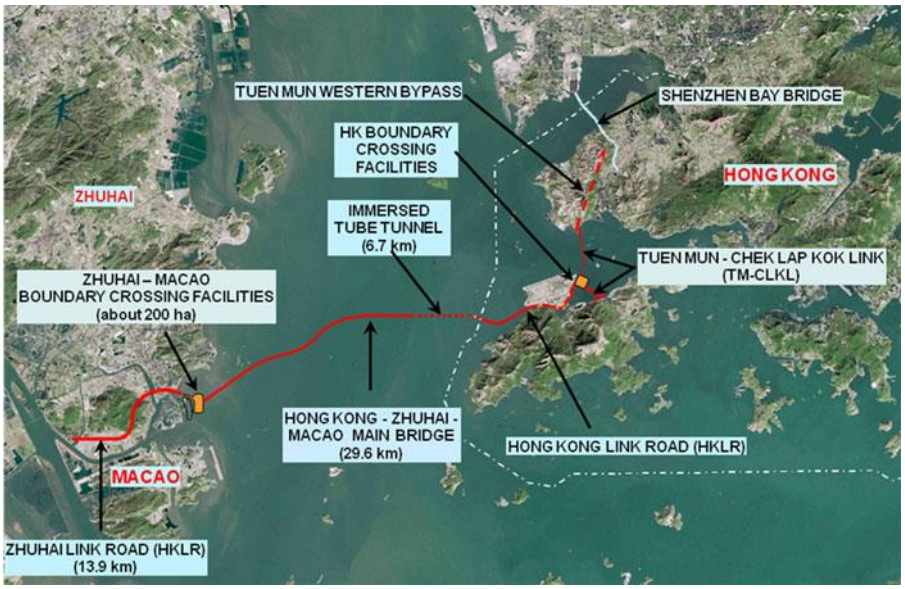


Figure 1 Layout of the Hong Kong-Zhuhai-Macao sea-link project[8]

[7] http://gcjx.hzmb.org/en/bencandy_4.html
[8] https://www.tunneltalk.com/Hong-Kong-Zhuhai-Macao-Link-Jun11-Construction-starts.php

Project main objective:

Project Mission and Vision: integrate technologies, economy, and culture, and link the areas of Hong Kong, Guangdong province, and Macao

Construction Objectives:

⇒ Build a world-class cross-sea channel
⇒ Provide users with high-quality services
⇒ Become a landmark

Objectives at the Operation Stage

⇒ Provide users with high-quality services
⇒ Operate world-class brands
⇒ Create social and economic value

(Context: One country, Two systems, Three currencies, Three jurisdictions, Three technical standards, Three local governments, Three autonomous tariff areas)

Starting date, initial budget, target finish date

Starting date: 2011.1.4

⇒ The construction of the bridge commenced on December 15, 2009, while the commencement date for the main part of the project (the tunnel and island part) was on January 4, 2011.

Initial budget: 38.1 billion RMB

⇒ The number is for the initial budget of the main bridge (according to the Ministry of Transport statement following the preliminary design of the main bridge)[9]. **The construction cost of the HZMB's main bridge was increased by RMB 9.95bn ($1.55bn) to RMB 48.068bn ($7.52bn) due to the rising costs of labor and material, as well as fad design and construction trends[10]. The incremental cost was financed jointly by the three governments and through bank loans.** The final cost/investment for the whole bridge reached 127 billion RMB (US$ 18.8 billion).

[9] http://gcjx.hzmb.org/en/bencandy_2.html
[10] https://www.roadtraffic-technology.com/projects/hong-kong-zhuhai-macau-bridge/

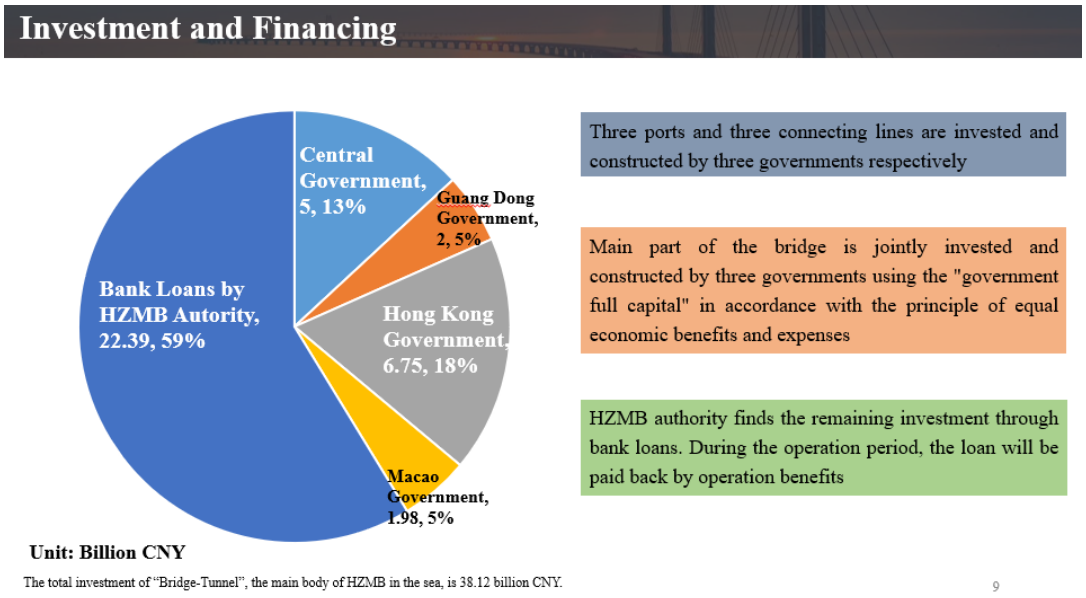


Figure 2 Investment plan

Finish date: 2018.2.6 (official), 2016.12 (planned)

The main bridge was competed on July 7, 2017, after nine years of construction. Then on February 6, 2018, the main project of the HZMB was handed over for acceptance.

Current status at the moment of documentation: The operation stage

The opening ceremony of the HZMB was held in Zhuhai, Guangdong Province on October 23, 2018, where President Xi Jinping announced the official opening of the bridge.

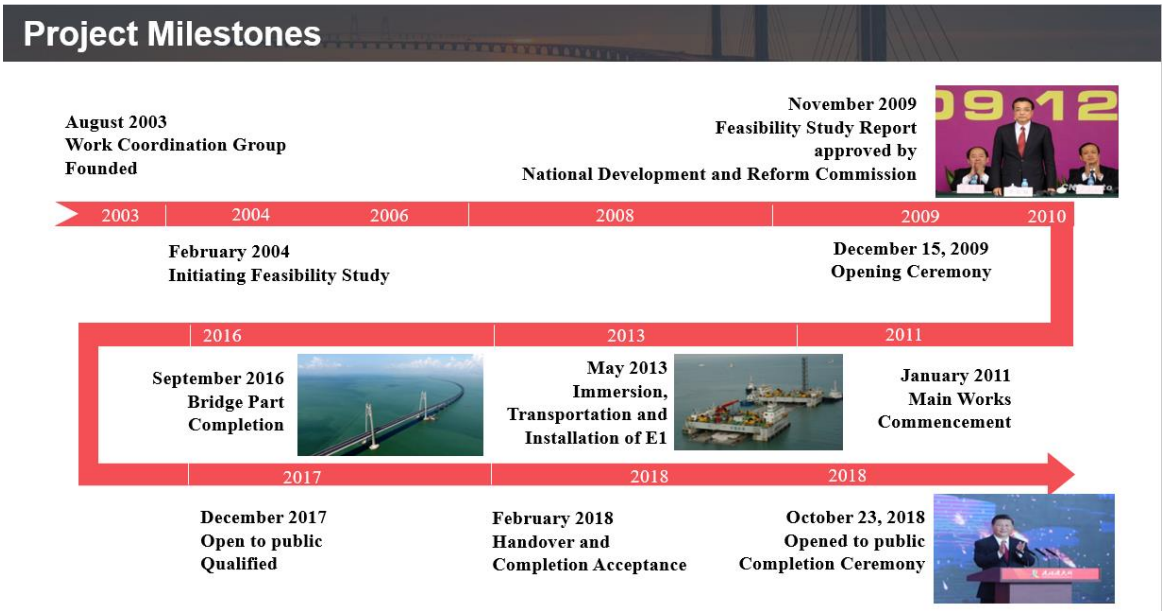
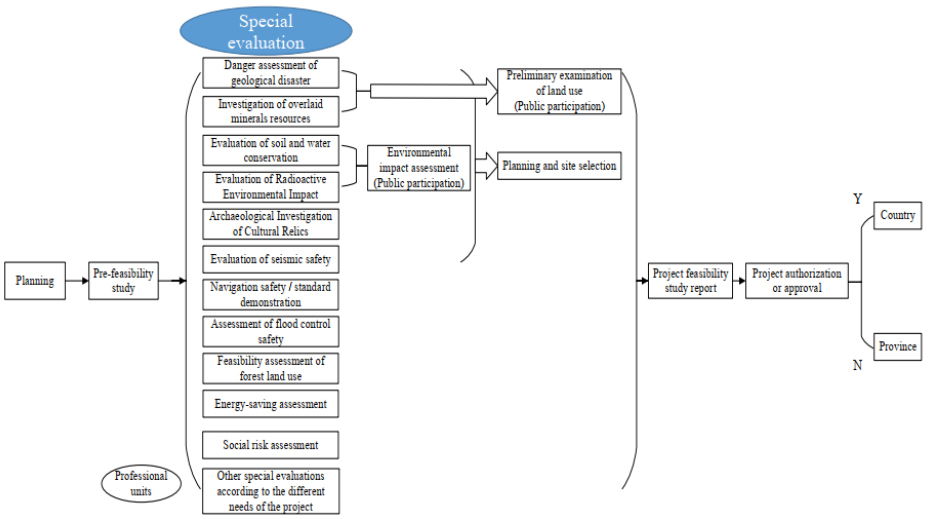


Figure 3 Timeline of HZMB project

1. Contributions to the TF1.1

Acceptance	* * * The environmental impacts have been studied in the Feasibility Study Report. Various sites and alignment options have been examined and views from extensive public consultation since 2007 have been considered to minimize environmental impacts of the HZMB project (Yeung, 2016). Locations of the project have been carefully chosen to avoid major active areas of the Chinese White Dolphin (Gao et al., 2018). 
Bankability	* * * The financial acceptance was studied in the Feasibility Study Report. The bridge construction was financed jointly by the government and loans. The governments of China, Hong Kong and Macau together contributed RMB15.73bn ($2.3bn). The contribution of the Chinese Central Government was RMB7bn ($1.02bn), while Hong Kong and Macau respectively provided RMB6.75bn ($987m) and RMB1.98bn ($289m). The cost of the Main Bridge-cum-Tunnel will be shared according to an agreed principle of Equalization of Benefit to Cost Ratio where Hong Kong, Guangdong Province and Macao will bear 50.2%, 35.1% and 14.7% of the construction cost, respectively (Yeung, 2016). The three regional governments are responsible for the construction of the boundary crossing facilities, ports, and connecting links within their territories individually. The remaining costs were funded through a loan from the Bank of China. The Bank of China led a financial consortium formed along with the banks of Hong Kong and Macau. The Bank of China provided an RMB22bn ($3.21bn) loan to construct the main body of HKZMB.
Governance (accountability and transparency)	* * *The three-level structure and two-level coordinated governance mechanism ensure the openness, accountability, and transparency of project management. (decision-making procedures were formalized) The HZMB Task Force led by the NDRC was established in January, 2006. Joint Works Committee of the Three Governments was established in May, 2010. And later, the HZMB Authority was officially set up in July, 2010.

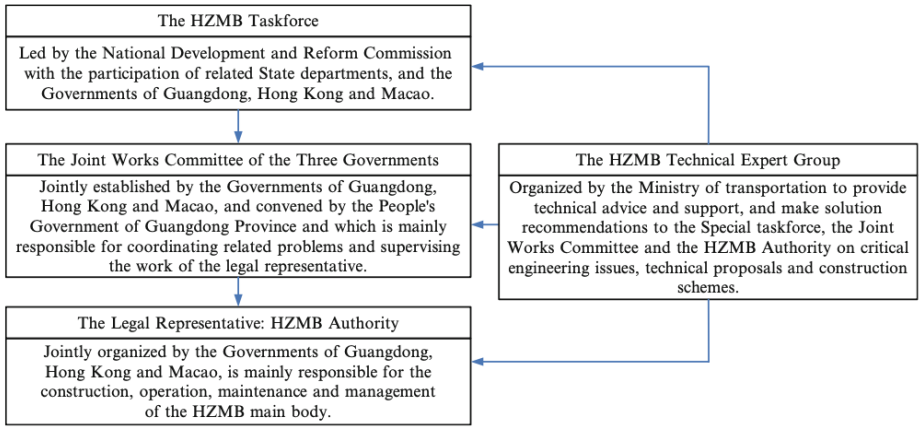


Figure 4 Administrative organization chart of the HZMB (Yu et al., 2013)

Legend:

* some importance

** medium importance

*** strong importance

The Feasibility Study Report of HZMB project was formally submitted to the HZMB Advanced Work Coordination Group on 5th December, 2004; and it was officially approved by Premier Wen Jiabao at an executive meeting of the state council on 28th October, 2009, marking the completion of the preliminary work of the project and the official implementation of the project (Yeung, 2016).

2. Project description and summary

Hong Kong-Zhuhai-Macao Bridge is the longest bridge-cum-tunnel sea crossing in the world (as of 2021), comprising Hong Kong Port, Zhuhai Port, Macao Port, link roads among ports, as well as the 29.6km Main Bridge (see Figure 5), under the framework of “one country, two systems”. The Main Bridge or Main Structure, a dual 3-lane carriageway, is approximately 30km long comprising a sea viaduct section of approximately 22.9km and an immersed tube tunnel section of approximately 6.7km. Two artificial islands are established at both ends of the tunnel to realize the conversion between bridges and tunnels. The main bridge involves white dolphin preservation, flood control, and typhoon prevention, and should meet the complex construction conditions of navigation, marine and aviation (Zhu et al., 2018). The bridge has a designed service life of 120 years and can withstand a magnitude 8 earthquake, a magnitude 16 typhoon, a 300,000 ton impact, and a 300-year flood in the Pearl River Estuary.

Figure 5 Geographical and economic environment and overview of the HZMB (Zhu et al., 2019)

The very early idea of a cross-border bridge Hong Kong and Zhuhai can be traced back in 1983 (Shi et al., 2020). A preliminary planning of the Bridge was proposed again in 2002, and the HZMB Pre-Coordinating Group was founded in August 2003, indicating that the initial planning work started. At the end of 2006, the HZMB Task Force led by the National Development and Reform Commission was established to solve controversial issues and conflicts among different governments. It was in October 2009 that the engineering feasibility research report was officially approved by the State Council. The Bridge was officially commenced in December 2009, constructed in January 2011, opened to the public on 24 October 2018.

Figure 6 Project overview

The Main Bridge is constructed, operated, managed and maintained by the HZMB Authority, a legal entity that is formed jointly by the three governments, Hong Kong, Macao and Guangdong Province, in the Guangdong-Hong Kong-Macao Greater Bay Area (Hu et al., 2018). The HZMB Authority was established in July 2010, based on the agreement among the three governments.

3. Key results / Accomplishments

1) **Social value**: The bridge connects Hong Kong, Macao and Zhuhai, playing a crucial role in promoting the Guangdong-Hong Kong-Macao Greater Bay area. Greater cooperation and collaboration between Hong Kong and the western Pearl River Delta, as part of the Bay Area initiative, is a major value of the bridge. The bridge is also likely to boost tourism. Guangdong, Hong Kong and Macao, all blessed with rich tourism resources, have positioned recreational tourism as a key industry. It is named as one of the "Seven Wonders of the Modern World" by the Guardian.
2) **Schedule**: Built in 9 years, as the main bridge commenced in 2009, completed in 2018.
3) **Safety**: zero death during the engineering of the island tunnel project
4) **Techniques and innovation**: The HZMB project is embedded in a harsh environment, with complex environmental situations, multiple environmental protection standards, high-level technical standards. In this context, the design and construction of this bridge required a numbers of innovative techniques and new solutions. For instance, the engineering of the island tunnel is one of the most demanding projects in the world. The HZMB project team employed a new construction method—using 120 giant, round, steel buckets—to compose the artificial islands, which is environmentally friendly and efficient for construction (Shi et al., 2018).

4. Barriers / Obstacles

Decision-making stage (Front-end, preparation)

1) **Legal issues and conflicts among three districts**, three different currencies: The complexity of the HZMB Bridge and the political environment of "one country, two systems, three districts" have imposed great influence on the decision making associated with the management of this mega project (Yin et al., 2018).
2) **Decision-making complexity:** The decision-making complexity (including six dimensions technical, social, financial, legal, organizational and time) is associated in the front-end phase of this project (Shi et al., 2020). The decision-making procedure and coordinating mechanisms among three districts needed to be established to allow the project effectively implemented and delivered. **For instance, the reason why the planning stage was so long is due to the consensus on the alignment and landing points of the bridge, namely, the 'single Y-shaped' design or the 'double Y-shaped design' (Yang, 2006).** The interests of the three cities were all considered and needed to be aligned. The establishment of the organizational structure of HZMB Authority shall apply to the laws from the three districts.
3) **Stakeholder management and management of conflicts** among key stakeholders at the initial stage (Wu et al., 2018): Environmental conflicts, neighboring conflicts, and traditional conflicts were identified throughout the project lifecycle (Xue et al., 2020).

Implementation stage

1) **Technical complexity**: The islands and the tunnel, known as the Island and Tunnel Project, is the most technically demanding aspect of the HZMB Project and based in a complicated navigational environment[11]. Among the key technical challenges are:
   - for prefabrication of large volume concrete elements and crack control, synchronous jacking, positioning, and immersion control of the huge segmental elements;
   - techniques for improving the foundation of the immersed tube elements with driven steel tubular piles and sand replacement in the sea;
   - construction techniques of the artificial islands on the very soft-plastic clay in the sea;
   - construction techniques of the interface of the tunnel and bridge; and
   - mitigation measures to protect vulnerable environments.
2) **Relationship management**: The HZMB authority introduced several international companies and formed project partnerships with their contractors and suppliers (Zhou et al., 2018). During cooperation, there were conflicts from time to time which required both parties to activity communicate with each other and maintain partnerships.
3) **Contract management**: While the HZMB authority enforced contracts with their contractors and suppliers, due to uncertainties and bounded rationality, the estimated original cost needed to be adjusted.

Trial operation stage

1) **Human resource management**: Though the HZMB authority prepared for the operation management of the project at an early stage. The preparation work started early in 2015. They still

[11] https://www.tunneltalk.com/Hong-Kong-Zhuhai-Macao-Link-Jun11-Construction-starts.php

faced challenges in terms of how and when staff at the construction stage transited to the operation stage.

5. Lessons Learned

1) **Knowledge accumulation, sharing and codification:** It is important to learn from projects and accumulate knowledge and codify knowledge in order to shed lights on future projects. It is difficult and costly to do so. But the HZMB Authority has devoted efforts and time to summarize such practice and lessons learnt from this megaproject.
2) **Human resource management of people working on mega projects:** Megaprojects, such as the HZMB project, are often one-off. The question remains as to how experienced and skilled staff working on one mega project can better play their roles.
3) **Lifecycle thinking:** to consider the operation management of the bridge at an early (even the initiation stage); otherwise, a lot of difficulties or challenges would occur at the operation stage. For instance, the border controls posed challenges to the workers working on the border control areas, leading to increase of costs, reduction of efficiency, and poor responsiveness.
4) **Project leadership:** The importance of project leadership is highly emphasized in managing and delivering megaprojects. The project leader (project manager) played an important role in shaping the culture of the project organization.
5) **<u>Aim/Objectives – Project Management Planning – Management Systems and Standards:</u>** Proper project planning at the preparation stage is essential and forms the foundation of successful delivery of projects.

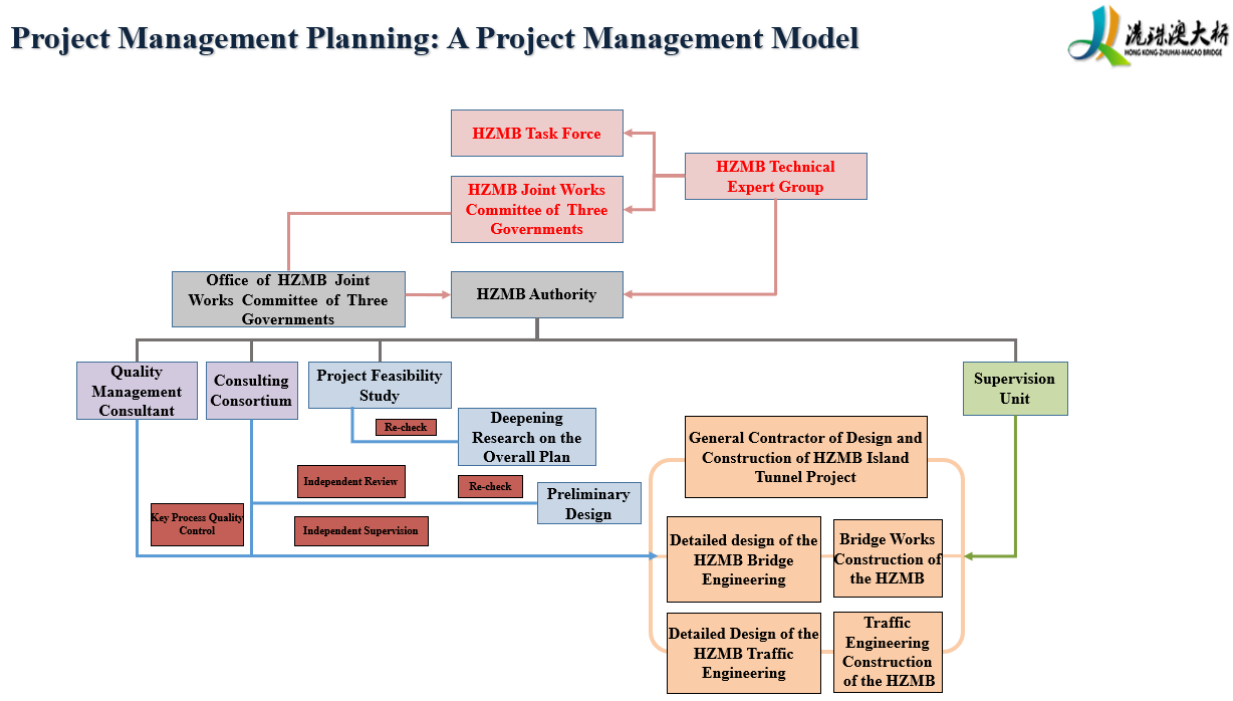


Figure 7 Organizational structure

6. Contact (the person who documented the case study)

Mr. Gao Xinglin (648017367@qq.com; gxl@hzmbo.com)

Dr. Sujuan Zhang (yyzhangsujuan@163.com)

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4.5 RN 19 – PORT-SUR-SAÔNE BYPASS (FRANCE)

Acceptability	*	*	*
Bankability			
Governance	*	*	

Country: France

Organization

This project concerns a national road (RN19[12]), it is owned by the State (Ministry of Ecological Transition). The State is represented at local level by its regional service: the DREAL[13] of Bourgogne-Franche-Comté (ISO 9001 certified).

The management of the project is entrusted to another government department, the Interdepartmental Eastern Roads Directorate and its Alsace Franche-Comté road engineering department.

An operational quality plan specifies the organization of the awarding authority and project management departments and their respective responsibilities, particularly in terms of risk analysis in the following areas: finance, environment, planning, safety and communication. Specific monitoring tools have been introduced.

Cost of the project

The final cost of the project, as provided for in the State-Region planning agreement (CPER), amounts to 130.2 million euros, including VAT. It is financed 75% by the State, 12.5% by the Bourgogne-Franche-Comté region and 12.5% by the Haute-Saône department[14]. Savings made during the works will make it possible to finish below this budget.

The fact that the State is the awarding authority does not mean that the project is financed solely by the State. It is common for local authorities to be called upon to participate in the financing of a project on a national road (for instance, within the framework of State-Region planning agreements; the present project is included in such an agreement for the period 2015-2020).

Project description

See illustrations in appendix 1 and 2.

The RN19 bypass at Port-sur-Saône (a small town of 3,000 inhabitants) was part of a more global project to develop the road link between Langres (A 31) and Delle (Swiss border). This so called A319 motorway

[12] RN : « Route Nationale » = National Road
[13] DREAL : « Direction régionale de l'environnement, de l'aménagement et du logement » = Regional Directorate for the Environment, Development and Housing
[14] Please refer to previous report by TF 1.1. regarding French organization of road authorities

project between Vesoul and Langres was abandoned by the Government based on the conclusions of the Mobility 21 Commission (2013) and then the Infrastructure Advisory Council (COI) (report of January 30, 2018). Priority has been given to the completion of the Port-sur-Saône bypass, with the COI also recommending the adoption of a new development strategy for the route, giving priority to on-site development of the current road through treatment of cross-town sections (possibly with local bypasses), overtaking lane sections and safety improvements (particularly at junctions).

With the Port-sur-Saône bypass, the State's objectives are to improve the west-east link, to make the areas crossed more accessible in order to promote their economic development, and also to improve traffic conditions, users' safety and the quality of life of the residents and inhabitants of Port-sur-Saône.

It is a 7.9 km long new road project with two lanes in each direction (separated by a central reservation), on which the maximum speed limit will be 110 km/h. The main works carried out are shown in Appendix 2. In particular, the construction of a 600m-span bridge allows the crossing of the Saône river.

Results obtained

The procedures related to the appraisal of road projects in France under government responsibility are described in the report presented in 2020 by Task Force 1.1.

The main phases of the appraisal were as follows:

- preliminary studies (particularly traffic studies): 2002-2009
- studies prior to the declaration of public utility (including the selection of the preferred route and development option, from five alternatives studied): 2010-2011
- declaration of public utility (at ministerial level): 2013
- detailed design studies on the selected alternative: 2013-2016
- derogation order for the damage to protected species or habitats: 2015
- water law decree: 2016

The works started in 2016 and the commissioning is planned for the end of 2021. Although this chronology may seem rather long, it should be noted that the actual project studies only began in 2010. The completion time therefore appears rather tight compared to other projects under State ownership.

The long duration of the works is also justified by the use of complex structures such as the two viaducts and the bridge over the railroad, the construction of which was necessary to facilitate earthmoving from east to west.

Particular attention was paid to the environment. After identifying the risks associated with the new infrastructure, design choices as well as avoidance, reduction or compensation measures were defined to limit or even eliminate the negative impacts of the project.

Among the measures proposed and retained, we note:

- land use planning to optimize cultivable plots of land;
- the restoration of a wetland under the bridge over the Saône river to allow the resettlement of the habitat of a protected species (the "Marsh Copper" butterfly);

- the resettlement of three forest islands allowing the natural management of their evolution;
- the acquisition of houses close to the project's right-of-way in order to reduce the degradation of the living environment of their inhabitants.

The Saône valley is also a protected site (Natura 2000), but the crossing of the Saône river by a large viaduct was an effective mitigation measure and thus made it possible to conclude that there was no significant impact on this area.

Finally, it should be noted that the jobsite was self-sufficient in terms of materials used up to the capping layer, with the reuse of excavated materials by on site crushing. This process, together with the use of a mobile hot-mix plant, made it possible to greatly limit the transit of trucks generated by the works, resulting in significant environmental benefits, particularly in terms of greenhouse gas emissions, compared with works of similar scale.

Difficulties encountered

As indicated below, the project benefited from a broad consensus among all the stakeholders, so that the difficulties encountered could be resolved in the normal course of consultation:

- definition of the study zones and selection of the preferred design option, allowing the declaration of public utility and the rights-of-way acquisitions necessary for the project;
- main environmental measures: construction of five water treatment basins before discharge into the natural environment, an under passage for big animals, etc.
- definition of so called “accompanying works” in the project area (financed by 1% of the project amount, such as the burying of high voltage lines for better integration in the landscape).

Lessons learned

The major lesson learned from this project is that a project perceived as necessary by all stakeholders has a better chance of being prepared and carried out under satisfactory conditions. In this case, in particular, all organizations concerned: State, Region, Department, and Municipalities, have combined their efforts to move the project forward in the right direction.

This consensus was reflected both in the agreement on the financing of the project and the absence of any fundamental criticism of the project at the local level. Indeed, this long-awaited project will put an end to road unsafety, pollution and noise caused by traffic in the city center (12,000 vehicles per day, 13% of which are heavy goods vehicles).

In addition, special emphasis was placed on communication, both at the preliminary investigation stage and at the implementation stage: a project website was created on the initiative of the DREAL Bourgogne-Franche-Comté, and this initiative was hailed as pioneering by the Ministry.

About twenty newsletters (downloadable) have also been published regularly throughout the duration of the work (about 5 years). This is very important in order to maintain contact with the public (especially regarding the works, temporary detours, etc.).

Contact

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loic.plancon@developpement-durable.gouv.fr

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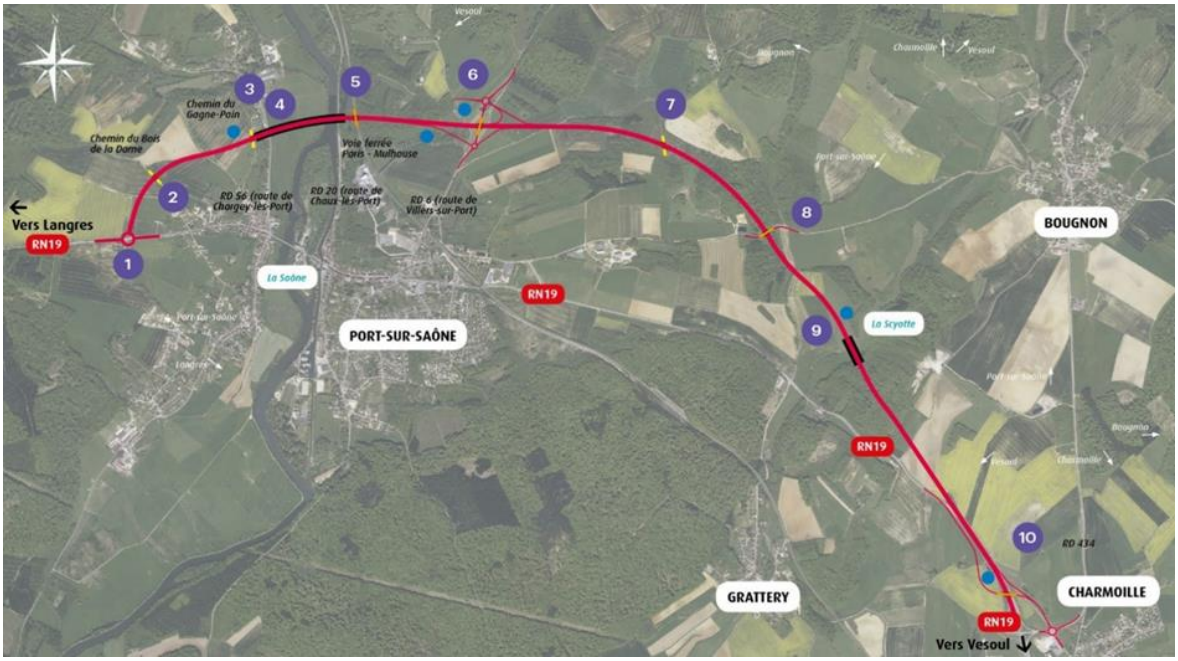
Website (in French) : https://rn19-portsursaone.fr/

Appendix 1 Geographic position of the project in France

Appendix 2 Details of the project



Connection roundabout to the existing RN19, west of Port-sur-Saône

2. Restoration of the Bois de la Dame road
3. Restoration of the Gagne-Pain road
4. Viaduct over the Saône river and RD56 and RD20
5. Railway crossing bridge
6. Port-sur-Saône Centre interchange allowing the restoration of RD6
7. Large fauna bridge
8. Restoration of RD100
9. Bridge over the Scyotte river
10. Charmoille interchange, connection to the existing RN19 east of Port-sur-Saône

4.6 A 79 – Concession motorway between Sazeret and Digoin (FRANCE)

Acceptability	*	*	*
Bankability	*	*	*
Governance	*	*	

Country: France

See illustrations in appendix.

Organization

This project concerns the upgrade of a 88 km long section of National Road 79 to a 2x2 lane-motorway standard. However, this project is not carried out directly by the State services, it was rather let as a concession project, based on an invitation to tender that took place in 2017.

After a selection process of the tenders received, followed by a negotiation phase, the State signed the A 79 concession contract in March 2020 with the private company ALIAE, a subsidiary of the Eiffage Group that was created for the special purpose of this project.

The contract includes the design, planning, widening, upgrading to motorway standard of the road between Sazeret and Digoin, as well as the upkeep, operation and maintenance of the resulting motorway, with toll collection, for a period of 48 years. All these tasks are being carried out by subsidiaries of the Eiffage Group, including operation (carried out by APRR, which operates approximately 2,300 km of motorways in France). Works are currently underway, with completion scheduled in summer 2022 and opening of the motorway in October 2022.

Cost of the project

The financing of this toll motorway, whose investment is estimated at 548 million euros, is entirely provided by the Eiffage Group, without any public subsidy. The financing plan is fully supported by this private group with a level of equity of 50%. The cost of the design-build operations is estimated at 482 million euros.

Description of the project

The project is a section of a more global project, the Route Centre Europe Atlantique (RCEA), which is part of the European route E62, linking Nantes to Genoa via Geneva and Milan (Fig. 1)

Carrying a daily traffic between 10,000 and 15,000 vehicles per day depending on the section, this route is heavily used by hauliers, with heavy goods vehicles accounting for about 40% of the global traffic. Sometimes referred to as the "death road", the 88 km section between Sazeret and Digoin is particularly accident-prone. Making this section safer is therefore considered as a high priority.

In more detail, the project of upgrade to 2x2 lane-motorway standard includes:

- 65 km of widening of the current section;
- 23 km of motorway upgrade;
- 57 new engineering structures, including the 416-meter long Allier viaduct;
- 92 existing structures upgraded;
- 12 interchanges;
- 4 rest areas, 2 simple rest stops and 1 service area.

Results achieved

Deadline

The selected concessionaire proposed to the State to put the motorway into service within a very short timeframe: 23.5 months from the date of effect of the concession contract. To meet this commitment, the concessionaire carried out numerous administrative procedures in hidden time as soon as it was designated as the preferred bidder (water law file, fauna/flora inventories, hydraulic studies, etc.). The integration (within the same group) of all the parties involved, from design to construction and operation, also helps to meet deadlines. For instance, the concessionaire decided to standardize the twelve new viaducts along the route (11 m wide, mixed structure combining steel beam and prefabricated reinforced concrete decks), which minimizes construction time and safeguards the main critical paths, by allowing teams and equipment to be repositioned if necessary.

Safety

Safety must be ensured by the concessionaire as soon as the infrastructure is handed over by the State, without waiting for the work to be completed. The concessionaire has therefore implemented immediately targeted actions to reduce head-on collisions and neutralize lateral obstacles. After commissioning, the operator APRR will deploy all the equipment (emergency networks, cameras, variable message signs, weather stations, etc.) required for monitoring by the regional traffic control center.

The sequencing of works will enhance the safety of the construction site, as they will be carried out under traffic: the first phase will involve the construction of two new lanes parallel to the existing road; the second phase will consist in shifting the traffic to the new roadway in order to rehabilitate the old pavement, while separating the two directions by means of reinforced concrete blocks.

Local economic development

In addition to the major issue of safety, the concessionaire has also considered local economic development. In particular, while there is a lot of through traffic, two sections of the motorway (one of 17 km, the other of 6 km) will be free. Local users will also benefit from subscription formulas (with a discount up to 60%). The rest areas accessible outside the toll system will also be equipped with carpooling areas and even bus stops.

Local employment is encouraged on the site (10% of working hours reserved for unemployed or disabled people), 30% of the work is allocated to third party companies and SMEs.

Protection of the environment

The project includes particularly:

- 4,600 meters of acoustic protection;
- a "free flow" toll system to avoid slowing of traffic at traditional toll gates (and associated CO_2 production), and to consume less natural space than full-width gates;
- special attention paid to landscape integration;
- the collection of rainwater into treatment basins before discharge into the natural environment; these basins will also have the capacity to trap accidental pollution;
- special provisions for species (fauna and flora) identified as special during the preliminary inventory: 17 hydraulic structures equipped with lateral strips for small fauna allow, in addition to the proper flow of watercourses, the passage of fauna from one side of the motorway to the other; a 20-meter wide eco-bridge allows the crossing of the motorway by large terrestrial mammals, increasing viaducts length improves the landscape structure, etc.
- doubling the length of the bridge over the Allier, the main river crossed by the route, in order to ensure the hydraulic flow in times of flood, while avoiding the effect of channeling the river in a protected natural reserve zone;
- minimizing the energy footprint of the construction site: creation of a carbon arbitration fund to finance the cost surplus of more expensive but more CO_2-efficient technical solutions; reuse of 98% of the excavated materials and recycling of 100% of the planed asphalt mixture from the existing roadway; implementation of a 1.7 km conveyor belt over National Road 7 and the railroad to facilitate the transport of materials from a quarry close to the construction site and avoid the rotation of 160,000 supply trucks on local roads;
- environmental compensation: in spite of all the adopted measures, there remains a "compensatory debt" of about 380 ha evaluated according to the regulations for protected species; the concessionaire has secured this amount of land before the start of works and uses it to improve biodiversity, in partnership with the farmers concerned (restoration of forests, bocage, wetlands);
- monitoring of the planned measures all through the concession period.

Encountered difficulties

The schedule for the operation was carried out according to the following phases:

- Public debate on the project to accelerate the upgrading of the RCEA to 2x2 lanes and decision to proceed by way of concession: 2010-2011
- Preliminary study, CEREMA, December 2014.
- Public meetings: presentation of the project, the public utility inquiry file and the operation schedule: 2015

- Declaration of public utility and launch of the invitation to tender for the concession: April 2017
- Designation of the sole preferred bidder: June 2019
- Designation of the concessionaire: September 2019
- Land survey: November 2019
- Concession contract: March 2020
- Unique environmental authorization: August 2020.

According to the report of the public utility inquiry commission, the public meetings and debate took place in a calm and constructive atmosphere. There was no real opposition to the 2x2-lane project. The discussions focused mainly on the principle of the concession and the imposition of tolls on a road that was previously free of charge, and the need to have toll-free sections.

It should be noted that after the declaration of public utility, the right-of-way to be acquired is not precisely defined and that the concessionaire still has room for discussion and negotiation with the local residents. Similarly, the final layout of rest areas has been established by the concessionaire, and the detailed right-of-way has yet to be specified by the concessionaire (land survey).

At the end of the various procedures, the State's commitments are summarized in a public document and are binding on the selected concessionaire. Similarly, the rules for setting tolls are defined in the concession contract specifications.

Lessons learned

To be reviewed with regard to the criteria of acceptability, governance, bankability.

Principle of the concession

As mentioned above, the debates on the concession focused on the fact that some sections should be toll-free, on the one hand, and on the financing, on the other hand, with some people considering it inappropriate for the State to grant an equilibrium subsidy, if the concessionaire eventually selected had requested one (which was not the case).

It is obviously premature to comment on the financial viability of this operation for the concessionaire. It should be noted, however, that according to CEREMA's preliminary studies, the project was rather sturdy, since the project's internal rate of return remained higher than the discount rate even in the event of a sharp increase in project costs (optimism bias study).

Characteristics of the concessionary system

In terms of acceptability, the concession system has brought the following advantages:

- the competitive bidding for the concession allowed a number of questions raised by the stakeholders to be answered positively, notably on the appropriateness of an equilibrium subsidy from the State (ultimately not requested by the concessionaire) and the fact that certain sections heavily used by local traffic would be free of charge;
- by transferring a certain number of responsibilities to the concessionaire for important aspects of the project, such as the detailed definition of the necessary right-of-way, the

location of rest and service areas (within the limits permitted by the regulations on the distance between areas), the choice of construction procedures (standardization of engineering structures, installation of a conveyor belt), the concession system allows, subject to in-depth local consultation, a fairly rapid decision-making process; from this point of view, the preparation of the project can be seen as a joint effort by the State and the concessionaire, but at different levels of detail.

In addition to these project-specific advantages, there are general advantages of the concessionary system, such as:

- the contribution of innovations by the concessionaire: this is the case in particular of the "free flow" system adopted for the first time in France on this scale;
- overall economy, for example the possibility of adopting preventive maintenance strategies, depending on the observed growth in traffic, and of intervening neither too early (risk of over-dimensioning) nor too late (risk of excessive deterioration), or of implementing alternative solutions to help meet the objectives of the climate transition.

Finally, in terms of bankability, the financial solution chosen by the selected concessionaire is somewhat unusual, since it does not call on banks for the financing of the construction phase (corporate financing). This has the advantage that the concessionaire is not exposed to the margins that banks would take for the "construction risk", but it does expose it to a market risk at the time of refinancing.

Contact

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References

Website (in French): https://www.autoroute-a79.fr

Appendix

Fig 1: Insertion of the RCEA (Route Centre Europe Atlantique) in the European network.

The A79 motorway concession project is highlighted in red on this map.

Fig. 2 Insertion of the RCEA (in red) in the French network.

Fig 3 : Location plan of the Sazeret-Digoin section, subject of the present case study.

4.7 ELEVATED VIADUCT, SANTA CATARINA, NUEVO LEÒN (MEXICO)

Acceptability	*	*	*
Bankability	*	*	
Governance	*	*	

Country: Mexico

Organization

CONCESIONARIA AUTOPISTA MONTERREY SALTILLO, S.A. DE C.V., a subsidiary of ROADIS Financial Group, received an extension of the term of its Concession Contract from the Ministry of Communications and Transportation, (SCT[15]), in November 2019.

Subject

The project involves the construction of a four-lane elevated viaduct connecting the Monterrey-Saltillo highway and Monterrey's Morones Prieto Avenue. Santa Catarina, San Pedro Garza Garcia.

The City of Monterrey and all state of Nuevo Leon in northeastern Mexico, will benefit from this project. Main goals are to reduce congestion on the toll-free Saltillo-Monterrey road and improve access/exit into the Monterrey city area. The Annual Average Daily Traffic in 2020 was 8,620 vehicules, 50% are heavy vehicules.

It does not involve any use of public funds and has a positive impact on development in the country's Northeast region. It also supports national and local industrial development, reduces the risk of accidents, and reduces carbon monoxide emission into the atmosphere.

This project is part of road rescue plan, a concession rescue plan, also known as a “redefinition of concession scope”, is a way of extending the scope of a concession by utilizing mechanisms specified in the Concession Title, such as the term and tariffs. The goal of this extension is to generate financial flows which might allow for the development/construction of additional road and/or financial infrastructure for the concession.

The original time of the concession was for 30 years, and it was extended for another 30 years.

The analysis of a redefinition of concession scope allows us to determine how far the time and/or tariffs should be extended to estimate future flows and the recovery of investment charges while maintaining the project's financial balance and original parameters.

[15] SCT:«Secretaría de Comunicaciones y Transportes» Mexican, Ministry of Transportation and Communications

Cost of the project

The concessionaire contributed 100% of the $4.9 billion Mexican pesos invested in the project. The construction began on February 10,2020 and is expected to be completed in July 2022. A total of 2,300 direct and 5,000 indirect employments are expected to be created.

Project description and summary

See illustrations in Figure 1. and Figure 2.

The project consists of the construction and operation of an elevated viaduct that has the necessary feasibility studies and permits to coexist harmoniously with the Santa Catarina River. It will be an A4 type road, with two lanes of traffic in each direction. It will have an extension of 7.9 kilometers, from the end of the concessioned road in Las Huastecas, in the southwest zone of the Santa Catarina River, to the final junction with Gustavo Díaz Ordaz Avenue. The project consists of 8 kilometers of concrete structures on the Santa Catarina River, about 8 kilometers of bridges.

Figure 1. Panoramic view, Elevated Viaduct, Santa Catarina

The project will solve the congestion problem on the Saltillo-Monterrey toll free highway in the section between the Monterrey ring road and downtown Monterrey.

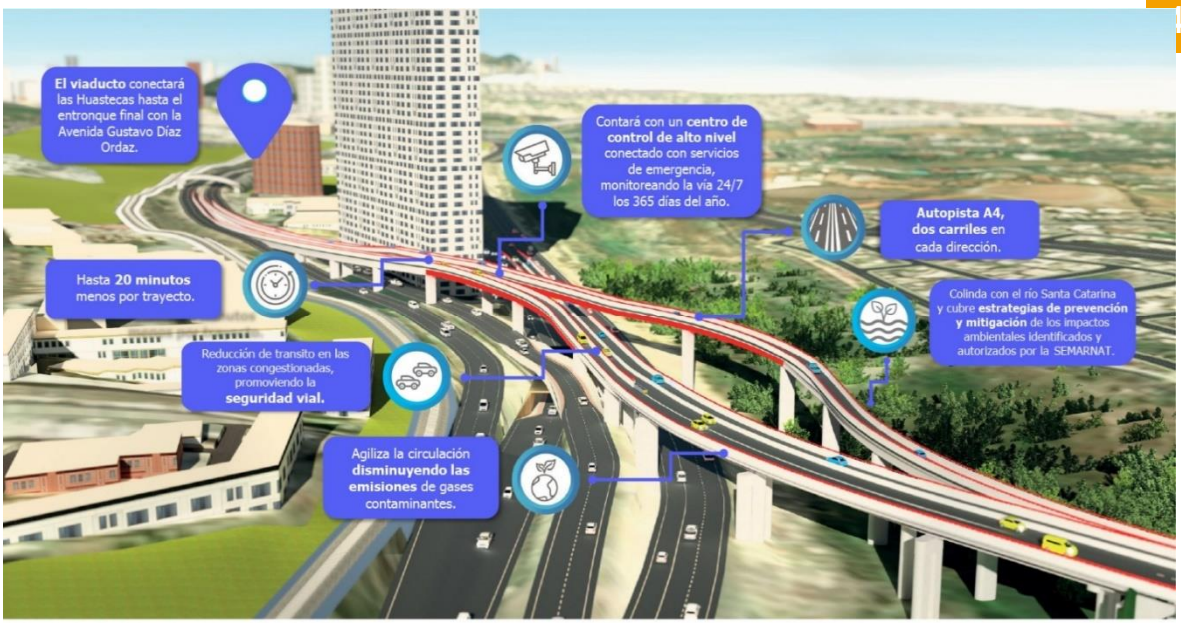

Figure 2. Elevated Viaduct, Santa Catarina

It will be in a strategic area for international trade due to its connection with the U.S. border; it is planned to be completed in its entirety by the ending of 2022. It offers a direct communication alternative for travelers in the Monterrey metropolitan area, who will now find a renovated and efficient route for a fluid journey, saving up to 20 minutes and avoiding road conflicts in the urban area of Monterrey and Santa Catarina.

Results and benefits obtained

One of the main benefits of this elevated viaduct will be to prevent heavy traffic from continuing to circulate along the avenues of Santa Catarina, driving it in advance towards the connection with the highway, saving damage to the current infrastructure, reducing traffic, and avoiding road accidents caused by this type of heavy vehicles.

- The concession provides the state with the opportunity to create road infrastructure using entirely (100%) private funds.
- Some of the incentives for the concessionaire include improving its flow profile, refinancing processes, and capturing fresh flows that help to secure its financial position on a regular basis.
- Toll-free road sections are built, resulting in an improvement in the revenue profile of the "redefinition of concession scope" due to the traffic induction effect.

Difficulties encountered

During the pandemic's difficult period, road concessions reported a revenue decrease of more than 20%; however, in the post-Covid-19 period, it is possible to identify important projects that are attractive for private investment, given that the rates of return on private capital are around 10% in real terms, a strong legal framework is there, as well as an institutional vision that promotes these schemes, providing interesting investment opportunities.

To develop and construct more road infrastructure projects and other forms of transportation under this redefinition of concession scope model, institutional teamwork is required to conduct a detailed

analysis of the current concessions' potentialities. as well as an experienced and creative institutional structure to adapt these schemes and set standards for various forms of transportation in each type of concession's own context.

Lessons learned

The major lesson learned from this project, due to a lack of project preparation in previous years and a lack of budgetary resources for infrastructure investment, as well as the need to develop innovative financing schemes in public-private partnerships within the legal framework, alternatives such as redefinition of concession scope, investment recycling, and a road concession program are to be considerate by the State.

The redefinition of concession scope is a way to extend the scope of a concession by utilizing mechanisms specified in the Concession Contract, such as the term and tariffs. The goal of this extension is to generate financial flows which might allow for the development/construction of additional road and/or financial infrastructure for the concession.

The analysis of a redefinition concession scope allows us to evaluate how much time and/or tariffs should be extended to forecast future flows and recover investment expenses while keeping the project's financial balance and original specifications.

Contact

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REFERENCES www.sct.gob.mx

4.8 NORTHERN BYPASS OF KRAKOW (POLAND)

Acceptability	*	*	*
Bankability	*		
Governance	*		

Country: Poland

Implementation organization

The General Directorate for National Roads and Motorways the central administration authority in Poland established to manage national roads, motorways and expressways, as well as to implement the state budget in this area.

Costs

1 958 000 000 zł, 458 623 193,50 €,

Project stage: under construction

Subject

The Northern Bypass of Krakow

Project description and summary

Background

Initially the owner of the project was the City of Krakow.

The first steps to build the Bypass were taken in 1990 when the preliminary location was establish. From the legal point of view there were no formal restrictions to build in the area

As time went on people became more skeptical of the plans and slowly began to build up the reserved area.

Therefore, when in 2005 the announcement was published that the City undertakes formal steps to implement the project, it awakened strong emotions.

It took 6 years of planning to agree 3 route options required for Environmental Agreement Application and another 6 years to select one of them, that was accepted in Environmental Agreement Procedure.

Such a long planning period made the initial assumptions obsolete, outdated. The progressive development of the city and the increasing traffic were the direct cause. Consequently, the class of the planned road had to be upgraded from the pre-assumed GP (high-speed main road) to S (express road). Subsequently, the investment was handed over to GDDKiA (as, abiding to law, GDDKiA manages the express roads in city areas). Therefore since 2016 GDDKiA is the owner of the project.

Project description

Purpose and expected effects of the project are to provide a high – class connection on the northern side of the city. This is the last, long expected lacking part of the Krakow ring. So far the heavy transport flows through the city center which caused bad traffic conditions and decreased road safety. Therefore, the main objective of the project is to move out the heavy traffic from the city, improving traffic capacity and safety.

The project involves the construction of::

- 12.50 km expressway from the Modlnica junction to the Mistrzejowice interchange,
- engineering structures,
- extension of the existing Modlnica interchange,
- 3 new interchanges,
- infrastructure for pedestrians and cyclists,

- **Key results and accomplishments**

Since the change of the project owner, the pressure on its implementation has become enormous. To meet society's expectations and gain the highest possible acceptance for the investment, the policy of transparency and informing has been introduced. This was also to mitigate the risk of appeals at the stage of Permission to Implement Road Construction Investments (ZRID).

The assumptions to achieve the goal were:

- reaching as many people as possible with the information about investment by:
  - organizing meetings,
  - providing information on dedicated website,
  - providing contact details to the project team,
- being in touch with local authorities ,

- consulting the project with influential stakeholders (utilities owners, investors).






The transparency ensured at each stage of the project allowed us not only to convince people to the investment, but also to obtain a lot of information on the local heritage sites in the area, valuable natural habitats, as well as ideas for environment protection during the works.

Another added value was the information provided by citizens in terms of landowners who required support in the process of resettlement. Therefore we were able to stay in touch with local government to help people with all the formalities required to change their place of residence.

This transparent and open approach resulted in successfully completed administrative procedure and high level of acceptance.

- **Barriers / Obstacles**

  appeals against Environmental Agreement

  5 appeals were issued, concerned mainly on:

  – Noise protection
  – Protection against pollution
  – Formal matters
  – Objection to the displacement
  – Incorrectly performed analyses and traffic forecasts

  Listed heritage sites of the project

Fortifications

Krakow Fortress

Cholera cementry

Obiects of religious worship

Species under environmental protection

Protected invertebrates	3 species
Protected birds	36 species
Protected mammals	4 species

Resettlement of residents

Residential buildings to be demolished	19
Outbuildings to be demolished	92

Reconstruction of utilities in collision with route of the road

Low voltage power network	13
Medium voltage power network	9
High voltage power network	3
Water supply	22
Sanitary sewerage	23
Storm water drainage	8
High pressure gas network	4

Parallel infrastructure projects at different stages

Lessons Learned

A great deal of consultation and transparency was necessary to achieve the highest possible acceptance and mitigate risks including environmental threats.

The factors we had to take into consideration were:

- Landowners, we have to take a land from
- The heritage
- Environmental and ecological mitigations

Organizing public meetings, publishing information on dedicated websites and using all possible measures to reach people influenced by the investment is the way to recognize a risk and manage it at

the early stage when the project stays “on paper” and changes are possible with relatively low costs and time consequences.

The meetings give the chance to get information from the society about obstacles like protected species, habitats or heritage sites.

Due to transparency the strong opponents ware also recognized on the consultation process. That gave a chance to negotiate and find a compromise. The risk has been recognized and we could undertake adequate measures to limit a negative impact of it.

Contact (the person who documented the case study)
Magdalena Karolak
References
https://s52-polnocnaobwodnicakrakowa.pl/

4.9 EXPRESS ROAD CRAIOVA – PITESTI (ROMANIA)

Acceptability	*	*	*
Bankability	*		
Governance	*	*	*

Preamble[16]

Romania is a member state of the European Union, located in south-eastern Central Europe, on the lower Danube River, north of the Balkan Peninsula and on the north-western shore of the Black Sea.

The population is 19.29 million (2020), with a total area of 238,397 km².

The car ownership rate is 386 cars per thousand inhabitants, one of the lowest in the EU.

At 31 December 2019 the total public road network was 86.391,00 km:

- 17.873,00 km (20,7%) national roads
- 35.083,00 km (40,6%) county roads
- 33.435,00 km (38,7%) local roads.

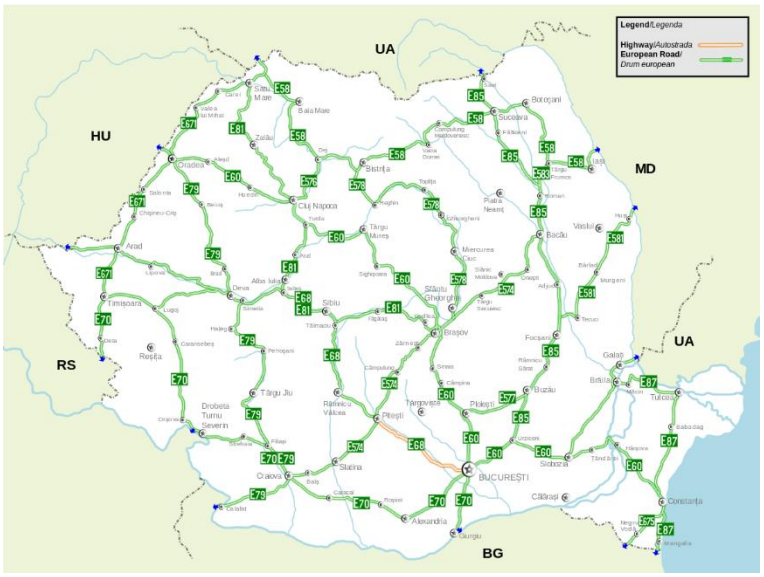
The national roads are:

- 6.176,00 km (34,6%) European roads
- 866,00 km (4,8%) motorways

Lanes number:

- 35,00 km (0,2%) 6 lanes
- 1.923,00 km (10,8%) 4 lanes
- 290,00 km (1,6%) 3 lanes
- 15.625,00 km (87,4%) 2 lanes

[16] This preamble applies to all three case studies from Romania (sections 4.9, 4.10, and 4.11)



The national network (National roads & motorways) is administrated by the Ministry of Transport through a state company called CNAIR.

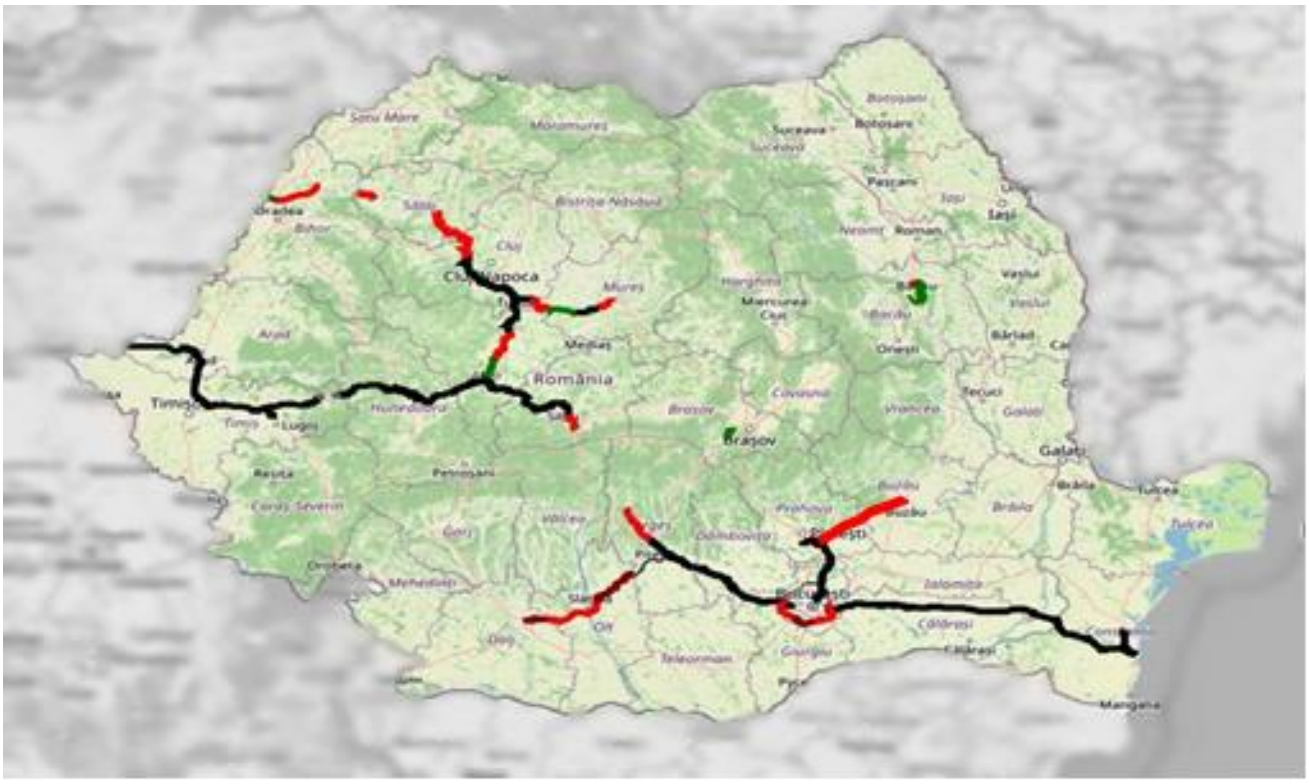
CNAIR has the main office in Bucharest, in the same building with the Ministry of Transport and has 7 regional departments and one research institute.

CNAIR is in charge with planning, design and maintenance of all national roads network

The 3 case studies are part of the National Transport Masterplan, approved in 2016.

All the Actual European roads are overloaded, with the average traffic of 17k to 25k vehicles.

The actual motorways, executed in the last 30 years, are presented below:



The future network shall look like that in 2030

Country: Romania

Implementation organization: CNAIR (National Company for Roads Infrastructure Administration)

CNAIR is a strategic national state company under the authority of the Ministry of Transport. CNAIR is in charge with the maintenance and development of the national roads and motorways network on safety traffic, fluency and continuity bases.

Cost: 1,034,207,741.06 USD without VAT

Subject

Express Road Craiova – Pitesti is located in the south – west region of Romania, crossing Dolj, Olt and Arges counties. DX12 is the first Express Road under construcution in Romania on the Pitesti - Slatina - Craiova alignement, with a total lenght of 121,18 km

Project description and summary

This road is ment to connect two motorways „South Motorway" (Bucuresti – Alexandria - **Craiova**) and A1 (Nadlac – Arad – Sibiu – **Pitesti**– Bucuresti - Constanta).

The total lenght of the alignment is 121 km, divided in four sections:

- Section 1: Craiova border of Olt/Dolj counties, km 0+000 – km 17+700, length 17,700 km;
- Section 2: border of Olt/Dolj counties - Valea Mare, km 17+700 – km 57+550, length 39,85 km;
- Section 3: Valea Mare – border of Olt/Arges counties, km 57+550 – km 89+300, length 31,75 km;
- Section 4: border of Olt/Arges counties - Pitesti (Catanele), km 89+300 – km 121+185, length 31,885 km.

Project consists in 4 lanes carriageway with central reserve, 75 bridges and passages, 26 interchanges, 4 short term parking areas, 4 service areas, 4 link roads with 8.85 km.

Project timeline

- Preparation of Feasibility Study: 2007-2008
- Preparation of detail design: December 2018 - September 2019
- Execution started: September 2019
- Execution works are in various stages for all lots.

Key results / accomplishments

The existing national road DN 65 is a 2 lanes national road on 92% of its length between Craiova and Pitesti and it is considered a congested road, with high shares of HGV's, as well as a dangerous one due to the large number of accidents that occur (nr. of fatalities is 5.8% above national average).

The average travel speed is below 60 km/h. Any accidents or maintenance works generate significant delays, which add up to the already long travel times.

Other routes between Pitesti and Craiova are either by national secondary roads DN67B- DN65C through Dragasani or by DN65A- DN6 through Rosiori de Vede and Caracal.

Both DN65 and the other routes cross numerous localities, thus generating air and noise pollution, and traffic safety problems. Moreover, the level of service (LoS) analysis carried out, considering the 2015 national traffic census AADT values, shows that the majority of the sections have LoS D to F, indicating the need of additional traffic capacity to accommodate the current and future traffic demand in conditions of safety and comfort, with improved travel speeds.

According to the 2020 updates traffic study, the forecast AADT for the express road sections vary between 12 120 and 22 615 vehicles for 2025, and between 15 550 and 27 300 vehicles for 2050.

For DN 65, the forecast AADT vary between 2 640 and 11 425 vehicles for 2025, and between 3 560 and 14 880 vehicles for 2050 for the "with-the-project" scenario. For the "without-the-project" scenario, they vary between 13 160 and 26 615 vehicles for 2025, and between 12 920 and 28 230 vehicles for 2050.

The scale of the intervention was determined at FS level based on Romanian design norms in force, which recommend express roads to be built for forecasted traffic volumes between 10.000 and 15.000 AADT.

The project aims to improve the performance of the national and TEN-T road network, covering the estimated increase of passenger and freight traffic. The immediate effects will be increased travel speeds and reduced travel time, increased user safety, decreased operating costs and pollution at all levels in the transit areas.

The results of the CBA update carried in 2020 showed the main social and economic indicators of the project:

- ENPV: 917,249.637 EUR
- EIRR: 11.24%
- Benefit-cost ratio: 2,27

Barriers / Obstacles

One of the main delays which occurred during the project development stages was related to the significant interval dedicated to the tender procedures, due to repeated litigations (July 2017 - December 2018). The procedure for two out of four lots had to be cancelled and retendered, while Lot 4 is still pending closure due to another set of litigations.

Another important issue was the time lapse between the Feasibility Study development (2007-2008) and the Design stage (2019-2020). As a result, some changes occurred on the project site, which led to minor modifications of the route.

Currently Lots 1, 2 and 3 are fully authorised and the project has significant progress (25% on lot 1 and 80% on lot 2).

Lessons learned

As a result of the previous experience Romania had during the evaluation process of the financing application for the Sibiu – Pitesti Motorway, the environmental aspects related to the Craiova – Pitesti Expressway have been approached in a similar manner, which led to a fluent evaluation process by the EC, and the project approval without any significant observations.

CNAIR started a tremendous process of preparation and/or revision of existing feasibility studies for the major road transport corridors.

During the preparation of the feasibility studies became obvious the need for a standardised approach among the various consultants in respect with different alternatives, social and economic impact assessment, field investigations, protection / relocation of existing services, environmental impact, expropriation procedures, preparation of tender documents for design and build contracts.

Based on the lessons learned, CNAIR prepared a comprehensive guideline for the preparation of the feasibility studies, which is now used as base document for the procurement and assessment of consultancy services.

In the view of the extensive load of execution contracts it becomes necessary an overall assessment of the demand in respect of materials and contractors / equipment availability in a defined period of time.

Preparation / review of standard technical specifications as well as quality control norms and procedures is on CNAIR immediate action steps.

Tender documents for design & build contracts must be very precise in respect with employer requirements, giving also space for contractors to provide modern and reliable solutions and method of works. CNAIR is imposing preparation of the design at the feasibility study in 3D models, as a first step in the transition to a proper BIM modelling,

Contact

Cristina Amarazeanu, Head of Department for European Funds Monitoring, cristina.amarazeanu@andnet.ro

References

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https://www.facebook.com/MNDroneShooting/

4.10 INEGRATED INFRASTRUCTURE FOR THE BUCHAREST METROPOLITAN AREA - LOT 1 BUCHAREST BYPASS MOTORWAY SOUTH SECTION (ROMANIA)

Acceptability	*	*	*
Bankability	*		
Governance	*	*	*

Please refer to the preamble in section 4.9.

Country: Romania

Implementation organization: CNAIR (National Company for Roads Infrastructure Administration)

CNAIR is a strategic national state company under the authority of the Ministry of Transport. CNAIR is in charge with the maintenance and development of the national roads and motorways network on safety traffic, fluency and continuity bases.

Cost: 1,034,816,998.81 USD without VAT

Subject

Main scope of this project is the achievement of the ring road connecting the 3 existing motorways and the European roads starting from Bucharest central area.

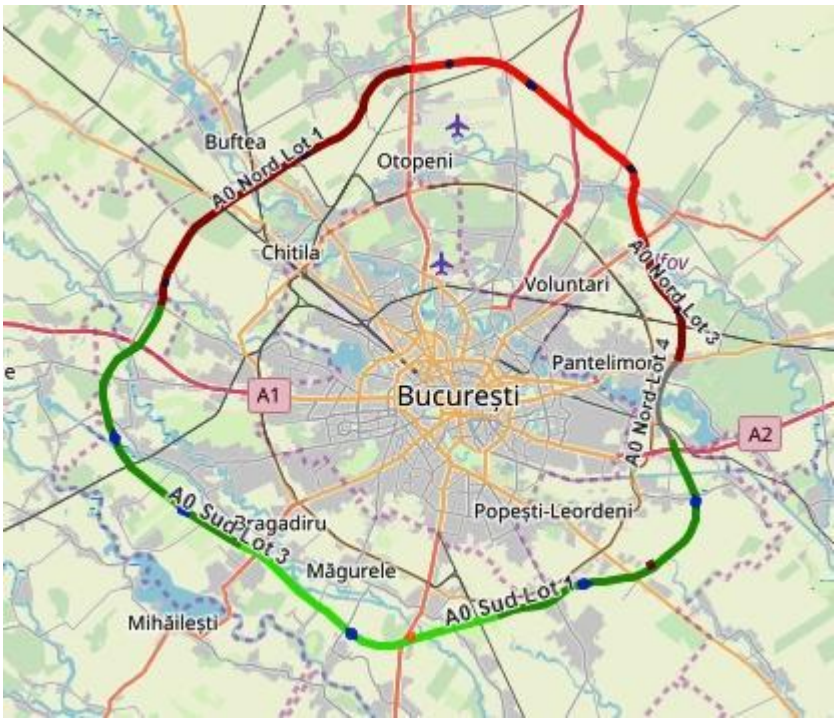
Project description and summary

This is a major motorway project, linking two motorways „South Motorway" (Bucuresti – Alexandria - **Craiova**), as well as A1 (Nadlac – Arad – Sibiu – **Pitesti**– Bucuresti) and A2 (Bucuresti - Constanta).

The project has 6 component sections, from the widening of existing roads to the execution of new bridges and passages and execution of a ring motorway for Bucharest.

Component no 1, subject of this case study, is the bypass motorway – South Section

Bucharest bypass motorway is a ring with total length of 100 km. It is crossing all the main roads starting from Bucharest DN1 (Otopeni), DN2 (between Voluntari and Afumați), DN3 (Pantelimon), DN4 (Popești-Leordeni), DN5 (Jilava), DN6 (Bragadiru) și DN7 (Chitila), motoerways A1 (Roșu), A2 (Cățelu) și A3 (Crețuleasca), secondary national road DN1A (Mogoșoaia and many other county and local roads).



Bucharest ring road South Section is divided in three lots:

- Lot 1, A2 - CF902 (Jilava), 16,3km
- Lot 2, CF902 (Jilava) - DN6, 17,0km.
- Lot 3, DN6 - A1, 17,5km

The project includes execution of 5 interchanges, 42 bridges and passages, 4 short term parking areas, 1 service area, one maintenance centre and one support maintenance center.

Project timeline

- Preparation of Feasibility Study: 2007-2008
- Preparation of detail design: April 2019 – August 2020
- Execution started: August 2020

All three lots have been awarded and are under construction. Estimated deadline is 2023. Major earthworks are in progress at the time of this report.

Key results / accomplishments

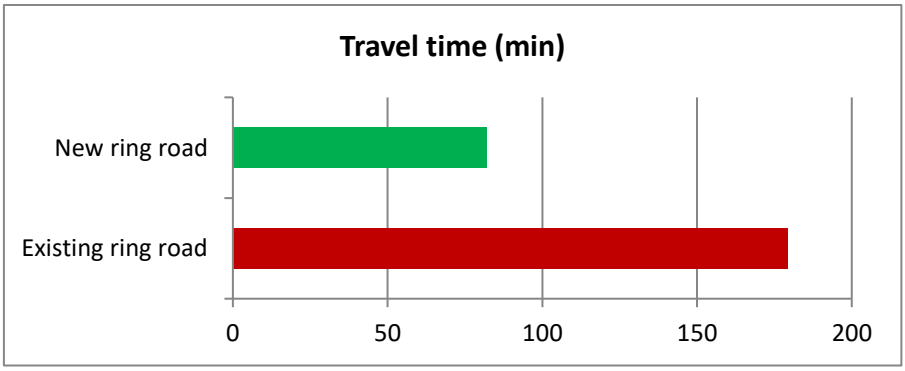
Due to urban development, the existing ring road serves both local and local traffic long distance, which led to exceeding the traffic capacity of the road. High volume traffic congestion leads to congestion with all negative effects (travel delays, air pollution, noise etc.).

- Within the "Strategic Study for the Ring Roads of Bucharest" the analysis of the capacity of the existing infrastructure indicated the following:
- - There are several sections on the current ring road of Bucharest, which currently operate at service level and there is therefore an urgent need to implement improvement measures in order to increase capacity.
- - The highest traffic volumes are on DN1, although it is estimated that with the expansion of A3 towards the city center, on DN1 there will be a decrease in traffic.
- - In terms of saturation, the other two - lane sections of the existing northern by-pass were substantially saturated. On the sections of the northern by-pass that have already been widened, reaching the current Reserve Capacity created is expected for the medium term horizon, so there is need for an increase in capacity for the medium-term time horizon.
- - The analysis of level interchanges, based on current traffic volumes, presents significantly inadequate situations, i.e. almost all intersections at the level operate at the level of Service F.
- - On the existing southern by-pass, all sections currently operate at the border level service. In terms of saturation, all sections of the southern by-pass currently operate at a saturation between 31% and 86%.

There are also numerous radial roads on the existing by-pass, especially the sections of inside Bucharest, which operates at service level F and which have high saturation rates.

The traffic and CBA analysis were carried for the integrated project, therefore the results are valid in the implementation of the scenario proposed in "Strategic Study for the Ring Roads of Bucharest".

Following the project implementation, the travel time on the TEN-T network is expected to decrease by approx. 54% (48 minutes).



The economic performance indicators for the integrated project are:

- Net prezent value (NPV) 2,224,965 thousand EURO
- Economic rate of return 12.05%
- Cost Benefit ratio 2,43

Barriers / Obstacles

One of the main challenges for this project was the preparation phase, in connection with the financing application process.

Initially, the components of the project were prepared separately, for each component being developed feasibility studies at different moments in time. The necessity of insuring a solid foundation for the EU financing application led to successive revisions and completions of the feasibility studies, in order to meet the requirements for eligibility under ESIF.

However, once it became obvious that an integrated approach is necessary for the entire area of Bucharest-Ilfov, a specific study was carried through the BEI-PASSA technical support programme, which was the basis for establishing the intensity of the intervention and which defined the infrastructure priorities.

Another challenge was the tender procedure for the three motorway sections. They were launched in July 2017 and, due to litigations, the design and build contracts were signed in March - August 2019.

During the detailed design stage came up the need for protective solutions for Lot 1 of the motorway in the area of the Catelu Military Base. The ballistic study carried in this respect supplied the technical options for this protection, consisting in steel panels to be installed in the motorway area. Considering the significant cost of this measure, the problem was taken further and solved at ministerial level, representing a positive example of inter-institutional collaboration when it comes to major projects.

Lessons learned

There are several aspects regarding the development of large infrastructure projects in Romania.

The delays in the development of a proper motorways network put a major pressure on the existing national roads network, all designed more than 50 years ago and unable to undertake the actual traffic values.

The need of a strategic plan regarding the transport infrastructure network has been materialised into the National Transport Masterplan, approved in 2016.

CNAIR started a tremendous process of preparation and/or revision of existing feasibility studies for the major road transport corridors.

During the preparation of the feasibility studies became obvious the need for a standardised approach among the various consultants in respect with different alternatives, social and economic impact assessment, field investigations, protection / relocation of existing services, environmental impact, expropriation procedures, preparation of tender documents for design and build contracts.

Based on the lessons learned, CNAIR prepared a comprehensive guideline for the preparation of the feasibility studies, which is now used as base document for the procurement and assessment of consultancy services.

In the view of the extensive load of execution contracts it becomes necessary an overall assessment of the demand in respect of materials and contractors / equipment availability in a defined period of time. Preparation / review of standard technical specifications as well as quality control norms and procedures is on CNAIR immediate action steps.

Tender documents for design & build contracts must be very precise in respect with employer requirements, giving also space for contractors to provide modern and reliable solutions and method of works. CNAIR is imposing preparation of the design at the feasibility study in 3D models, as a first step in the transition to a proper BIM modelling

Contact

Cristina Amarazeanu, Head of Department for European Funds Monitoring, cristina.amarazeanu@andnet.ro

References

http://www.cnadnr.ro/ro/proiecte/autostrada-de-centura-bucuresti-sector-sud-lotul-1

https://www.youtube.com/channel/UCDkWW-33f7EJC2I7Qf3UfEQ

4.11 A7 Motorway, section Ploiesti – Buzau (ROMANIA)

Acceptability	*	*	*
Bankability	*		
Governance	*	*	*

Please refer to the preamble in section 4.9.

Country: Romania

Implementation organization: CNAIR (National Company for Roads Infrastructure Administration). CNAIR is a strategic national state company under the authority of the Ministry of Transport. CNAIR is in charge with the maintenance and development of the national roads and motorways network on safety traffic, fluency, and continuity bases.

Cost: 1,140,369,336.11 USD without VAT

Subject

A7 Motorway is a planned motorway to connect A3 (Ploiesti) to A8 (Pascani) with a total length of approximately 314 km.

Project description and summary

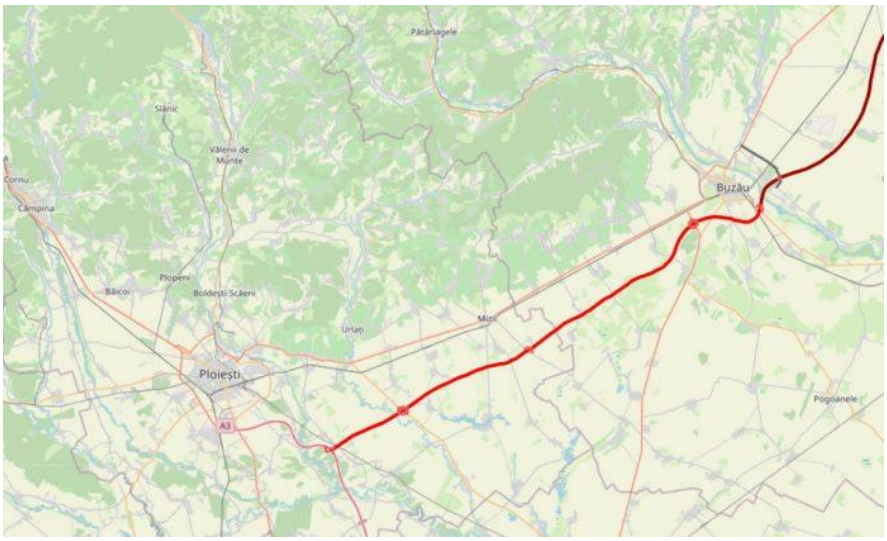
Alignment of Ploiesti – Buzau Motorway will connect A3 Bucharest – Ploiesti – Brasov motorway with Targu Mures – Iasi Ungheni Motorway, passing through the east region of Romania from south to north.

The first section will cross two counties, Ploiesti and Buzau

Total length of this section is 63,25 km, divided in 3 lots:

- Lot 1 – Dumbrava (Autostrada Bucuresti - Ploiesti) to Mizil (DJ 100C)
- Lot 2- Mizil (DJ 100C) – Pietroasele (DJ 203G)
- Lot 3 – Pietroasele (DJ 203G) – Municipiul Buzau (DN 2B)

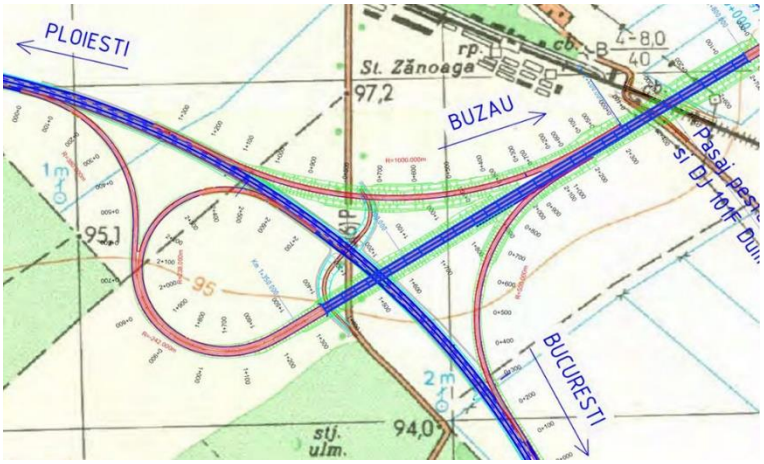
The project includes construction of 42 bridges and passages, 6 interchanges, 4 service areas and 3 maintenance centres.



Project timeline

- Preparation of Feasibility Study - Trim. IV, 2020 (approval SF: Trim I, 2021)
- Preparation of detail design: Trim. IV, 2021
- Foreseen start of execution: Trim. II, 2022

The project is in the process to obtain the building permit.



Key results / accomplishments

In the existing network in the area of influence of the Ploiesti - Buzau project, the average speed registered on DN1B, between Ploiesti - Buzau is about 71 km / h. The connection between the two TEN-T poles (Ploiesti and Buzau) is made through the European National Road DN1B, with 1x1 profile.

The main conclusions resulting from the critical analysis of the existing network are:

- The Ploiesti - Buzau motorway sector is part of the Moldova - Transylvania Intercorridor which provides the connection between the OR1, OR2 and OR3 corridors and connects Moldova with the center of the country and Europe;
- The road sectors related to the project, operate in the existing situation at service level D, close to capacity, due to the increased demand registered especially for the freight and passengers transport. The road is expected to exceed its capacity by 2030, with an estimated service level E on most sections.
- The large number of accidents registered on the national road DN 2 in the studied area, accidents, which due in large part to the road profile (1x1), and excessive speed;

- High share of heavy vehicles, apx 26%;
- Travel times with long delays (average speed recorded is approx 71km / h), which does not correspond to the minimum standards of a TEN-T network section.

The final alignment of the project was the result of a multicriterial analysis that was carried in 2 steps. Three main alignments, as well as four sub-alignments were analysed in the first stage for every sector of the road. The resulted alignment was taken into the second stage MCA, where two road profiles were analysed: expressway and motorway. The analysis showed that the motorway profile is the preferred one, both in terms of attracted traffic, as well as considering the technical difficulties if a subsequent decision to upgrade to motorway profile is made in the future.

After the project is implemented, it is estimated that a significant traffic share will be diverted to the new motorway.

The economic performance indicators for the integrated project are presented below:

- ENPV: 690 580 EUR
- EIRR: 17,6%
- Benefit-cost ratio: 1,38

Barriers / Obstacles

The main delays which occurred for the design contract were related to the significant interval dedicated to the tender procedure due to repeated litigations (November 2016 - September 2018), resulting in the poor mobilisation of the contractor at the beginning of the contract. The contract duration was extended from 24 to 32 months.

Lessons learned

The project benefitted from BEI-JASPERS assistance during its development and was closely monitored in all its stages, which resulted in a solid documentation, which will be the basis for the financing application process, as well as project implementation.

Proper tender documents and proper project management will reduce the risk of claims.

Based on the lessons learned, CNAIR prepared a comprehensive guideline for the preparation of the feasibility studies, which is now used as base document for the procurement and assessment of consultancy services.

In the view of the extensive load of execution contracts it becomes necessary an overall assessment of the demand in respect of materials and contractors / equipment availability in a defined period of time.

Preparation / review of standard technical specifications as well as quality control norms and procedures is on CNAIR immediate action steps.

Tender documents for design & build contracts must be very precise in respect with employer requirements, giving also space for contractors to provide modern and reliable solutions and method

of works. CNAIR is imposing preparation of the design at the feasibility study in 3D models, as a first step in the transition to a proper BIM modelling

Contact

Cristina Amarazeanu, Head of Department for European Funds Monitoring, cristina.amarazeanu@andnet.ro

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https://www.g4media.ro/

https://www.economica.net/

4.12 North Access to Algeciras Port (SPAIN)

Acceptability	*	*	*
Bankability	*		
Governance			

Country: Spain

Implementation organization

Ministry of Transport, Mobility and Urban Agenda

Subject

Procedure of improvement of road safety conditions at the design phase

Project description and summary

Traffic accidents cause suffering and pain, loss of economic productivity, sanitary expenses and costs due to material damages and legal compensations. The "Directive 2008/96/EC of the European Parliament and of the Council of 19 November 2008 on road infrastructure safety management", recently amended by " Directive (EU) 2019/1936, of 23 October 2019", has as main objective the improvement of road safety on roads.

In Spain, the implementation of Directive 2008/96/CE has meant the incorporation of the so-called "Road Safety Audits" (RSA hereinafter) along the drafting phase of road projects. The RSAs are a detailed, systematic and independent assessment (carried out by duly accredited and trained experts) of the level of safety of a road features applied to the different phases covering the entire life of the project (since the concept design and feasibility analysis to the commissioning). Passing through several RSAs procedures (corresponding to the different degrees of progress of the project) prior to its approval and subsequent construction is considered essential for the success of the future infrastructure.

RSAs seek to identify in advance the potential problems affecting the road safety (critical elements and deficiencies or omissions that may compromise safety), in order to adopt measures to eliminate or alleviate these issues. Each time a project pass through a RSA, the following steps are followed:

- Delivery of the Project documentation to the auditors. The auditors shall not be part of the design team to ensure the total objectivity of the assessment.
- Kick-off meeting between the auditors, consultants and representatives of the General Directorate of Highways (Ministry of Transport, Mobility and Urban Agenda).
- Visit to the project location by the auditors.
- Delivery of the RSA report. The report aims to identify potential troubles for all the road users. Likewise, it evaluates how the projected infrastructure will interact with its surroundings and

with the adjacent road, especially with those connecting with the design stretch, as well as any element that could be problematic from the point of view of safety.

- Implementation of those modifications considered feasible to remove or alleviate the problems identified in the RSA report, taking into account technical and economic conditions.
- Delivery of a final report by the consultant detailing the technical aspects of the measures adopted based on what was specified in the corresponding RSA report.

A clear example of the application of the RSA procedure described in the previous lines would be the project called "Connection of the A-7 with the North Access to the Algeciras Port". This project consists of the construction of a one-way underpass equipped with two lanes that provides solution to the intersection between an existing roundabout and the mentioned road. The new underpass connects the exit movement of the Port of Algeciras (the largest port in Spain, with more than 100 million tons and 5 millions of TEUs in 2019, and the largest port in the Mediterranean Sea) with the A-7 motorway.

In the documentation submitted to the auditors, it could be seen that the design initially solved the connection between the new underpass and the A-7 Highway with the inclusion of a transition from the two lanes of the underpass to a single lane and, subsequently, the usage of a weaving section for the junction.

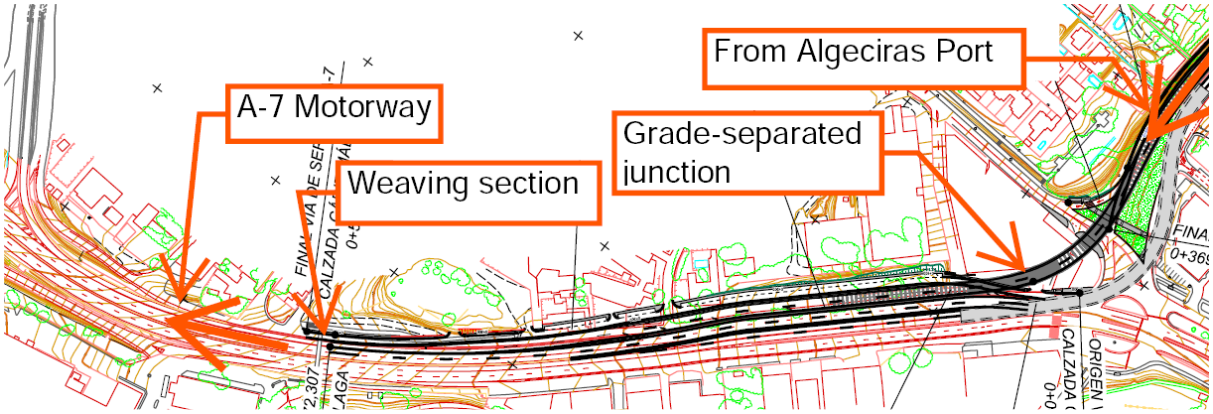


Figure 1. Plan view of the solution initially proposed.

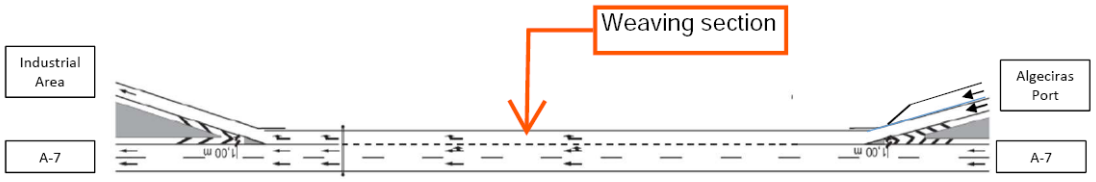


Figure 2. Scheme of the weaving stretch

Due to the peri-urban environment of the project location, the space available for the weaving section was quite limited. The RSA report revealed the following:

- The project included the placement of restraint systems wider than the space available for them between the weaving section and the service road that was planned next to it.

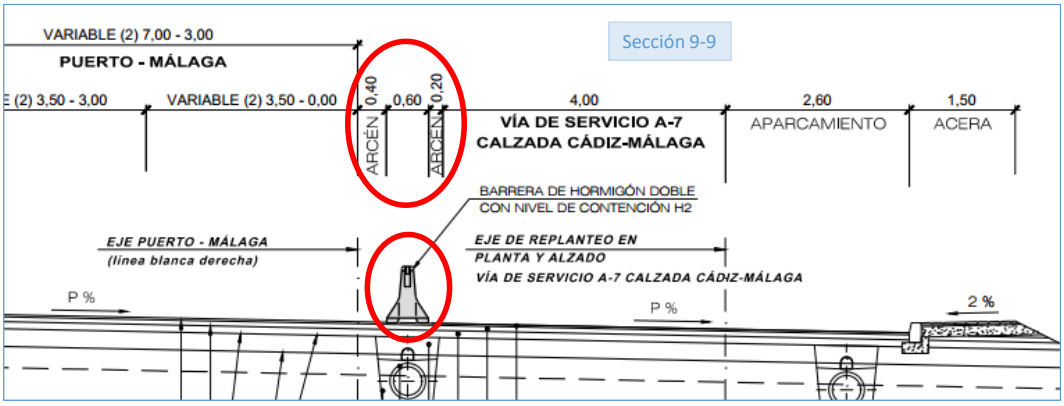


Figure 3. Restraint system next to the weaving section

- The weaving lane width (3 m) was very limited, causing a feeling of unsafety in the users who would entry and exit the motorway A7, thus increasing the probability and severity of accidents by frontal-lateral collision and by rear-end-shock.

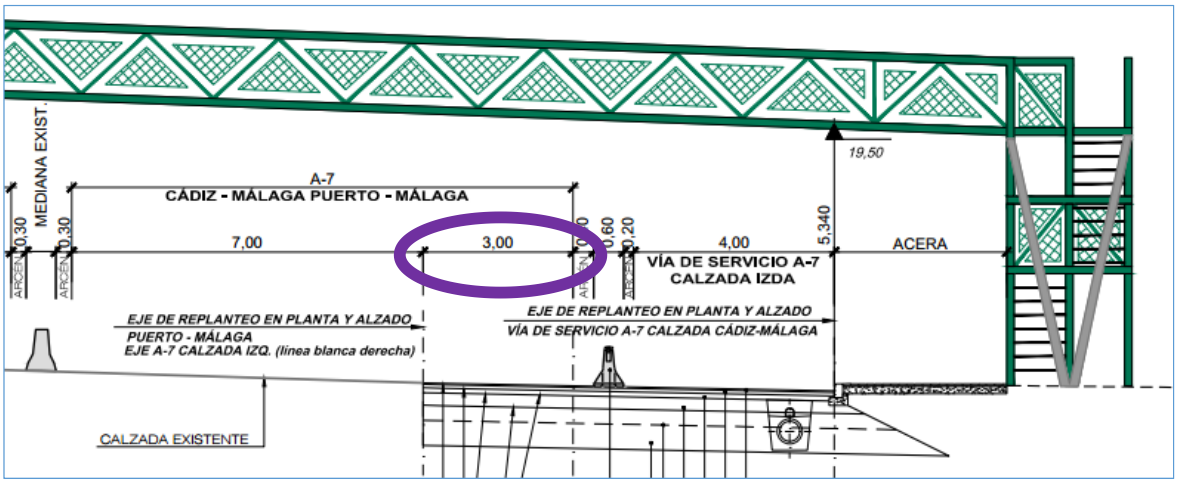


Figure 4. Width of the weaving section

- Limited weaving section length. Although the level of service reached out according to HCM2020 may be acceptable, a limited weaving section length increases the risk of frontal-lateral collision and by rear-end-shock. Specifically, the latter is increased by positioning the weaving section after the underpass, in which the available visibility is reduced due to the small radius of the curve that defines its geometry. This situation is aggravated taking into account the high number of trucks coming from the Algeciras Port.

In short, from a road safety perspective, the solution initially envisaged carried unacceptable hazards and increased their severity due to an inadequate performance of the restraint systems.

Once the RSA report was analyzed, then the consultant studied other road schemes that would mitigate the abovementioned hazards. With this purpose, the plan view and the elevation of the road were modified accordingly to eliminate the weaving section and to define a confluence between roads, as illustrated in Figure 5. On the other hand, the new scheme requires less space, freeing up enough area to ensure the proper work of restraint systems.

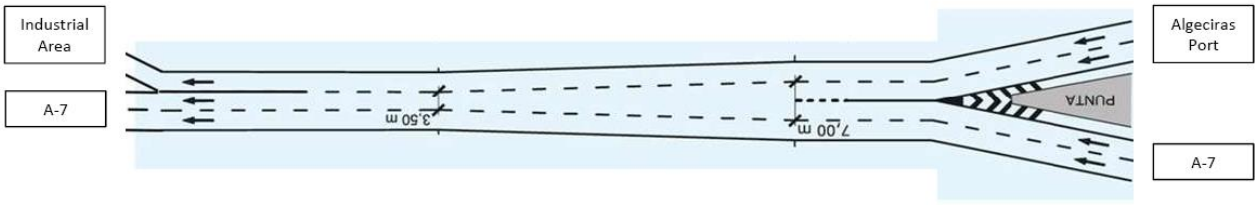


Figure 5. Final Scheme after the RSA

Key results / Accomplishments

The proposed scheme complies with the Spanish road codes and standards and, at the same time, aimed at optimizing road safety. With the new design, the probability and severity of accidents by frontal-lateral collision and rear-end-schock is reduced.

RSAs are part of the effort being made by the Minsitry of Transport, Mobility and Urban Agenda of Spain to improve safety on its roads. To achieve this goal, energies are being concentrated in early phases of the projects, where the incidence is greater and the overcharge is lower. Therefore, road safety has been appointed as one of the key design criteria during the drafting of a road project. This decision, together with other measures adopted by the mentioned ministry, has resulted in a significant improvement on accident rates on the State Road Network.

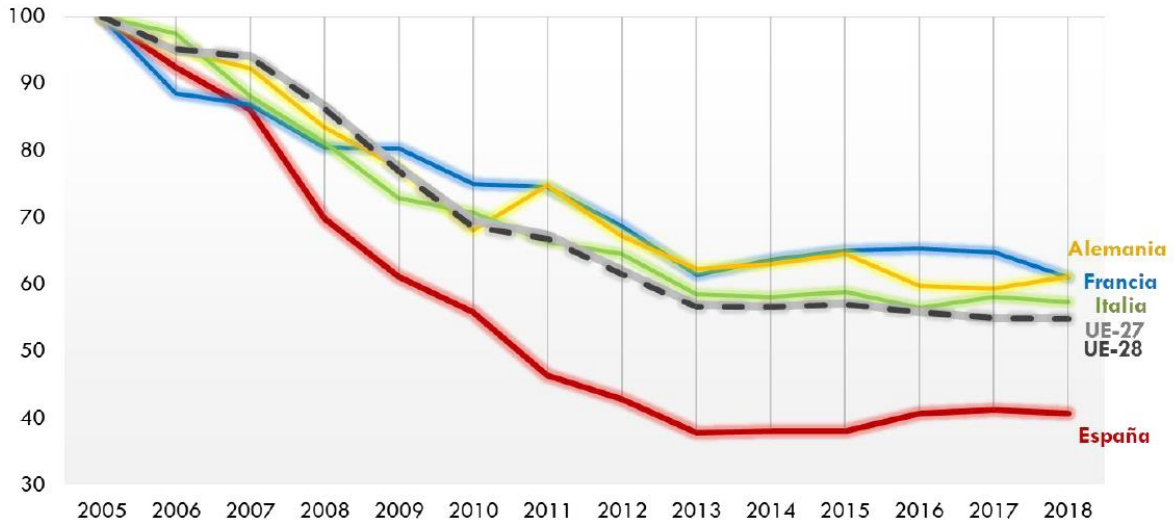


Figure 6. Evolution of the number of fatalities in EU-27, EU-28, Spain, France, Germany and Italy. 2005-2018. (Index 2005 = 100)

Source: Observatory of Transport and Logistics in Spain 2020 with data from the European Commission (EU Transport in figures)

Policies

The RSA procedure is mandatory on the roads that are part of both the Trans-European Road Network and the Spanish State Road Network.

Barriers / Obstacles

The implementation of a RSA procedure, such as the one described, presents the following obstacles:

- The completion of the RSA increases the time required to complete the Project phase.
- It is necessary to implement a regulated system for the training of auditors.
- Recommendations derived from RSAs are sometimes difficult to carry out for technical or financial reasons.

Lessons Learned

The drafting of a road project that takes into account road safety criteria has a positive impact on the following aspects:

- Acceptance: given the increase in social demand for roads to be increasingly safe.
- Bankability: in a PPP financing scheme, safe roads reduce need of contingencies to cover potential legal expenses, damages and losses.

Costs (in USD, if possible)

Contact

Miguel González Fabre (mgonzalezf@mitma.es)

References

1. Real Decreto 345/2011, de 11 de marzo, sobre gestión de la seguridad de las infraestructuras viarias en la Red de Carreteras del Estado (Royal Decree 345/2011, March 11, on road infrastructure safety management on the State Road Network).

   https://www.boe.es/boe/dias/2011/03/12/pdfs/BOE-A-2011-4555.pdf

2. Orden Circular 30/2012 por la que se aprueban las directrices de los procedimientos para la gestión de la seguridad de las infraestructuras viarias en la Red de Carreteras del Estado (Circular Order 30/2012 approving the guidelines for the procedures for managing the safety of road infrastructures in the State Road Network).

   https://www.mitma.gob.es/recursos_mfom/oc302012.pdf

4.13 REMODELATION OF THE CONNECTION OF THE AUTOVÍA DEL SUR (A-4) WITH THE SE-20 (SEVILLE) (SPAIN)

Acceptability	*	*	
Bankability	*		
Governance	*	*	*

Country: Spain

Implementation organization: Ministry of Transport, Mobility and Urban Agenda

Subject

Procedure to prevent and reduce the adverse impacts of waste generation and management in road projects.

Project description and summary

Construction of large transport infrastructures is one of the main focus of waste generation. The environmental problem posed by waste generation derives not only from its increasing volume, but from their post-treatment, which is still unsatisfactory. Among the environmental impacts produced, it is worth to highligh the contamination of soils and aquifers under uncontrolled landfills, the deterioration of the landscape and the removal of these wastes without taking advantage of their valuable resources. This serious situation must be corrected in order to achieve a more sustainable construction activity.

The European Union enacted Directive 2008/98/EC on waste (recently updated in 2018) which establishes measures aimed at protecting the environment and human health by preventing or reducing the adverse impacts of waste generation and management.

In Spain, the management of Construction and Demolition Waste (hereinafter CDW) is regulated through "Royal Decree 105/2008, of February 1st, which controls the generation and management of construction and demolition waste", and whose purpose is to promote their prevention, re-use, recycling, recovery and proper treatment of those destined for disposal. Among other aspects, it founds the obligation to the “waste producer” (who decides to build) to include as part of the project a study (CDW Analysis) related to the management of construction and demolition waste, which shall contain, at least:

- Identification and estimation of the quantities of CDW to be generated.
- Measures to prevent the generation of CDW.
- CDW re-use, recovery or disposal operations.
- Measures for the isolation and selective collection of CDW.
- Drawings of the facilities planned for the storage, handling, isolation or other CDW management operations.

- Contractual prescriptions for the storage, handling, separation or other CDW management operations.
- Estimate of the expected cost for the correct management of the CDW, which will be part of the project budget.

To illustrate the way this methodology is applied, the project case named "Remodelation of the connection of the Autovía del Sur (A-4) with the SE-20 (Seville)" is shown as an example.

The promoter of this project was the Ministry of Transport, Mobility and Urban Agenda (Spain) and its location can be followed in Figure 1. The Plan view of the action is illustrated in Figure 2. The objective was the improvement of the connection between two very important roads in the peri-urban area of Seville:

- A-4 Motorway, which connects the city of Seville with Madrid.
- SE-20, which constitutes one of the ring roads of Seville.

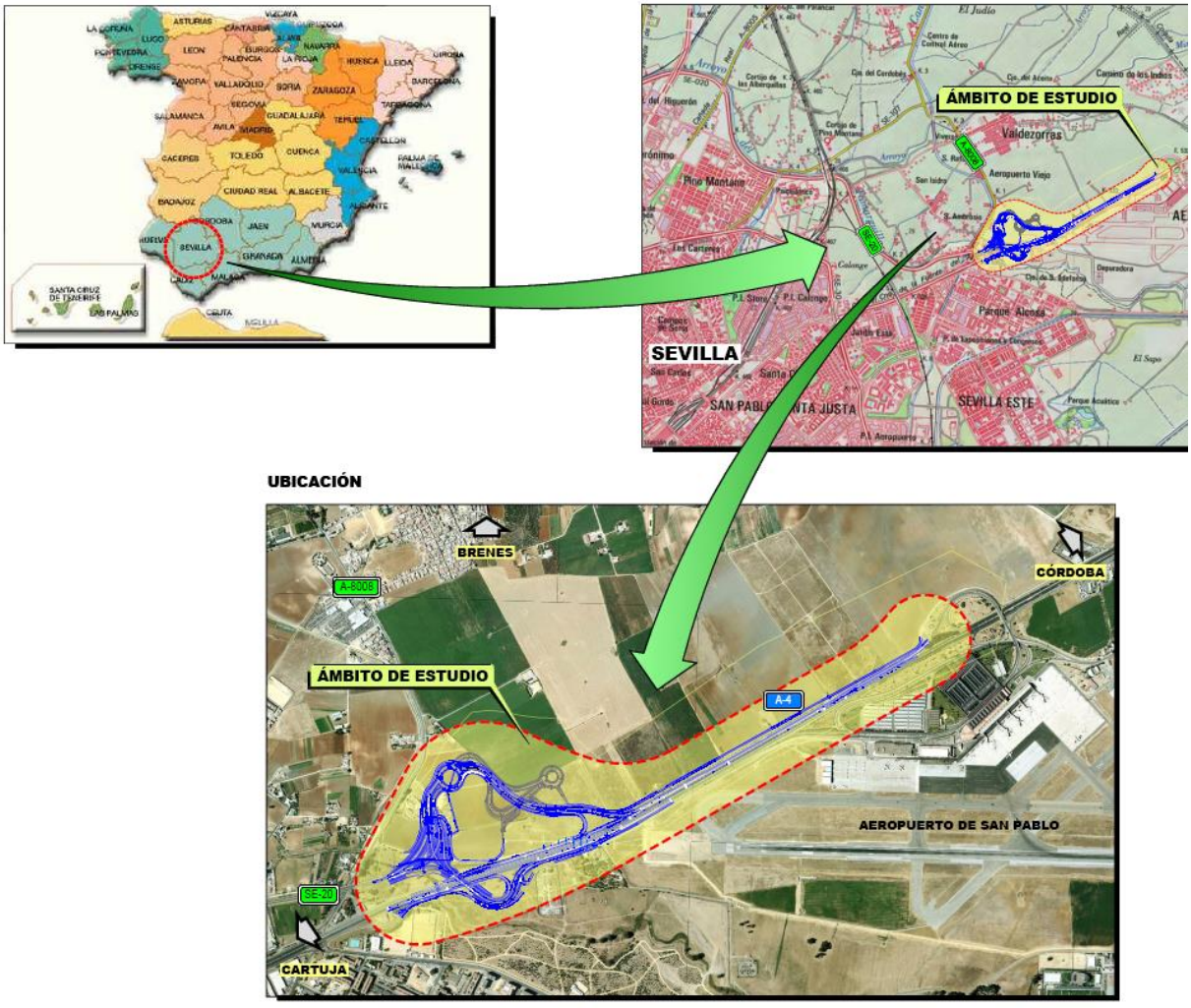


Figure 1. Project location

Figure 2. Project Overview

The methodology to complete a typical CDW Analysis consists of the following steps:

1. Calculation of the volume and weight of the different generated wastes in accordance with the European List of Waste (ELW).

   In the mentioned example, waste from demolition and construction were differentiated as shown in Table 1 and 2, respectively.

ELW CODE	DESCRIPTION	REAL VOLUME (m^3)	APPARENT VOL. (m^3)	WEIGHT (t)
17 01. CONCRETE, BRICKS, TILES AND CERAMIC MATERIALS				
17 01 01	Concrete	191,56	326,36	440,59
17 03. BITUMINOUS MIXTURES				
17 03 02	Bituminous mixtures	8.739,49	16.134,43	20.974,76
17 04. METALS				
17 04 05	Iron and Steel	24,33	43,12	189,74

17 06 INSULATION MATERIALS AND BUILDING MATERIALS CONTAINING ASBESTOS				
17 06 05*	Asbestos building materials	9,32	11,02	12,12

Table 1. Waste from demolition

ELW CODE	DESCRIPTION	REAL VOLUME (m^3)	APPARENT VOL. (m^3)	WEIGHT (t)
15 01. PACKAGING				
15 01 01	Paper and cardboard packaging	2,46	17,73	7,96
15 01 02	Plastic packaging	4,92	35,45	15,93
15 01 03	Wooden packaging	41,82	301,37	74,66
15 01 04	Metal containers	0,02	0,18	1,00
15 01 10*	Contaminated packaging	34,70	34,70	2,60
17 01. CONCRETE, BRICKS, TILES AND CERAMIC MATERIALS				
17 01 01	Concrete	490,21	805,34	1.127,47
17 01 02	Bricks	0,63	0,72	1,01
17 02. WOOD, GLASS AND PLASTIC				
17 02 01	Wood	11,38	22,77	6,83
17 02 03	Plastic	3,97	29,13	4,37
17 03. BITUMINOUS MIXTURES				
17 03 02	Bituminous mixtures	104,92	167,87	251,80
17 04. METALS				
17 04 05	Iron and Steel	3,91	16,96	30,54
17 05 EARTH (INCLUDING EXCAVATION OF POLLUTED AREAS), STONES AND DRAINAGE SLUDGE.				
17 05 04	Land and stones	20.059,66	23.599,60	40.119,32
17 05 04	Land and stones (landfill)	31.956,81	38.804,70	54.326,577
17 05 03*	Soils and stones containing dangerous substances	291,29	353,71	495,19
20 02 PARKS AND GARDENS WASTE				
20 02 01	Biodegradable waste	1.521,49	2.535,81	760,74

Table 2. Waste from Construction

The origin of CDWs in construction works basically are the following:

- Surplus construction materials (concrete, bricks, wood, plastics, bituminous mixtures, iron and steel).
- Containers and packaging of products and materials (wood, paper-cardboard, plastic and metal). A portion of the packaging waste contained traces of dangerous substances or was contaminated (paints, adhesives and concrete release agents).
- Surplus excavation and biodegradable from clearing.

The construction waste quantities, mainly constituted by surplus construction materials and the usage of containers and packaging, are normally derived from the quantities of materials used, what are previously measured and economically valued in the project budget.

2. Measures aiming to prevent and minimize the generation of waste in the project shall be described in the CDW Analysis. These measures should be specified by the contractor along the execution phase of the work in the CDW Management Plan. The Management Plan specified how the CDW Analysis would be applied, as well as how to cover its cost and provide to the appropriate documentation proving the correct management of such waste.
3. Likewise, measures for the separation and selective collection of CDW shall be detailed. The latter should be also specified by the contractor in the CDW Management Plan.

   In the present case of study, the items listed below were proposed:

   - The collection of waste separately by materials, according to the ELW.
   - The designation of a main waste storage area with containers (Clean Point) within the site.
   - The designation of temporary areas with smaller containers close to the site.
   - The designation of collection areas for high volume waste such as excavation waste (earthworks) and demolition waste (bituminous mixtures and concrete).
   - The design of an on-site collection plan for differentiated waste that included material and human resources for its implementation.
   - Awareness and training in waste separation and management for all personnel, including subcontractors.
   - The installation of panels informing about the isolation and selective waste and collection areas.
   -
4. Measures aimed at the re-use of products or components of products that are not considered waste and are used again for the same purpose for which they were conceived shall be also detailed, as presented in Table 3.

In the current case, products or components of products re-use were proposed resulting from the disassembly of signals, lighting columns, telephone lines, powerlines during the execution of the work.

ELW CODE	DESCRIPTION	QUANTITY	Ud
701.N503	LIFTING OF SIGNALS AND ARROWS	78	ud
301.N101	GALVANIZED STEEL PORTIC DISASSEMBLY INCLUDING FOUNDATION	122,7	m
701.N406	DISASSEMBLY AND REMOVAL IN PLACE OF STORAGE OF PORTIC AND PMV	1	ud
701.N504	REMOVING THE SIDE POSTER	4	ud
965.N001	REMOVAL OF THE UNDERGROUND POWERLINE.	250	m
965.N002	DISASSEMBLY AND REMOVAL OF EXISTING LIGHTING COLUMN	32	ud
965.N003	DISASSEMBLY AND REMOVAL OF IRRIGATION WATER LIFTING GROUP	1	ud
965.N004	REMOVAL PHONE COMMUNICATION LINE	1.250,00	ud
965.N005	REMOVAL AND REMOVAL OF ELECTRICAL LINES	1.100,00	m

Table 3. Reuse measures

5. Waste recovery operations identified in the project shall be specified, too.

   Waste recovery covers any operation whose main outcome is waste to serve to an useful purpose by substituting other materials, which otherwise would have been used to fulfill a particular function. Waste recovery are carried out only by authorized managers, who has to be enrolled in the Register of companies for the collection, transport and storage of non-hazardous waste (RNP).

   For the project under analysis, the following valuation measures were proposed:

   - Use of inert waste in the restoration of environmentally degraded spaces that existed close to the project location.
   - Filling of some areas of the site in order to improve the terrain, visual integration, drainage, etc.

6. Waste elimination operations to be also included.
   In the case of this project, it was appraised the need of allocating the fibre cement waste with asbestos to waste elimination operation. This operation can be only carried out by authorized managers, as for the waste recovery operations.
7. The planned place to carry out the operations described above is indicated on drawings, as shown in Figure 3.
8. An economic valuation of the cost of managing the CDW shall be included, which will be part of the project budget .
   The economic valuation of this project included:
   - The collection of waste: an operation consisting of the collection of waste, including the initial classification and storage for its transport to a treatment facility.

- Pre-treatment: physical, thermal, chemical or biological process, including classification, which changes the characteristics of construction and demolition waste, reducing its volume or danger, facilitating its handling.
- Temporary waste storage on site.
- Transportation, from the place of generation on site to the recovery or disposal facilities.
- Surveillance and control of these operations.

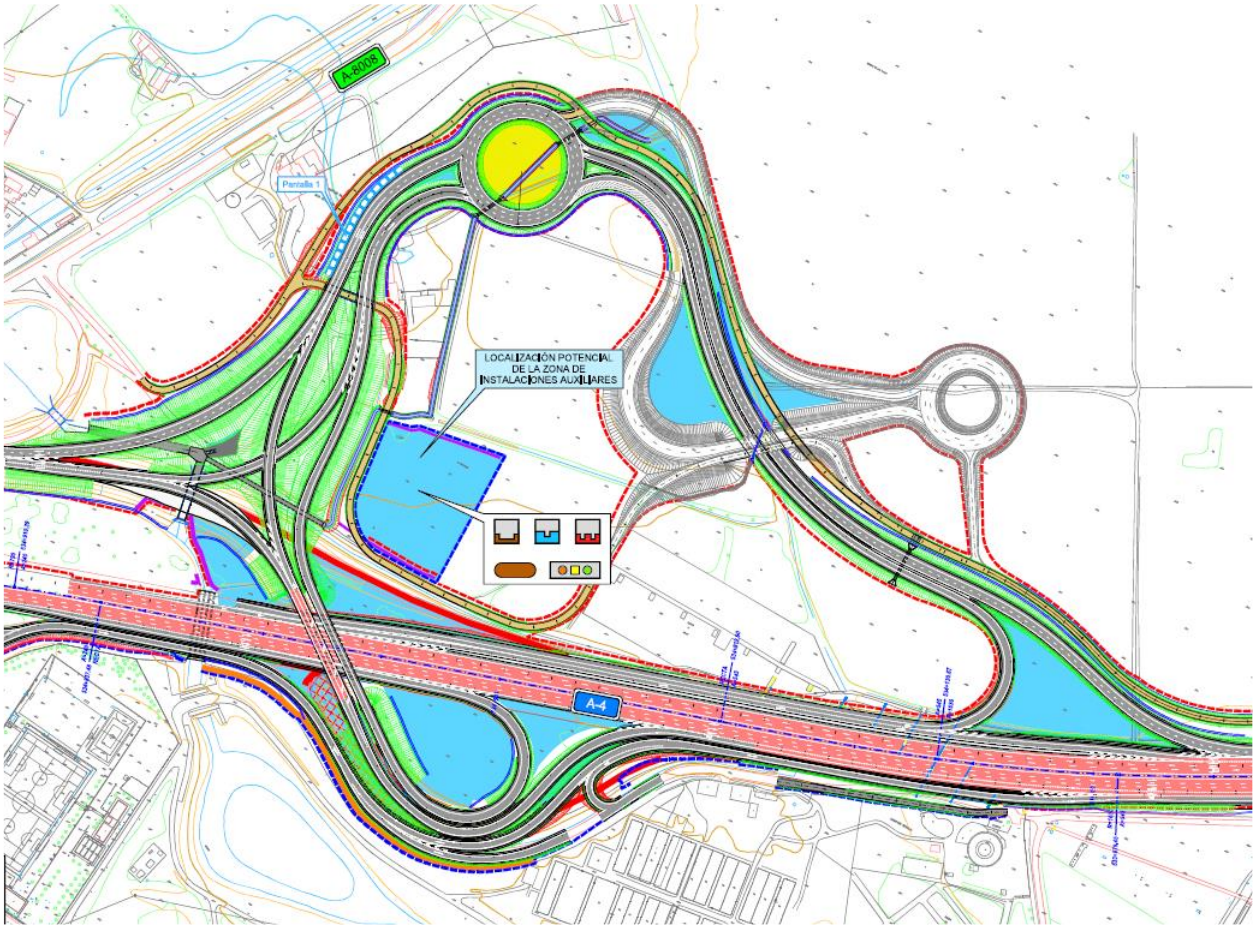


Figure 3. Identification of the place where the CDW management will be carried out

The CDW Analysis budget was as follows:

ASSESSMENT OF THE COST OF RCD MANAGEMENT	
Unit	**Cost (€)**
CLASSIFICATION AND SELECTIVE COLLECTION	11.837,03
NON-STONE RNP MANAGEMENT	7.293,02
RNP STONE MANAGEMENT	85.396,29
DANGEROUS WASTE MANAGEMENT	3.978,82
LAND MANAGEMENT	95.885,17
UNCONTROLLED LANDFILL WASTE MANAGEMENT	287.930,87
MANAGEMENT OF POLLUTED LAND	26.245,07
ADMISSION TESTS IN LANDFILL	20.670,00
TOTAL	**539.236,27**

Table 4. Economic valuation of the management of CDW

The waste management study typically continues along the work execution. Before the start of the works, the contractor is obliged to present to the Ministry of Transport, Mobility and Urban Agenda the Management Plan for CDW. The Plan shall specify in detail how its obligations will be carried out in relation to the CDW, as well as the guidelines and measures considered in the project's CDW Analysis. This Plan will become part of the contractual documents of the work.

Key results / Accomplishments

The inclusion of a CDW Analysis in the described project has made possible to identify and classify the waste that would be generated, to define the type of operation to which each waste would be subjected (prevention, re-use, recycling, etc.), to identify the land needs that were required to carry out these operations, and to include in the budget an economic valuation that ensured the financial feasibility of the defined operations.

Policies

Barriers / Obstacles

All road projects in Spain includes a CDW Analysis as a mandatory requirement. However, its effectiveness must overcome the following obstacles:

- The volumes and types of waste included in the CDW Analysis are merely estimates, so significant deviations may occur along the execution of the work.
- Some of the operations foreseen in the CDW Analysis are carried out only by authorized managers. Depending on the geographical location of the section of road under execution, accessibility can imply a significant increase of cost.

Lessons Learned

A road project that includes a CDW Analysis has a positive impact on the following aspects:

- Acceptance: given the increase in social demands regarding care for the environment, and demands from external stakeholders regarding the environmental integration of a road.
- Governace (ethics, transparency): as the volume and type of waste that will be generated and the treatment to which it will be subjected are known since the project phase by the community where the work located.
- Bankability: in a PPP financing scheme, the cost associated with waste management is identified since the project phase, reducing the amount of economic contingencies required to cover this concept.

Costs (in USD, if possible)

Contact

Miguel González Fabre (mgonzalezf@mitma.es)

References

3. DIRECTIVE 2008/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 November 2008 on waste and repealing certain Directives.
https://eur-lex.europa.eu/legal-content/ES/TXT/?uri=celex%3A32008L0098
4. Royal Decree 105/2008, of February 1, which regulates the production and management of construction and demolition waste.
https://www.boe.es/buscar/pdf/2008/BOE-A-2008-2486-consolidado.pdf

4.14 TWO CASE STUDIES ON PROCUREMENT – CASE #1 E20 PROGRAM WEST (SWEDEN)

Acceptability	*	*	
Bankability	*		
Governance	*	*	*

Preamble to the two case studies on procurement from Sweden[17]

Description of how the Swedish Transport Administration works with procurement

The Swedish Transport Administration is an authority and according to law must always strive to procure goods, services and contracts in competition. The laws are mainly based on directives from the EU. The directives are an important part of the work to promote the free movement of goods and services within the EU.

Public procurement exists to take advantage of a number of societal interests:

- promote cost-effective use of tax funds, promote free movement within the EU, eliminate anti-competitive practices, facilitate companies doing business with the public sector, ensure that the company that sells the goods, services or contracts in demand on the most favourable terms wins.

Five basic principles that permeate all procurement legislation:

-not-discrimination, equal treatment, proportionality, openness, mutual recognition.

The Swedish Transport Administration's purchasing policy

This policy must be applied to all purchasing work. Create value for citizens and businesses. Promote market development that leads to increased productivity, innovation and efficiency. Used as a strategic tool to drive development towards the Swedish Transport Administration's operational goals and to adapt to the society of the future.

The Swedish Transport Administration's ordering strategy / business model

Strong focus on the business in everything for the entire Swedish Transport Administration and each business' goal management regarding efficiency, productivity and innovation.

Plan and complete purchases

- Support procurement strategically
- Developed strategies
- Business Strategy 3.0
- System Support - Kommers

[17] This preamble applies to the two case studies from Romania (sections 4.14 and 4.15)

Analyze and plan procurement

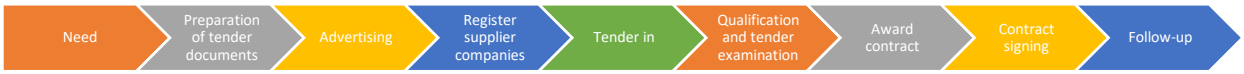
1. Complexity assessment
2. Strategy

a. Consultation - Choice of business form (motive appendix) - before a decision on advertising

3. Choice of business form

Using Project specification, Calculation, Risks, Control program, Master plan - schedule

The procurement process



1 Need

2. Preparation of tender documents

The tender documents are prepared with the support of established Purchasing Templates. Conduct third-party review.

3. Advertising

The procurement is announced electronically in a publicly available database and on the Swedish Transport Administration's website. Suppliers always have the opportunity to ask questions about the procurement and get answers within a certain time. The answers must be submitted in writing to all suppliers participating in the procurement. Even if questions are received in English, answers are provided, but in Swedish. All suppliers must receive the same information at the same time, regardless of who requested the additional information.

4. Register supplier companies

5. Tender in

E-signing of tenders is accepted

6. Qualification and tender examination

Requirements for financial position have at least credit rating A according to Dun & Bradstreet or at least risk class three (3) according to the information centre's company information (UC), or equivalent.

Requirements for technical and professional capacity and ability Example: - Two construction projects regarding road construction with a contract cost greater than SEK 70 million. kr. -Road projects in the existing section with at least 3000 vehicles a day. -At least one (1) of the above road projects must have contained at least one concrete structure (bridge).

7. Award

An e-signed award notice is sent to all tenderers stating which, or which, suppliers have won the procurement. Contracts can be signed no earlier than ten days after the award notice has been sent out (10-day contract suspension).

8. Contract signing

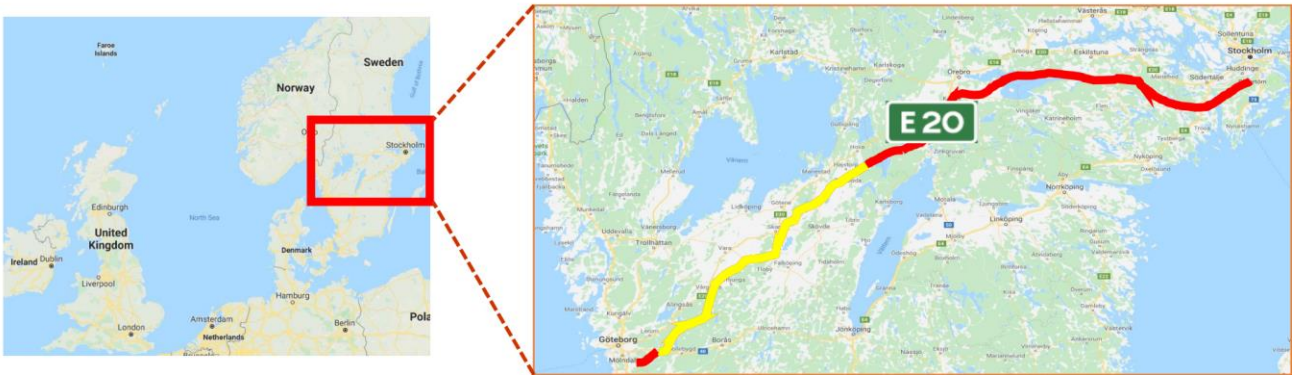
E-signing of contracts is applied from 2021

9. Follow-up

Follow-up of the contract takes place with the help of follow-up of 8 quality parameters twice a year. System support UppLev.

E20 program West

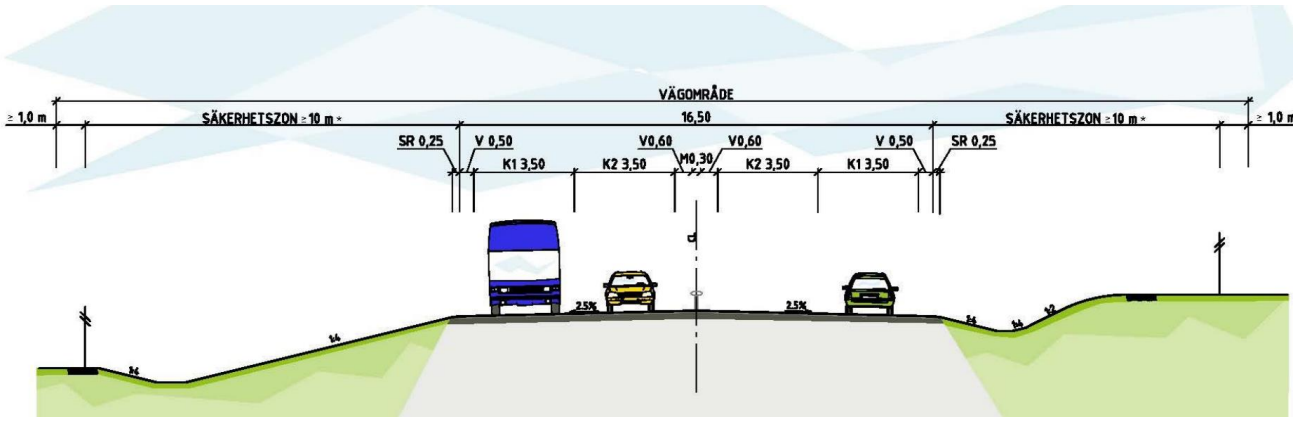
The E20 in Sweden connects Gothenburg and Stockholm and is of great importance for national and international freight transport.



A major investment in accessibility and traffic safety

The entire E20 through Västra Götaland will be expanded to a meeting-free country road until the year 2026. The entire 56 kilometers will mainly have road standard 2 + 2 roads and other sections, approximately 19 kilometers, 1 + 1 roads.

The national plan for the transport system 2014–2025 included five new stages in addition to previously decided expansions. The state, the Västra Götaland region and several municipalities invested SEK 4 billion in addition to previously decided investments of SEK 2.5 billion



Background the expansion of the E20

The purpose of the E20 expansion is to improve traffic safety, and to create better conditions for transport on one of Sweden's most important freight routes.

Nine stages (14 contracts) will be expanded during the planning period

In total approx. SEK 6,5 billion (755 million USD)

Key results / Accomplishments

Completed procurements up to and including today (approx. 15)

Consulting procurements: Road plans, Inquiry documents for construction contracts, Construction site follow-ups

Construction: build only contracts, design build contracts and early contractor involvement contracts (ECI)

Number of tenders

For the last 7 construction contract procurements (E20 program)

- amounts to approx. 50% of bidders foreign suppliers (new suppliers in the Swedish market)
- attracts an average of 5.3 tenders per procurement (average for TRV as a whole in 2019 was 3.0).

Purchasing schedule

The E20 projects' current and planned procurements are continuously updated on the Swedish Transport Administration's website. In order to improve suppliers' foresight and facilitate planning.

Pilot procurement - UppLev - Added value in procurement

The Swedish Transport Administration has carried out a pilot procurement by using references from previous assignments that have been graded in the supplier follow-up UppLev.

Examples of questions that have occurred during the pilot. How similar are the assessments from different PL? - Ex. does everyone justify their grade 4 with a clear motivation? Current account gives easier high ratings than fixed price? What is the correct% for added value?

International B2B seminars and meetings

The E20 projects conduct seminars and meetings to create interest in both new and existing suppliers. Works to attract foreign suppliers. See bif. presentation Austrian webbinar.

Supplier days (National and regional)

Normally carried out annually both nationally and regionally

External referral

The Swedish Transport Administration gives companies and organizations the opportunity to submit comments on the draft tender documents, before the procurement is announced, through an external consultation.

External referral for increased dialogue. External referral is a way for the Swedish Transport Administration to open up for a dialogue with companies, idea-driven organizations and industry organizations.

Sustainability requirements for suppliers

The Swedish Transport Administration procures in accordance with the requirements that exist for state authorities, for example social requirements, such as labor rights and anti-discrimination, and environmental requirements.

Employment requirements

Bonuses and fines are applied to employment requirements

Climate calculation

Bonuses and penalties are applied to climate requirements using climate calculations.

Payment plan

The Transport administration evaluates payment plans in consulting procurements corresponding to priced quantity lists in construction contracts.

Barriers / Obstacles - Barriers to entry

Language, landfill (upplag), quarries (täkt), rules (AB, MER), laws, risks, geotechnics, to small contracts for international players, cost development in contracts.

Lessons Learned - Positive effects have been created thanks to

- Purchasing schedule: facilitates the bidders' planning and markets the projects: more tenders
- UppLev - Added value: It will be important for the suppliers to carry out the projects with good quality / grades in order to be able to gain an advantage in future procurements. Became important to deliver good quality.
- B2B seminars and meetings: created interest that generated a much higher number of tenders than average.
- External referral: increased dialogue, avoids errors and misconceptions in the tender documentation / implementation.
- Employment requirements: the unemployed are introduced to working life which leads to increased chances for jobs.
- Climate calculation: creates innovation opportunities and reduces climate impact.
- Payment plan: focus on payment and delivery, better deliveries, easier management for us and easier management of sub-consultants for the main consultant.

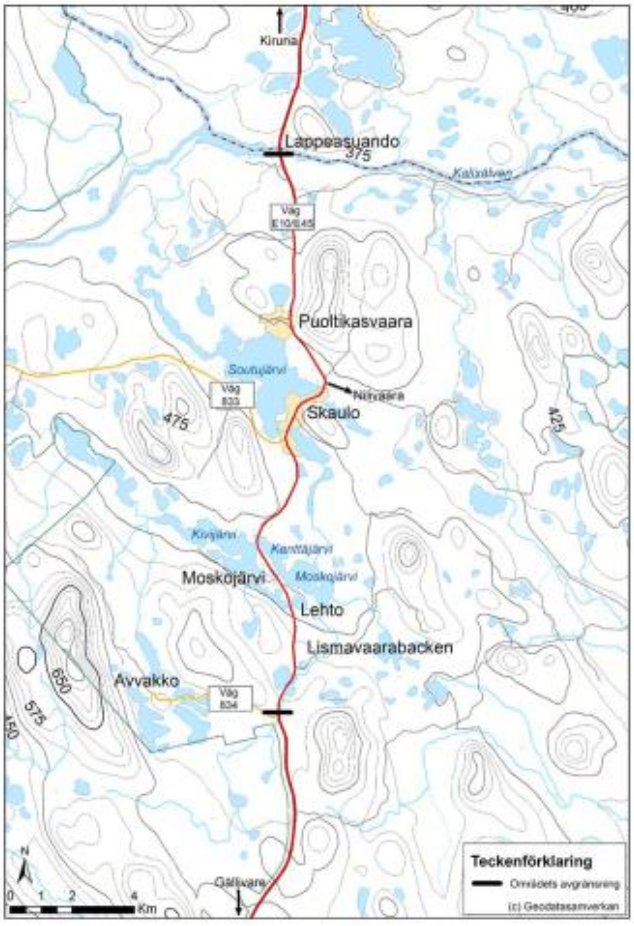
4.15 TWO CASE STUDIES ON PROCUREMENT – CASE #2 E10 (SWEDEN)

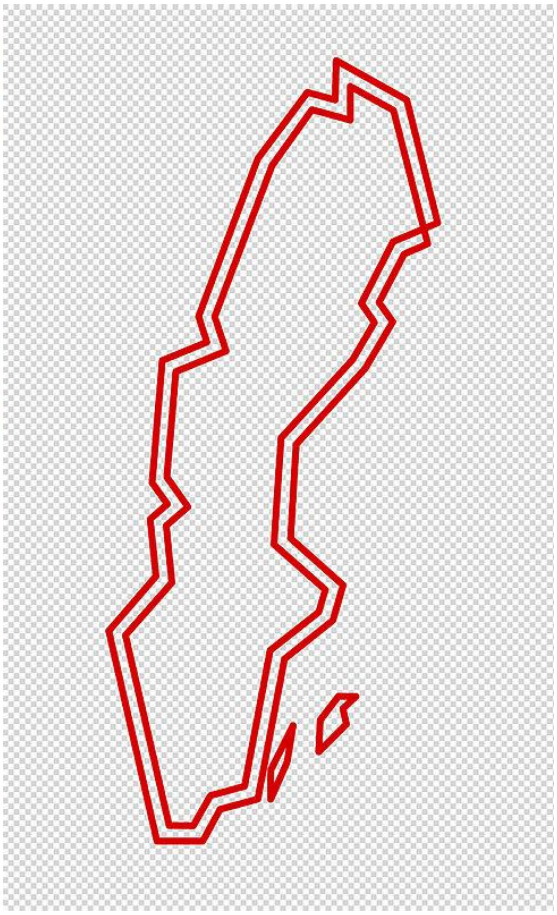
Acceptability	*	*	
Bankability	*		
Governance	*	*	*

Please refer the section 4.14 for the preamble of this case study.

Country: Sweden

The road between Avvakko and Lappeasuando is narrow and has a poor standard. Planning is underway for expansion to a meeting-free road to increase traffic safety and accessibility.



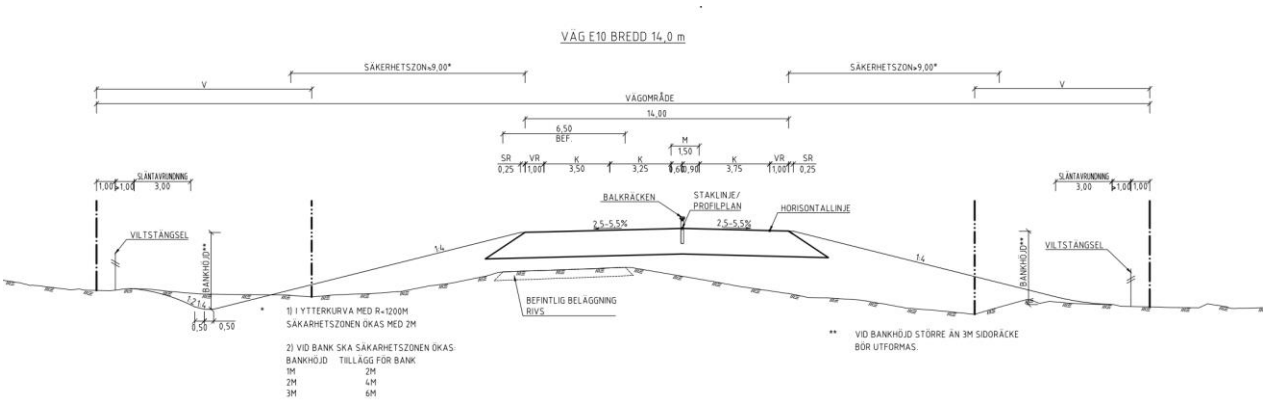


The road between Avvakko and Lappeasuando in Gällivare municipality is about 18.5 kilometers long and goes through the villages Moskojärvi, Skaulo and Puoltikasvaara. The section is partly narrow and has a lack of plan and profile standards. On some parts of the section in question, visibility is poor, which makes it more difficult to overtake. Of the approximately 1,600 vehicles that drive the route

daily, a large proportion are heavy traffic that sometimes has difficulty driving, especially in winter in the parts of the road that have a steep slope, mainly at Lismavaarabacken.

To increase traffic safety and ensure passability, the section will be rebuilt into a meeting-free country road with a with median barrier and game fence. In addition to measures to increase road safety, there are also plans for ecoducts for reindeer and game and for active outdoor life. A large number of connections to the E10 will be closed and a small number of safe intersections will be built.

What: 14 meters wide 2 + 1 road with median barrier



Budget: 400 Million SEK

Current situation: Approval examination of road plan and procurement of construction document in progress.

Construction start: Year 2022.

The procurement

Examination of tenders

The Transport administration will accept the tender that is the most economically advantageous for the client. This will be decided according to the evaluation basis and award criteria set out below.

Acceptance of the developed project budget

The Swedish Transport Administration presents a project budget and the planning conditions that are included in the calculation, eg quantities, services, etc. Developed roadmap is the basis for all the measures included in the project budget. In some respects, the roadmap has been supplemented and clarified and is included in the project's budget.

By submitting a tender, the tenderer accepts the size of the project on a budget. Project budget is used when calculating project incentives, see EC § 6.

For this procurement, the Swedish Transport Administration has decided on a project budget and tenderers are assumed to have read the basis for the project's calculation and also carried out a self-inspection of the calculation's level and reasonableness. When submitting tenders, the project budget

is accepted. Testing of tenders regarding price is done only by choosing the level for overhead and profit, see the point above.

Evaluation model

For the customer, the most economically advantageous tender is the tender that has the best price-quality ratio, i.e. lowest comparative figure according to the evaluation model below.

The Swedish Transport Administration uses a so-called absolute evaluation model. This means that the evaluation of tenders is made according to established criteria, independent of the sums and quality of other tenders.

The evaluation model means that the customer appreciates the qualitative properties (added value) that are valued in the procurement. In the evaluation, the tender sums are adjusted with a deduction depending on the extent to which the tenderer in his tender offers the added value that the customer requests. In the event of equal comparative figures, the tender with the highest value of added value offered will be accepted.

In summary, the evaluation model can be described according to the following formula.

Lowest comparison number wins:

- Comparative figures = bid amount - (minus) surplus values (SEK).

Example:

- Tenderers state overhead and profit10% gives Tender amount = 1.10 x 400 = SEK 440 million
- Comparative figures = 440 - added values

The added value is scored according to what appears below and is then recalculated to a sum where each point is valued at SEK 0.8 million (SEK). Added value can amount to a maximum of 50 credits in the evaluation, which corresponds to SEK 40 million.

Example:

- The Swedish Transport Administration's assessment of tenders amounts to a total of 40 points.
- Added value = 40 x 0.8 = SEK 32 million
- Which then leads to the tender's Comparative Figures
- Comparative figures = 440 - 32 = SEK 406 million
- Evaluation will take place according to the criteria and circumstances set out below.

Award

Price evaluation takes place by the contractor fee, overhead and profit, provided by the tenderer, shall amount to a minimum of eight (8) percent (%) and a maximum of twelve (12) percent (%), multiplied by a fictitious volume of four hundred million (SEK 400 million) SEK. This volume is only a tool for evaluation and will not be the agreed scope. The product of this constitutes the Tender's Tender Sum.

Overhead and profit is stated with one decimal place in the tender.

Example: overhead and profit = 9.8%

Evaluation of added value regarding quality

When testing tenders, quality is an important part and in this evaluation, the Swedish Transport Administration has selected some criteria that are taken from the project's challenges and goals.

In addition to the project objectives, the success of the project is largely based on the parties' ability to collaborate with all participating parties. The model is not comprehensive but should be perceived more as a "sample" of qualities that are relevant to the project and that can contribute to the project producing added value so that the facility is better seen from the taxpayers' point of view, ie what is judged to be the most economically advantageous alternative.

One motive is that, among other things, these added values and dialogue in collaboration should encourage suppliers to be able to propose their own solutions that are expected to contribute to a better function or in the long run a more sustainable solution that provides lower reinvestment costs and / or contributes to a lower burden on the environment.

The evaluation criteria are assessed by submitting descriptions that are compiled under a heading that corresponds to the award criteria;

- Collaboration and communication A total of 15 points
- Safety and working environment A total of 10 points
- Technology and development A total of 25 points

The descriptions must amount to a maximum of 4 A4 pages / award criteria in the attached Word templates.

Award criteria

Award criteria Assessment Max points

Collaboration and communication

Experiences from other projects are of great importance for good collaboration and communication between participating parties and others involved throughout the project.

The tenderer must provide a description of what the process of collaboration and communication can look like with regard to:

Description of how tenderers will work with the project's step-by-step organizations, including a description of how each organization covers the scope of the project, how the roles complement each other

The project is located along the E10 and goes from exit road 834 towards Avvakko in the south to Lappeasuando by the Kalixälven river in the north.

Key results Accomplishments Result / performance

5 tenders! (Average 3,0)

Barriers / Obstacles What is the challenge?

Climate, long winter and short summer

The reindeer industry

Swedish partner

The outskirts of Europe

Get more offers on an over-established market (mining, nortvolt, hybrid)

Internal resources

New approach at the Swedish Transport Administration

New contract form for contractors in the Swedish Transport Administration region north

Lessons Learned

Calibration of quality parameters

The purpose is for participating parties to understand what is the added value of the project.

It must also be clear in what way the added value connects to the project's challenges. Do we have the right skills to participate?

Above all, it is a benefit that everyone understands the assessment basis used for evaluating the tender.

Follow-up of offered quality added values is done within the contract. Unfulfilled surplus values are subject to fines in relation to the weight against the financial assessment in the tender. 1% overhead and profit can correspond to 10 p added value and in relation to the project volume, points can then be translated into kronor

Review of tenders

A common goal is to increase knowledge of the assessment basis and how it translated the tender and then how it was valued by the Purchaser.

Another point of discussion is if the shape has been limiting… can this be improved?

Valuation between quality and price? How has the bidder viewed the game plan for quality and price? Has it been clear that the right skills provide better financial returns?

It is important that the Client is given the opportunity for feedback, as it is in the Client's interest to obtain the most suitable competence per invested krona.

The Client takes responsibility for their documentation

A clearly defined request is suitable for a fixed price assignment. Based on a self-calculation, the Client can place a fixed project budget for a well-described whole in an assignment. Rough quantity list provided during procurement.

The conditions of the project are described in the tender dossier and together with quantity list from the road plan the contractor makes a check of the data.

The customer's calculated budget has been produced with an appropriate margin based on the total business case.

The client takes responsibility for their documentation

Compared with traditional procurement for a turnkey contract, the Contractor has a reduced work effort in his tender work.

The client carries out the effort internally with specialists or together with a consultant. It is an advantage that the specialist is active during the procurement and development of the tender dossier.

Example: cost savings of SEK 0.5 million / tender

Number 5 x 0.5 = 2.5 million

Cost internally, approx. 0.7 million, provides a societal saving of SEK 1.8 million

Very good response from the market (even from those who lost) for:

- Market dialogues before procurement 8 pcs
- Meetings during the tender period, 2 x 6
- Feedback with non-assigned suppliers, 4 pcs
- Costs (in USD, if possible) SEK 400 000 000. (46 500 000 USD)

Contact: Jörgen Simu

4.16 CASE STUDY ON ACCEPTANCE OF A120 LITTLE HADHAM BYPASS AND FLOOD ALLUVIA SCHEME (UK)

Acceptability	*	*	
Bankability	*		
Governance	*	*	

Country: United Kingdom, Hertfordshire

Implementation organization

Hertfordshire County Council and Environment Agency

Costs (in USD, if possible)

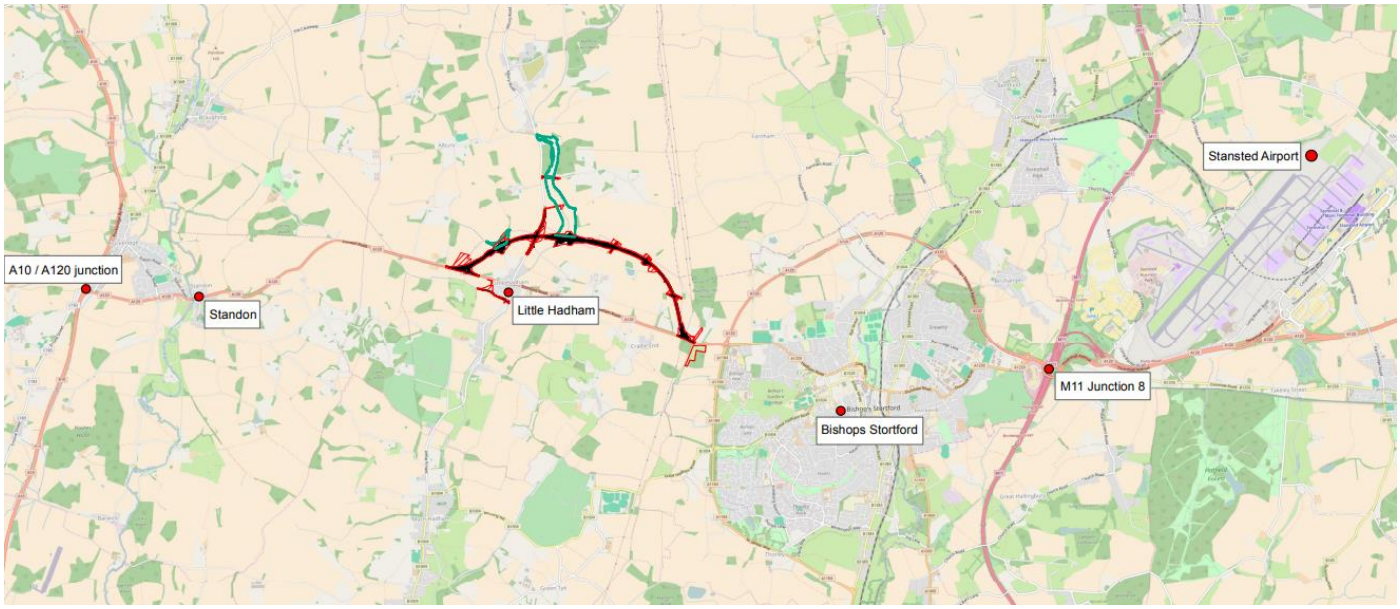
$41 million (£30 million)

Subject

A120 Little Hadham Bypass and Flood Alleviation Scheme

Project description and summary

The scheme is located on the A120 at Little Hadham in East Hertfordshire, England, approximately 5km west of the centre of Bishop's Stortford.



The A120 is an important east-west link in Hertfordshire's primary road network. The road runs from the A10 at Puckeridge eastwards to join the M11 near Bishop's Stortford and Stansted Airport, before continuing through Essex, past Braintree and Colchester, to the port of Harwich. The A120 is also used as part of an official signed emergency diversion route for the M11 and M25. The road currently experiences severe congestion and delays, as a result of a signal-controlled junction at the junction between the A120 and Albury Road that allows traffic from one of the four arms through at a time only. This area is known locally as The Ash traffic lights.

The Ash and The Ford, in the parish of Little Hadham are at risk of flooding from the River Ash and its tributaries. Both have suffered from flooding from rivers on several occasions, most recently in February 2014. Flood modelling indicates that currently, 72 properties in The Ash and The Ford are assessed as having a 1 in 100 (1%) or greater annual probability of river flooding.

The scheme is a bypass of Little Hadham, along the A120 to cut journey times between Bishop's Stortford and the A10 and to create a more reliable route. As part of the scheme, the Environment Agency is delivering an associated flood alleviation scheme on the River Ash, the Albury Tributary and Lloyd Taylor Drain which will reduce flood risk in Little Hadham and downstream communities.

The purpose of the Proposed Scheme is to:

- Reduce the majority of through traffic congestion, thereby improving the environment of residents along the current route through Little Hadham village;
- Reduce the risk of flooding in the village and surrounding communities downstream as part of the delivery of the bypass; and
- Decrease journey times and improve time reliability along the A120 between Bishop's Stortford and the A10, to provide an improved transport network to support the East of England region by 2019.

Key results / Accomplishments

The complexity and number of issues within the Little Hadham area meant a holistic solution was required instead of separate solutions to individual issues. Initial assessments had identified that a standalone solution to the flooding issues would not be viable within the current funding arrangements. Therefore a single scheme, which addressed multiple issues, provided a complete solution which hence was more acceptable to the local population.

A joint integrated project team was formed which representation from both Hertfordshire County Council (the highway authority responsible for the A120) and the Environment Agency (the relevant authority responsible for the river Ash and the proposal flood alleviation measures). This relationship was set out within a formal Collaboration Agreement which outlined roles and responsibilities. This approached ensured both a single point of contact for

local residents and key stakeholders, but also a cohesive team that was able to successfully develop and deliver the scheme.

Barriers / Obstacles

The delivery of the works as a single project ultimately delivered an integrated scheme that was more acceptable to residents and stakeholders. However, the approached required a number of obstacles to be overcome.

The technical standards for the design of a road embankment and dam (part of the flood alleviation measures) differ and have different inspection and maintenance requirements. This required the team to undertake a detail analysis of the standards to identify both the worst case and most appropriate criteria for the design. It also required a clear operation and maintenance strategy to ensure clarity in terms of the respective orgainsational responsibilities once constructed.

In addition to the technical standards the statutory processes for obtaining consent and compulsory purchasing the required land are different. Which required a clear understanding of the need for different parcels of land, and the production of two parallel but complimentary Compulsory Purchase Orders.

Finally, the funding of the scheme was through multiple different routes and agencies. Therefore a clear a open approach to development of the scheme budget was important, which also required assessment of several options to understand the costs of the bypass or flood alleviation scheme on their own to understand the benefit of combining the two elements of work.

Lessons Learned

The A120 Little Hadham Bypass projects is an excellent example of a truly integrated project solving multiple problems for a local community. However, delivering the project required a close collaborative relationship between different agencies, and commitment to overcome challenges in processes and delivery. This was based on an understanding of the value both parts of the project brought to the local community, but also how each element supported the delivery of the other, i.e the bypass helping may the flood measures deliverable, and the flood measures improving the acceptability of the bypass.

Contact (the person who documented the case study)

References, if any

Planning Register | Hertfordshire County Council

4.17 CASE STUDY ON ACCEPTANT OF A487 NEW DYFI BRIDGE (UK)

Acceptability	*	*	*
Bankability	*		
Governance	*		

Country: United Kingdom, Wales

Implementation organization

Welsh Government

Costs (in USD, if possible)

$63 million (£46 million)

Subject

A487 New Dyfi Bridge

Project description and summary

The A487 Fishguard to Bangor Trunk Road is the principal strategic south to north route along the west coast of Wales. The trunk road north of Machnylleth, which crosses the Afon Dyfi on the Pont-ar-Ddyfi, has been subject to increased traffic flows and repeated flooding despite improved drainage measures. The narrow sub-standard nature of Pont-arDdyfi causes a hazardous situation for both motorised and non-motorised users with poor alignment and visibility, no footways and a poor junction at the northern end all of which results in traffic collisions and bridge strikes.

Since 2006, the bridge has been closed for an average of four days per year due to flooding and parapet strikes. The number of days that the route is closed due to flooding is likely to increase in the future as a result of climate change. When the bridge is closed, traffic must follow a 10 mile diversion via the B4404, whilst Heavy Goods Vehicles (HGVs) must travel 20 miles to Cross Foxes to re-join the A487. There are costs to the economy associated with the closure of this route due to delays and increased journey times. Bridge closures affect the community's accessibility to key services including healthcare and education within the town of Machynlleth and beyond.

The proposed A487 New Dyfi Bridge Scheme consists of a new viaduct structure across the floodplain and a river bridge to cross the Afon Dyfi approximately 480m upstream of the existing Pontar-Ddyfi. The Scheme would consist of a new 1.2km long single carriageway road.

The Welsh Government's aim is to provide a more reliable crossing of the Dyfi valley with a new viaduct which would improve traffic flow, connectivity and network resilience. The Wales Transport Strategy 'One Wales: Connecting the Nation' sets out the policy framework for transport investment decisions across Wales. Eight scheme specific Transport Planning Objectives (TPOs) were agreed during the WelTAG planning stage:

- To improve the reliability of crossing the Afon Dyfi for people, freight and emergency vehicles on the A487 strategic corridor.
- To improve efficient and reliable accessibility to key services including employment opportunities, healthcare and education.
- To maintain the role of Machynlleth as a vibrant and sustainable local centre.
- To preserve the long-term integrity of the Dyfi Bridge.
- To reduce the number and severity of collisions and causalities on the A487 in the study area.
- To ensure that flood risk to third parties is not increased.
- To minimise the impact of transport improvements on the landscape, biodiversity, water resources and heritage.
- To increase the opportunity for efficient, safe and reliable travel by walking and cycling on the A487 corridor within the study area

Key results / Accomplishments

The scheme will improve the resilience of the A487 to flooding and associated closures. Therefore, providing more reliable connection to key services, business and transport links with

Machynlleth. However, in addition to the highway flooding the scheme also improves active travel connections across the river, provides flood mitigation measures for local business and properties and protects the existing bridge from further damage.

Barriers / Obstacles

The project had two major barriers to overcome in the form of the impact on flooding due to the project and the articulation of the value for money of the project.

During the design stage the project tested many structural layouts to understand the impact on flood patterns and levels. The extensive modelling allowed the project to develop a scheme with the optimal balance between length and cost of structure and impact on flooding. This ensured the scheme could progress through the statutory process without any formal objections to the scheme due to flood impact.

In addition to the flooding impacts, the project also needed to clearly understand the impacts of flooding in terms of road closures, how these may change with climate change and the impact on residents and businesses. This analysis provided the basis for the business case and investment decisions for the scheme.

Lessons Learned

The A487 New Dyfi Bridge is likely to be the first of many projects focused on resilience of transport networks to flooding and other impacts of climate change. The development of the Business Case for the scheme highlighted the importance of a clear strategic narrative and value case. In terms of traditional benefit to cost ratio, predominately based on journey time and accident savings, the scheme has a very low performance. However, the importance of the connection and the clarity of the need for the scheme was critical in ensuring the commitment of the funding for the project.

Contact (the person who documented the case study)

References, if any

A487: new Dyfi bridge | GOV.WALES

4.18 SOURCE: RAMPURA–AMULIA–DEMRA EXPRESSWAY (BANGLADESH)

Acceptability			
Bankability	*	*	*
Governance	*	*	*

Country

Bangladesh

Status

Under Construction - Expected Delivery December 2022

Preamble

This case study aims at providing an illustration of the role that SOURCE can play in improving project preparation based on a particular example: the Rampura–Amulia–Demra Expressway in Bangladesh.

SOURCE is the multilateral platform for sustainable infrastructure led and funded by Multilateral Development Banks (MDBs) supporting:

- the development of well-prepared projects to bridge the infrastructure gap
- governments digitalization agenda

SOURCE provides a comprehensive map of all aspects to consider for the preparation of sustainable infrastructure, for both traditional procurement and Public Private Partnerships (PPPs), covering governance, technical, economic, legal, financial, environmental and social issues. It uses sector-specific templates covering all the stages of the project cycle, spanning from project definition to operation and maintenance as well as allowing the definition of specific targets to fulfil the SDGs and Paris Agreement. For more information, please refer to the website at https://public.sif-source.org/source/.

In the particular example of Bangladesh, the contribution of SOURCE is twofold:

- Providing a checklist to ensure that all important features of the project have been identified, measured and priced, ensuring that the project can be implemented as planned as a DBFOM scheme (Design, Build, Finance, Operation and Maintenance);
- Providing a marketplace to the government to attract foreign investment and multinational contractors.

Organization

The Rampura–Amulia–Demra Expressway received approval from the Cabinet Committee on Economic Affairs (CCEA), chaired by the Prime Minister, to be implemented as a PPP on January 26, 2016. It is part of the PPP Authority's pipeline of key infrastructure projects for the country.

The Government of Bangladesh is focused on bringing bankable PPP projects to the market and has committed to provide adequate Government support to mitigate key risks and support the Project financially.

To attract the best foreign road developers and operators to Bangladesh, The Roads and Highways Department has structured the Project using an availability payment structure wherein the Government takes market risk and makes payments to the Project Company for the provision of services. The delivery of such public private partnership structure, the timeline of which is embedded into SOURCE was facilitated by the use of the platform. SOURCE's knowledge and decision support features, such as the risk allocation matrix, are particularly helpful in the context of complex projects.

SOURCE is also a market place and an efficient way for governments to attract foreign investment and multinational contractors. To make the project more attractive to international investors and lenders, the Government is also considering providing additional support to mitigate currency risk.

Project costs

Cost estimates have been prepared on the basis of current prices of materials, plants & equipment, and labour. Market prices of imported materials have also been considered where required, using the Roads and Highways Department (RHD) schedule rate analysis guidelines.

The calculation and analyses for unit rates of various items of work has been carried out using the "Standard Data Book for Roads and Bridges" developed by the Indian Roads Congress (IRC) and the RHD guidelines. The cost estimates are consistent with a feasibility study in their accuracy and can easily be incorporated into SOURCE.

The following major elements have been considered in the feasibility-level cost estimates:

- Preliminary items and general site facilities
- Earthworks for the embankments
- Structural works
- Pavement works
- Ancillary road works
- Contingencies

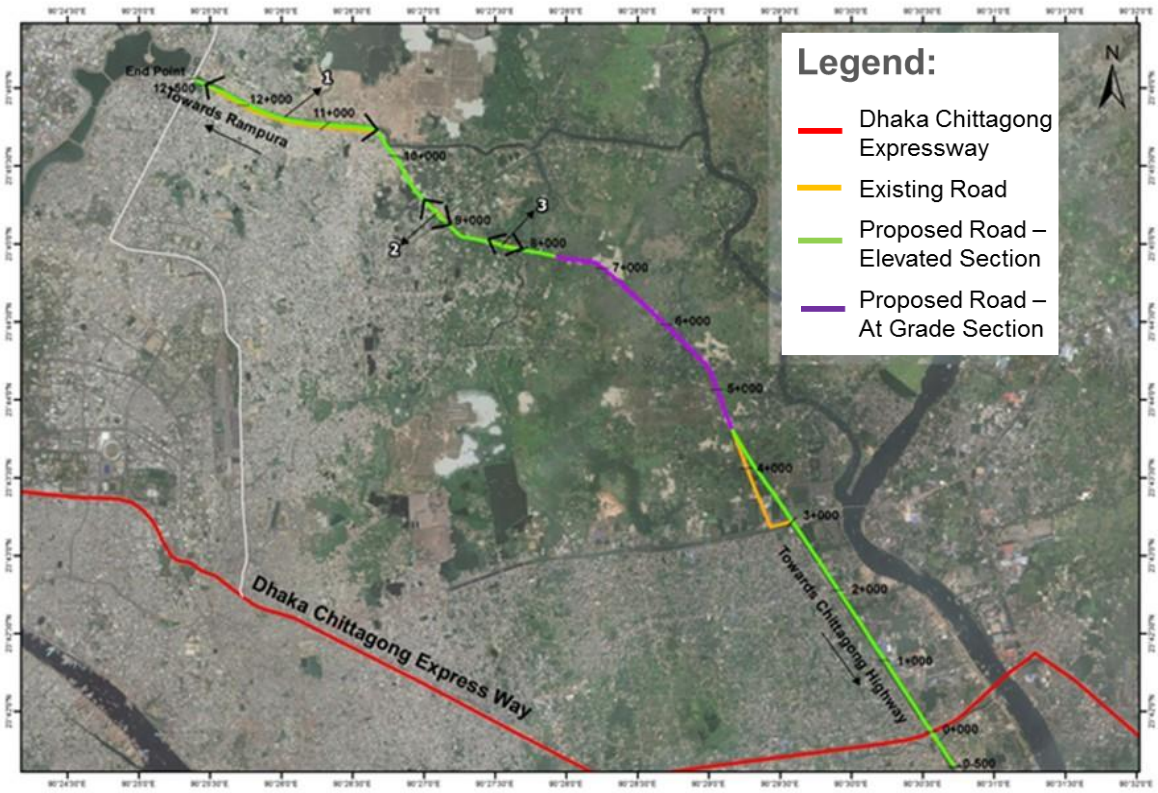
The preliminary estimated project cost for the RAD Expressway Project is US$ 240 Million.

Table 1: Preliminary Estimated Project Cost

Description	Estimated Cost
General & Site Facilities	114,933,765
Earthwork	391,992,732
Pavement Work	1,841,445,562
Foundation Work	3,713,948,101
Structures (incl. interchanges)	7,038,849,407
Incidentals	55,201,679
Dayworks	2,500,000
Subtotal Construction (Pre-Contingency & Soft Costs)	13,158,871,246
Specified Provisional Sums (included in 1-7)	30,475,001
Physical Contingency (on A-B)	1,312,839,625
Subtotal of Bills (A+C)	14,471,710,871
Price Contingency (on D-B)	2,166,185,381
Subtotal Hard Costs	16,637,896,252
Consultancy Service (on F)	665,515,850
Traffic Management / Construction Control (on F)	1,331,031,700
Business Administrative Cost (on F)	83,189,481
Subtotal Soft Costs	2,079,737,032
Independent Engineer (Developer Portion, 50%)	300,000,000
Legal Procurement and Bid Costs	230,000,000
Subtotal Developer Costs	530,000,000
Total Costs (BDT)	**19,247,633,284**
Total Costs (USD)	**240,595,416**

Project description

The 13.5-km access-controlled toll highway Rampura-Amulia-Demra (RAD) provides connectivity between the center of Dhaka, the fastest-growing megacity in the world, and Bangladesh's national highways N1 and N2. In addition, planned projects, including the upgrading of the Dhaka Bypass (under procurement) and the construction of the Dhaka-Chittagong Expressway (under preparation) are expected to connect with RAD and provide increased reach within Dhaka.



Plan 1 Project Location

A 2-lane service road (one-way / two-way) was included as an integral part of the design. Where possible, the existing 2-lane facility was transformed, when possible and with the necessary modifications, into a service road. All the existing cross-drainage structures including bridges were retained as part of the conceptual design. Portions of the RAD Expressway were conceptualized as an elevated structure to minimize land acquisition as well as to facilitate free-flow traffic conditions.

Some innovative cross-section design concepts were introduced to minimize the requirement for land acquisition and to create greater safety standards to accommodate higher exposure of truck traffic for the corridor, especially in the selection of median width and the provision of a service road / Non-motorized Transportation (NMT) facility in the at-grade section.

Safe sight distances have been provided for in the design to improve the visibility at the at-grade intersections, for service roads, horizontal/vertical curvatures and bridge locations. Lane configurations have been improved to allow a full access-controlled facility and to provide a safe and free flow of traffic. Some key geometric design elements include the following:

- Acceleration and deceleration lanes
- Service roads at the ground level
- Bus-bays on the service roads
- Pedestrian crossings (overpass/ underpass) in the at-grade section
- Shoulder rumble strips for alerting the driver (for improved safety) in the at-grade cross section
- Wider shy-distances for the elevated structure
- Lighting for the entire corridor

- New Jersey concrete barrier median
- Service road and RAD Expressway segregation with appropriate fencing in the at-grade section
- On-ramp Toll plazas

Outcome

The project was implemented by the RHD as a PPP project under the PPP Act and the PPP Guideline. In accordance with the PPP Guideline, the Project has been endorsed by the Ministry of Road Transport and Bridges of Bangladesh (MRTB), screened by the PPP Authority and granted in-principle approval by the CCEA and the Feasibility Study has been carried out to test its overall viability and to finalise its scope.

The Project Company bears the construction-related risks arising from cost overruns, delays, and other performance risks connected with the construction of the access-controlled expressway. As it is a DBFOM scheme, the special purpose vehicle will be required to operate and maintain the access-controlled expressway pursuant to the terms of the PPP Contract. The SOURCE platform has allowed to highlight inconsistencies with international risk allocation best practices and permitted the structuring of an efficient PPP contract. All data relating to the exploitation of the asset and the maintenance of the associated equipment is recorded into SOURCE for the entire duration of the contract. This way, when the road is transferred to RHD upon the expiry or termination of the PPP Contract, RHD will have at its disposal the data(traffic, operation, and maintenance) that is necessary to make an informed decision regarding the future of the asset.

The SOURCE platform allows to create a segmented yet transparent environment where the various stakeholders at play can interact and work on the project preparation while having full access to international guidelines and best practices. The extensive efforts focused on the project preparation phase has been crucial to the Rampura–Amulia–Demra Expressway's development to specification. A consortium of companies from the People's Republic of China—Sichuan Road and Bridge Group, Shamim Enterprise Ltd., and UDC Construction Limited—have signed a concession contract with the Government of Bangladesh to upgrade the Dhaka Bypass under a public-private partnership (PPP) arrangement. The Asian Development Bank (ADB) acted as financial advisor on the transaction to the Public–Private Partnership Authority (PPPA) of Bangladesh. The coordination between the different stakeholders is greatly facilitated by the use of the SOURCE platform.

Not only does SOURCE allow for inter-agency and inter-organization collaboration in a transparent environment it can also initiate it. SOURCE's project preparation facility (PPF) feature connects the platform users with the PPF that are relevant to their projects highlighting the phase at which the support will apply. ADB's OPPP provided legal support for this transaction and helped to develop a concession contract template for road PPPs through the Asia Pacific Project Preparation Facility (AP3F), a multi-donor trust fund managed by ADB. This project marks the first successful collaboration between ADB's transaction advisory services and AP3F.

Once the consortium has completed construction, it will operate, and maintain the tolled expressway over a 25-year concession period and will be able to charge tolls based on vehicle type. The Government

of Bangladesh will offer viability gap funding of 3.1 billion taka and a minimum revenue guarantee to the consortium to optimize the cost of financing. The contract also provides the government with a share of revenues generated by the consortium over a certain threshold.

Contact

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5. LESSONS LEARNED

The purpose of this chapter is twofold. First, it aims at sorting out the findings drawn from the case studies according to various items that are common to most of them. Second, at identifying those that can be considered as key components of a good project preparation.

After careful analysis we found that for a project to qualify as Well-prepared, the following three overarching items must be addressed:

- Stakeholder management
- Risk management
- Communication management

There are of course other items drawn from the case studies collected by Taskforce 1.1, they will be analyzed in a following section.

The selection of items and the resulting outline are debatable, but we have tried to incorporate all items we have found important. We are conscious that the limited number of case studies dealing with Low and Middle-Income Countries (LMICs)[18] may have introduced a bias, and other items should be considered specifically for these countries. We have therefore mentioned (*in italics*) such possible shortcomings as and when we felt it appropriate.

Because the case studies did not elaborate on all aspects of the project (and notably on technical issues), we also took stock of the lessons learned during the first phase of TF 1.1 work[19].

In this chapter, case studies are referred to as follows : (QC1) : Quebec, Ile-aux-Tourtes Bridge, (QC2) : Quebec, Turcot project (CL); Chile; (CH) : China; (FR1) : France, RN 19; (FR2) : France, A 79; (MX) : Mexico; (PL) : Poland; (RO1) : Romania, Craiova-Pitesti; (RO2) : Romania, Ploiesti-Buzau; (RO3) : Romania, Bucharest bypass; (SO) : SOURCE; (SP1) : Spain, Road Safety; (SP2) : Spain, Construction and Demolition Waste; (SW1) : Sweden, E20 West; (SW2) : Sweden, E10; (UK1) : UK, A 120; (UK2) : UK, A 487.

5.1. STAKEHOLDER MANAGEMENT

Stakeholder management is key to succeed with a transport project, above all for project acceptability and transparency, but even in some cases for bankability.

Among the different stakeholders, we make a distinction between “public entities” and “private entities or individuals”. The former comprise e.g., public authorities or governments and their agencies, either national or local, whether in charge of transport issues or not, as well as managers of public

[18] We have included in the “LMIC” category: Low-Income Economies (GNI per capita of $1,045 or less) and Lower-Middle Economies ($1,046 to $4,095).
[19] Review of the projects’ preparation processes in the 10 countries participating in the Taskforce. See footnote 1 above.

utilities. The latter comprise other private entities or individuals, e.g., citizens, either individuals or members of associations, NGOs, landowners, etc.

5.1.1. Public entities

A project perceived as necessary by all public stakeholders has a better chance of being prepared and carried out under satisfactory conditions. The consultation with public entities is mandatory in most cases: they represent a constituency or the public interest, and may be concerned by the project in such cases as:

- Consultation mandatory by law or regulations;
- Project interference between national and local road network and restoration of communication;
- Cofinancing of the project;
- Displacement of utilities necessitated by the project, etc.

Obviously, the project could not proceed without that type of consultation. Since such consultation is mandatory, related procedures are usually established at national level, for instance to determine who should pay for utilities displacement. In case of cofinancing, such consultation is an obvious prerequisite before going on with the project.

> *Establishing, updating, and respecting such administrative procedures is a must for countries that do not have them available.*

5.1.2. Private entities and individuals

But in addition to the mandatory consultations above, it is of utmost importance to extend consultations to as many third parties as possible, with a view to exchanging (both ways) information with them, for instance :

- obtain information related to:
  - environmental risks (including waste management[20]);
  - identification of key design elements as early as possible;
  - identification of strong opponents to the project, who can decisively impact its preparation;
- provide information on:
  - the usefulness/necessity of the project in all its aspects (technical, economic, financial, safety, possibly toll levels, etc.);
  - measures taken to avoid, mitigate or compensate environmental risks.

Many case studies highlight that involving this category of stakeholders from the early stages of the project, and continuously during its preparation, is a strategy that pays dividends for both the project

[20] See (SP2)

and the public. Consulting with the public early on brings benefits to the project owner because it allows him to identify their concerns, expectations, and values and to meet their needs. It is a great help to get feedback from stakeholders, guide decision-making, build consensus and make the project acceptable and transparent.

5.2. RISK MANAGEMENT

Together with other infrastructure projects, road projects have gained a poor reputation as far as cost estimates and completion times are concerned. This has negatively impacted the financing of these projects, whether they are financed in a traditional way (budgetary funds) or using other mechanisms (involving some degree of private finance). Therefore, risk management has become a must in road project preparation. For instance, Quebec has developed a specific tool ("Risk management in road projects") to deal with risk management[21]. As far as bankability of projects is concerned, it is necessary to improve risk management to reduce as much as possible uncertainties surrounding completion time and cost.

As we have seen above, stakeholder management is key to prevent and/or mitigate risks at project preparation stage. For instance:

- adequate consultation with public entities should allow to avoid risks of delay related to displacement of utilities or obtention of building permits, or risks of last-minute road realignment changes due to political reasons;
- consultation with the public at large should allow to avoid or limit recourses to court, facilitate land acquisition, speed up legal processes, and deal satisfactorily with environmental constraints.

The projects presented in the case studies, however, are supposed to be "well-prepared projects", and do not mention risks that were otherwise identified in the preliminary work of the Taskforce, namely in the "Review of the projects' preparation processes in the 10 countries participating in the Taskforce" (see footnote2).

One should therefore not forget the technical risks associated with project preparation:

- insufficient technical investigations at design stage;
- geotechnical risks;
- unexpected ground conditions;
- omissions in the design and in tender documents

were often mentioned as problems encountered occasionally.

> *Admittedly, these problems may have a limited impact in the case of High-income and Upper-middle-income countries present in the Taskforce, since these countries have a technical background and procedures related to technical studies and procurement of design. This may not be the case for LMICs, which would justify additional investigations for these countries.*

[21] See (QC1), and also presentations made during TC 1.1 virtual workshop 11-13 November 2020 organized in Quebec.

A special mention should be made about risks associated with traffic safety, as exemplified in (SP1) and (FR2).

Finally, we need to mention another global issue that has gained more attention in recent years, namely the resilience of infrastructure, which brings with it additional risks to be considered. Case studies (UK1) and (UK2) illustrate this point and make a case for close collaborative relationship between different public agencies.

> *Needless to mention, financing of projects is a major obstacle to road network development in LMICs, which will need to focus more and more on risk assessments in road project preparation.*

5.3. COMMUNICATION MANAGEMENT

While consultation with public entities is usually guided by administrative procedures, consultation with private entities and individuals rests upon diverse mechanisms involving all modes of communication: press releases, public meetings, social media, dedicated website, 3D presentations, etc. It is beneficial to use all modern communication tools, especially since young people are now quite used to them[22].

Communication should be open and transparent: it is the only way to maintain a candid relationship with stakeholders and to make the most of the consultation.

Indeed, communication with stakeholders, especially with private entities and individuals, is not one-shot: it should be continuous all along the project design phases.

5.4. OTHER IMPORTANT ASPECTS

5.4.1. Institutional arrangements

It is important to raise awareness of an issue found in a few case studies : who owns the project? While the answer is usually clear, it is not always the case :

(PL): the initial owner of the project was the City of Krakow, but the General Directorate for National Roads and Motorways (GDDKiA) stepped in after too much time had passed since the first studies were launched;

(CH): the HZMB Task Force led by the National Development and Reform Commission was set up to solve controversial issues and conflicts among different governments;

(UK1): the complexity of this integrated project (solving both road traffic issues and flooding issues) required a formal collaborative agreement between the Hertfordshire County Council and the Environment Agency;

[22] See (FR1)

(FR2) : even when the owner is clearly defined in case of this concession project, the concessionaire can still make decisions on important details of the project.

Although there is no ambiguity regarding project ownership for most projects, this issue becomes important in the case of cross-border projects, which have developed in many countries and are promoted by some organizations (MDBs, Belt and Road Initiative, EU Global Gateway) to develop trade and economy at regional level.

> *This issue could also impact LMICs, notably for projects involving landlocked countries. Past experience in the EU at the time of enlargement has shown that cross-border road projects need special care for their preparation, which should consider not only the infrastructure itself, but also border-crossing points, and such issues as traffic and migration controls, customs facilities, waiting times at the border, etc.*

5.4.2. Procurement

Many case studies have focused on procurement issues and procedures. Whereas many TF 1.1 countries are part of the European Union, and therefore have to comply with basic EU procurement directives, some have found ways to innovate in this general framework through innovative forms of contract (build only; design and build; design, build, maintain; concession/PPP; early contractor involvement, etc.), in order to obtain better value for money, attract foreign contractors, or maintain a dialogue with market suppliers[23]. The efficiency of these innovations needs to be assessed in the long run: while France has a 40-year-plus experience in concession projects, some more recent procurement innovations still need to stand the test of time.

In addition, a lesson learned during the Covid crisis is that there is a possible contradiction between the need to undertake as wide and continuous consultations as possible with stakeholders, which takes time, and the need to accelerate projects, for instance to implement stimulus plans. Similarly, some projects may be needed to face the climate urgency (e.g., to protect coastal roads exposed to rising sea levels) in delays that could be hardly compatible with extended consultations[24].

5.4.3. Human resources

Training and keeping competent staff to manage projects is an obvious prerequisite for good project management.

Megaprojects, such as the HZMB project[25], are often one-off. The question remains as to how experienced and skilled staff working on one mega project can go on playing their roles. The importance of project leadership is highly emphasized in managing and delivering megaprojects: the project manager can play an important role in shaping the culture of the project organization.

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[23] See (FR2), (MX), (SW1), (SW2)

[24] For more details, refer to the PIARC webinar organized on June 3rd, 2021 ("Impact of Covid on Road Projects: financing, procurement, transparency and due diligence") and presentations therein by OECD, Quebec and Italy, at https://youtu.be/OEcGYuwDiwA

[25] See (CH)

Whether for megaprojects or projects of any size, the issue is of paramount importance in LMICs, which may experience difficulties in keeping competent staff in their transport administrations.

5.4.4. Time dimension

The time dimension should not be overlooked in project preparation. Not only does stakeholder management take a lot of time, but a life-cycle approach is more and more required in project preparation with a view to optimizing the use of public funds[26]. While TF 1.1 case studies have dealt only with successful projects, the taskforce had the opportunity to comment on unsuccessful ones that often failed to take the time dimension in consideration.

5.4.5. Tools

5.4.5.1. BIM

Great hopes are placed on the development of BIM methodology[27]. Designed initially for buildings, it is more and more developed for infrastructure management.

Case study (CH) describes the process engaged in Chile for bridges. Introduction of BIM technologies require consultation both within and outside of the road administration, so that all actors concerned use and share the same tool: road administrations, engineering firms, contractors, subcontractors, suppliers, data managers, etc. BIM appears to be a promising tool, allowing to optimize a project from the design stage to putting into service, and then maintenance and possibly operation. It is however a complex tool that requires a lot of consultation and standardization.

BIM tools are probably not geared towards LMICs for the time being.

5.4.5.2. SOURCE

The Sustainable Infrastructure Foundation (SIF), which develops and implements the project preparation platform SOURCE, has provided a case study pertaining to a project in Bangladesh (the only LMIC actually involved in TF 1.1 case studies).

SOURCE can be recommended as a good tool for project preparation, for the following reasons:

- SOURCE has been designed and promoted by Multilateral Development Banks (MDBs - initially by the Asian Development Bank, followed by other MDBs)[28]; it is therefore perfectly adapted to developing countries, including LMICs; many other tools are available with the same objective (developed either by organizations or consulting firms), but they are most often designed for industrialized countries;

[26] See (UK1): definition of a clear operation and maintenance strategy for a complex project
[27] BIM was a specific topic discussed during TC 1.1 virtual workshop 11-13 November 2020 organized in Quebec.
[28] SOURCE is aimed at many different types of infrastructure: the road sector is mainly concerned by four "templates", related to roads, highways, bridges and tunnels. For more information, see for instance : https://public.sif-source.org/

- SOURCE works as a checklist, aimed at evidencing that the road authority has implemented their necessary homework prior to putting a project on the market; it comes with internal controls (to detect possible inconsistencies) and tooltips (to explain the various concepts used);
- SOURCE is not an additional tool on the shelf, it can be adapted to, and incorporated in, a country's existing procedures, thus facilitating the work of staff in charge;
- SOURCE can be used with different scopes, either internally (within the road authority), or communicated to the outside world as a platform (with controlled access), for instance to search for possible financiers of a project, public or private.

SOURCE should therefore be better known among road authorities, with a special focus on developing countries and LMICs.

6. CONCLUSION

This collection of 18 case studies from 10 different countries provides highly valuable knowledge on the complexity and multidisciplinarity of engaging in a process of well-prepared projects for great transportation projects. Nowadays, acceptability, bankability, and governance are at the hearth of successful projects, the ones that meet their target in terms of time, costs and scope. But more importantly, these projects have also to meet the outcomes for a diversity of stakeholders. Several challenges push the reach for better solutions for the changing world. In this context of uncertainty, the preparation of projects appears to be a necessity for adaptation.

More work can still be done to pursue the efforts of the task force. At the first place is to follow this first task force with the inclusion of LMIC countries. It may need to propose a different approach than the usual participation to a task force. Second, would be to undertake a longitudinal study to observe the resulting effects of the preparation of projects, for example, what are the practices giving good results in terms of outcomes in a diversity of situations. In other words, looking at the other end of the project life cycle, what has been done in successful project in terms on preparation?

7. REFERENCES

[1] United Nations [NU] web site, https://www.un.org/en/climatechange/17-goals-to-transform-our-world, accessed on February 4th, 2022.

8. APPENDICES

APPENDIX 1 – TERMS OF REFERENCE

TASK FORCE 1.1 – WELL PREPARED PROJECTS

How to improve bankability, acceptance, accountability, and transparency

Objectives

1. Review literature and existing project preparation softwares (e.g. SOURCE, HDM-4, EIPP, GIH) and analyze good practices of project management for improving and optimizing public and private investment.
2. Identify how well-prepared projects contribute to a culture of transparency and accountability.
3. Establish recommendations on:
    - Definition of strategies to set outcomes, optimize project delivery and project lifecycle
    - Requirements for road project preparation
    - Management relationship with financiers, with a view to maximizing project economic and possible budgetary return
    - Communication and engagement with stakeholders
4. Encourage coordination with other TCs and TFs, such as T.C.1.1 – Performance of Transport Administrations, T.C. 1.2 - Planning Road Infrastructure and Transport to Economic and Social Development, and T.C. 1.3 - Finance and Procurement.

It is widely recognized that good preparation of infrastructure projects, first and foremost road projects, is of utmost importance to secure their proper financing, wide acceptance and seamless implementation.

It is nowadays all too common to hear financiers claim that plenty of money is available for project financing, but that what is lacking is good projects.

Whatever the type of country considered (industrialized, emerging, or developing), a good preparation of road projects is of outstanding importance for the following reasons:

For ordinary projects (e.g. procured on a traditional Design-Bid-Build procedure), there is a need for:

- Improved acceptability by all stakeholders (e.g. by populations directly affected by social and environmental aspects of the project, or by other donors or public authorities participating in the cofinancing, …);
- Improved quality and resilience of the projects, in order to meet Sustainable Development Goals;
- Reduced risk of delays and cost overruns in construction and its possible impacts on maintenance
- Improved transparency in the procurement process and ethical behaviour of all parties.

For complex projects (typically PPP or concession projects), in addition to the above-mentioned reasons, it is necessary to:

- Explain to stakeholders the need to recourse to these complex procedures;
- Minimize transaction costs and standardize contract documentation as much as possible;
- Attract financing at favourable terms and conditions and sustainable funding;
- Overcome project complexity, while accepting innovative solutions.

To sum up, the better a project is prepared, the smaller the risks of seeing the project rejected by various stakeholders, or unable to reach adequate financing, or fraught during implementation with poor quality, delays, cost overruns, maintenance uncertainties and possible unethical behaviours associated with ensuing change orders.

The T.F. will aim at representing a wide diversity of circumstances, including cases from several countries and continents.

The final report will be based on a collection of case studies and will outline the various aspects analyzed, will make practical recommendations for road administrations and authorities and will focus on policy issues in both the short- and medium to long term.

The T.F. will make references to relevant activities and publications of other organizations, especially in the bank, contracting and consulting sectors, and academic publications. It will not duplicate their work.

Literature Review: November 2020

Collection of case studies: April 2021

Full report: September 2021

The SOURCE Software

The guidance provided by the SOURCE software is an interactive one: a logical set of questions are prepared for the project manager to answer. For most questions there is a list of the most frequent answers, and the manager simply has to select the box corresponding to his project.

The questions are organised by stages, according to the project development. Stages 1 to 4 correspond to the development phases; stages 5 and 6 to the tender process, Stage 7 to the work period and stage 8 to the operation period. After stage 1, the main characteristics of the project are described, and the government may ask MDBs or other IFIs for funding for the development of stages 2 to 4.

The questions are also organised by themes (Governance, technical, economic, legal; financial; environmental and social). The most important documents (for instance the feasibility study, the main technical characteristics of the project) have to be uploaded on SOURCE platform. In addition, before the start of the tender process, there is a possibility for the various stakeholders of the project (government bodies, advisors, contractors, financial institutions,..) to exchange information in a perfectly confidential way under project manager supervision.

To help the project manager to answer the questions, there are tooltips linked to all important questions. These tooltips are providing direct explanations and references to documents prepared by MDBs and IFIs about the topics referred to in the questions.

When reaching stage 4, the SOURCE software performs a series of automatic checks to test the consistency of the answers. If the consistency check is satisfactory, the project manager is informed and can call a reputable engineering office to check the answers and the tender documentation.

This process is practical and draws the project manager's attention to the main topics of his project.

A data base of the already completed projects will be used as a benchmark for future projects.

APPENDIX 2 LIST OF ACTIVE MEMBERS IN THE TASK FORCE 1.1 WELL-PREPARED PROJECTS

Country	Family Name	First Name
Canada-Quebec	AUBRY	Monique
Canada-Quebec	BÉDARD	Annick
Chile	GALAZ	Uriel
China	GAO	Xing Lin
France	DEMARRE	Michel
Mexico	POON HUNG	Clemente
Poland	KAROLAK	Magdalena
Romania	BORBELI	Cristian Daniel
Spain	GONZÁLEZ FABRE	Miguel
Sweden	SIMU	Jörgen
United Kingdom	FURNEAUX	Chris

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