Séminaire sur la thématique de la rénovation des tunnels du 11 février 2020

DIAGNOSIS, ANALYSIS AND ACTION PLAN TO UPGRADE THE TUNNELS OF THE WALLOON REGION

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Service public de Wallonie – Mobilité & Infrastructure

Road administration in Wallonia

2020-02-11
**Tunnels?**

- **What is a tunnel?**
  - No official definition
  - Directive 2004/54/CE: 500 m + RTE
  - France: 300 m
- **SPW-MI:** Need for specific EM/CE equipment:
  - Daylight, pump, ventilation, exit, fire equipment, …
  - Minimum length: 25 m
  - 56 tunnels with very different characteristics

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**Tunnels in Wallonia**

- **Length**
  - 1000 m <
  - 500-1000 m
  - 300-500 m
  - 100-300 m
  - < 100 m

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Diagnostic des tunnels SPW
Diagnose van tunnels SPW
Sabine Stassart & Rudi Noël
Tunnels in Wallonia

Section type

- Two tubes: 22
- One tube/2 directions: 19
- One tube/1 direction: 14
- Three tubes: 1

Service public de Wallonie – Mobilité & infrastructure

Ouvrages d’art routier
Région wallonne

Département d’Exploitation des infrastructures
Direction de l’exploitation des tunnels
Avenue des Tilleuls, 12 B-4000 Liège
E40-E25 Link

• Connections E40 – E25
• 5 tunnels (one of 1639 m)
• Open in 2000
• 80 000 veh/day (2 ways)

• Design was performed before
  – Mont-Blanc tunnel fire : 1999
  – Directive 2004/54/EC on minimum safety requirements for tunnels in the Trans-European Road Network

• But security was already an important concern during conception :
  – a traffic center including tunnels management
What about other tunnels in Wallonia

- Mainly 40 years old
- 2 separate management
- Civil Engineering part
  - Management regulations like for bridges
  - But access difficulty: ideal being off traffic (at night)
- Electromechanical part
  - Cross-view for some tunnels
  - Different regulations according to tunnels
  - Case-by-case management for the majority of tunnels

Wish for a coherent vision of all our tunnels

Master plan of renovation - Objectives

- Levels of service of the ideal tunnel
- CE and EM inspection of each tunnel
- Elements to renovate or upgrade Ideal => Realistic
- Prioritization of rehabilitations
- Budget programming
Renovation master plan - Requirements

- User safety;
- The visual aspect of the installations and the services to the users;
- Management in the framework of ITS (Intelligent Transport System) and intelligent routes with a centralization of information and control;
- Compliance with European standards and applicable legislation;
- Good maintenance practices;
- The sustainability of the infrastructure;

Study contract

- BG, Lombardi
- 27 april 2017 - 26 october 2018
- 4 parts:
  - Part 1: tunnel of Frasnes (Couvin) during the project;
  - Part 2: tunnels of the urban motorway link E40-E25 (5);
  - Part 3: tunnels of the structuring network (29);
  - Part 4: tunnels of the non-structuring network (21);
General strategy

• Establish a categorization of tunnels in the R.W.
  ➢ 1. - The tunnels of the links A602 (A26) / E25 (Cointe – Kinkempois - …)
  ➢ 2. - 500 to 1000 m tunnels of the structuring network
  ➢ 3. - 300 to 500 m tunnels of the structuring network
  ➢ 4. - Less to 300 m tunnels of the structuring network
  ➢ 5. - 500 to 1000 m tunnels of the non-structural network
  ➢ 6. - 300 to 500 m tunnels of non-structural network
  ➢ 7. - Less than 300 m tunnels of the non-structural network

• Functional Analysis Framework
  ➢ Infrastructure, equipment CE & EM

General strategy

• Operational functions
  ➢ Security features
    o Prevent incidents
    o Limit the consequences of an incident
    o User safety
    o Favor the intervention of emergency
  ➢ Traffic Management Functions
    o At the beginning, during the incident management
    o Inspection of infrastructure and equipment
    o Put back into service
General strategy

- Associated means to ensure security
  - Technical means (CE & EM equipment)
  - Human resources (internal and external to SPW)
  - Organizational means (procedures - Emergency response plan)
  - Additional resources (Fire résistance CE & EM)

- Analysis of current tunnels
  - Comparison procedure (compliance - deviations)
  - Cross analysis with inspections → actions → budget

Structure Inspection

- Visual examination
- Hammer sounding
- Cover + carbonation : 1/100 m, sidewalls and roof
- No dismounting of cladding
- Off traffic inspection, so at night
Structure Inspection

- Report with defects and pictures
- Sketches: scrolled map

Diagnostic des tunnels SPW
Diagnose van tunnels SPW
Sabine Stassart & Rudi Noël
Electromechanical inspection

- Preliminary analysis by tunnel
  - Material and historical inventory of equipment
  - Comparison with expected service levels
Electromechanical inspection

- On-site inspection
  - Visual examination of equipment
  - Functional test of equipment
  - Performance test (lighting, ventilation)
  - Test of the command chain
Deliverable

- Global deliverable
  - General strategy = Tunnel definition « high level »
  - Master plan of exploitation
Deliverable

- Individual deliverable by tunnel
  - Descriptive sheet
  - Diagram of required functions
  - Master plan of subsequent intervention file
  - Inspection report
  - Advantages / disadvantages analysis of technical / financial solutions
  - Priority Report - Action Plan
  - Budget plan

Next step

- Base on
  - Budget estimation (about 200 M €)
  - Prioritization proposal
- Prepare specific tunnel rehabilitation project
  - Combining civil engineering and electromechanical works
  - Proposal:
    - 5 for the next 5 years
    - 30 M €
Structure rehabilitation project

- Transversal structure for all the structures
  - Remote management / supervision – automation
  - High voltage protection / distribution

- Vertical structure by structure
  - Tunnel lighting - TGBT - ventilation - detection - pumping ...
  - Fire security equipement, ...
  - CE

As a conclusion in a European context

- Define an european common
  - Tunnel definition, regarding different environment (urban, mountain, highways, …)
    - Need in a specific electromechanical equipement ?
  - Vision of the ideal tunnel
<table>
<thead>
<tr>
<th>Tunnel XX</th>
<th>Réseau non structurant</th>
<th>&lt; 300m - Urbain/non urbain</th>
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<tbody>
<tr>
<td>Dispositions</td>
<td>Moyens attendus</td>
<td>Conformités</td>
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<td><strong>Génie civil</strong></td>
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<td>Trottoirs</td>
<td>A atteindre</td>
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<tr>
<td>Niches de sécurité</td>
<td>Non concerné</td>
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<tr>
<td>Niches incendie</td>
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<td>Alimentation électrique</td>
<td>A atteindre selon spécificités locales</td>
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<tr>
<td>Ventilation sanitaire et désenfumage / capteurs associés</td>
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<td>Eclairage</td>
<td>A atteindre 75 m et + (de base) sauf guidage</td>
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<td>Postes de secours</td>
<td>A atteindre 200 m et +</td>
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<tr>
<td>Extincteurs / bornes incendie</td>
<td>A atteindre 200 m et +</td>
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<tr>
<td>Indications de secours</td>
<td>A atteindre 200 m et +</td>
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<td>Barrières et feux</td>
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<td>Vidéosurveillance / DAI</td>
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<td>Patrouille</td>
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Thank you for your attention