

MOBILITY MANAGEMENT ON WINTER CONDITIONS IN ANDORRA

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Summary

In the country of Andorra, mobility management is especially important during the winter season. Andorra is located in the heart of the Pyrenees and most of its population lives in towns situated above 1,000 meters.

The current document presents an action plan called "Snow procedure" which specifies the phases that the road conditions go through, depending on different effects originated by snow and ice. The plan uses the procedure "Colors of Snow" to inform both the users and the agents involved, and also presents the recommendations and prohibitions for road users. The protocol covering the roads connecting France and Andorra is also presented and detailed.

1.- INTRODUCTION

Andorra is located in the heart of the Pyrenees. It has an area of 468 km² and a population of approximately 76,000 inhabitants. Andorra's average elevation is 2,000 m. The lowest elevation area is in the border with Spain at 838 m and the highest is the peak of Comapedrosa at 2,942 m elevation. The most populated towns in Andorra are situated on elevations between 900 to 1,200 meters, as well as in the bottoms of the valleys. The local administrative organization consists of seven areas (called *parishes*), and the capital of the country is a town called Andorra la Vella.

The largest population centre is formed by the assembly of Andorra la Vella and Escaldes-Engordany with 37,000 inhabitants, which is also the economic and financial centre of the country.

The main economic activities of Andorra are tourism and commerce. Regarding tourism, skiing-related activity plays a main role. Two important ski resorts can be found in Andorra: Gran Valira (Pas de la Casa - Grau Roig - Soldeu El Tarter) and Vallnord (Ordino-Arcalis - Pal - Arinsal), as well as a Nordic ski station in La Rabassa. It is therefore necessary that the roads have a high level of service to ensure its availability even in bad weather conditions.

During the rest of the year, lots of visitors also travel to Andorra due to the beauty landscapes on the mountains as well as complementary non-snow activities offered by the ski resorts. The annual rate of visitors is about 6,800,000 a year.

The road network is Y-shaped, with the radial centre located in Andorra la Vella. The network follows a route parallel to the major rivers flowing from north to south. The total length of the road network is 250 km, where 100 km are considered main roads and other 150 km are secondary roads.

Communication with Spain on the South is easier than with France in the North since the highest peaks are located on the northern border.

Until 1998 it was necessary to pass over the 2,400 m across the Envalira mountain in order to access France. After the implementation of the Envalira Tunnel, at an altitude of 2,000 m and with a length of 2,879 m, the access to France has been significantly improved on the Andorra side. However, the French side still presents difficulties due to the sinuosity and topography of the roads through the Pyrenees, especially in the winter because of snow and avalanches.

2.- ROAD COMMUNICATIONS

The table shown below presents the annual average daily traffic (AADT) on the main roads.

Road	Section	AADT
CG-1	Spanish Border - St. Julià de Lòria	15,180
CG-1	St. Julià de Lòria - Andorra la Vella	27,959
CG-2	Andorra la Vella - Encamp	22,755
CG-2	Encamp - Meritxell	8,214
CG-2	Canillo - El Tarter	7,707
CG-2	French Border - Pas de la Casa	7,762
CG-3	Escaldes-Engordany - La Massana	20,284
CG-3	La Massana - Ordino	10,777
CG-3	Ordino - Sornàs	4,923
CG-4	La Massana - Erts	5,599
CG-5	Erts - Arinsal	4,876

Table 1 – AADT on the main roads of Andorra

The highest traffic intensities are registered at the accesses to the central area Andorra la Vella - Escaldes Engordany, especially in the CG-1 between the parishes of Sant Julià de Loria and the capital. Over 20,000 vehicles per day are also registered at the entrances from the parish of Encamp (CG-2) and from the northern parishes (Ordino and La Massana, CG-3).

Regarding the cross-border traffic, it is highest across from Spain (more than 15,000 vehicles per day) than across the French border (7,762 vehicles per day). Due to the different height, the French border weather conditions usually require more control and closer monitoring to maintain the viability of the traffic.

3.- ORGANIZATION OF THE TRAFFIC MANAGEMENT IN WINTER VIABILITY

The National Andorran Traffic Centre (CENATRA) operates since 2007 and consists of the Centre for Information and Traffic Management (CIGT) and Tunnel Control Centre (CECOT). It is in charge of the technical management of traffic and user information and the exploitation of the tunnels on the road network (10 km of tunnels).

CENATRA has more than 60 cameras available for urban and interurban monitoring of traffic conditions, and 30 panels of variable information to inform users about road incidents.

Since 2003, there is an operating Snow Plan, which is annually revised and updated.

The "Winter Strategy" on the roads starts on November 15 and ends on April 15. The present document does not detail the operational management of the road teams during winter. However, it is important to list the priority order for snow removal on public roads, which is the following:

- Access to borders and urban settlements close to the main roads.
- Access to hospitals, schools and administrative buildings.
- Access to ski resorts and other population centres.
- Highways and main traffic streets.
- Other roads.

Currently, the Snow Plan is approved by the "National Bureau of Mobility", created by Law 7/ 2005, as a coordinating body for the overall management and common in the field of traffic management which consists of representatives of government and all municipal authorities and chaired by the minister for planning.

Likewise, the Traffic Commission, consisting of technical staff for the overall management, is responsible for the management and operational coordination device, supplementary to the document Snowfall Plan and is presented in the 4th section of this exhibition.

The actions to be taken in case of snow are set out in the operational plans of the Device Snow, in which two factors are very important:

- The first factor is to have proper weather information allowing an accurate weather forecast. Through the diagnosis of the weather forecast, effective fix snowplough services needed are detected and circulation levels are anticipated. The Government of Andorra has an agreement with Météo-France, in which daily weather forecasts and avalanche risk throughout the geography of Andorra are communicated. The information is especially detailed in the zone access to France; on both sides of the border because it is the most sensitive to disturbances due to traffic intensity of heavy vehicles.
- The second factor is the traffic intensity. This information enables users to plan their journeys in the most appropriate way to avoid dangerous situations.

The circulation levels are shown in a document called "The colors of the snow" to make them more accessible to the user. These levels have been used in information campaigns, broadcast media and in the press, and they are listed as:

- Alert Phase
- Green Level
- Yellow Level
- Red Level
- Black level

3.1.- COMMUNICATION TO ROAD USERS

The status of the roads is communicated to the user through the following methods:

- Information displays on the roads
- Text messages for users previously registered on the service
- Website "www.mobilitat.ad"

- Twitter “twitter.@Mobilitat_and
- RDS-TMC service
- CENATRA at the phone service number 18021802
- General information on the radio and TV

4.- SNOWFALL PROCEDURE

4.1.- ALERT PHASE

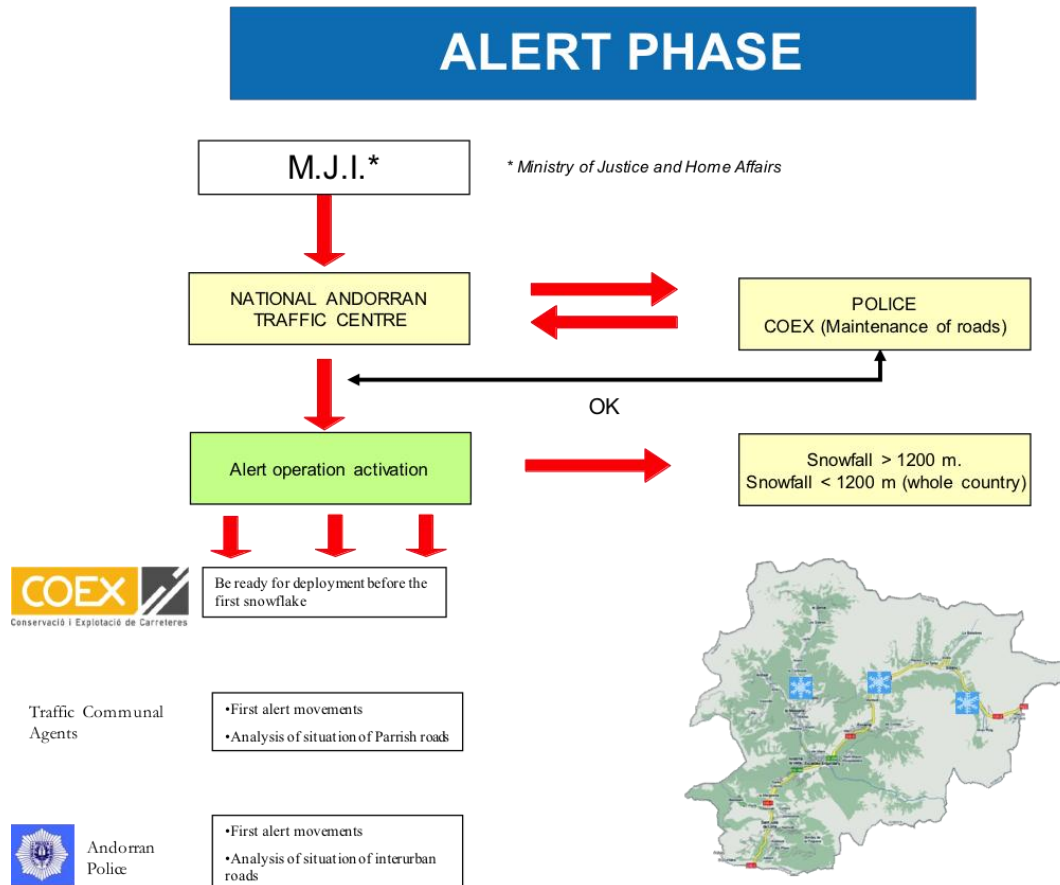


Figure 1 - Summary of the Alert Protocol

The Snow Plan Alert is activated after receiving a snow forecast for the next 24 hours. When predicting snowfall or icing the alert is enabled.

The weather forecast comes from Météo-France and is distributed to all stakeholders: snowplough services, ski tracks, hospitals, fire department, police department, Circulation Communal Services, Ministries, Customs, electric companies, ambulances etc.

In the alert phase it is essential to be properly informed about the weather forecast and its evolution, as well as the right notification in case the weather gets worse to every service involved. If weather forecasts anticipate an event of big magnitude, snow plough services would start preventive treatments with de-icing salt.

The interventions at every level of movement depend on whether the elevation is above or below 1,200 meters.

The actions that are performed at each level of circulation depend on whether the spot height is lower or higher than 1,200 m. The actions in either case are similar varying only the strength of the Police Service needed to comply Traffic sources CENATRA information and the possibility of creating a cabinet crisis.

4.2 - INTERVENTIONS WHEN IT SNOWS ABOVE 1200 METERS

4.2.1 - Green Level

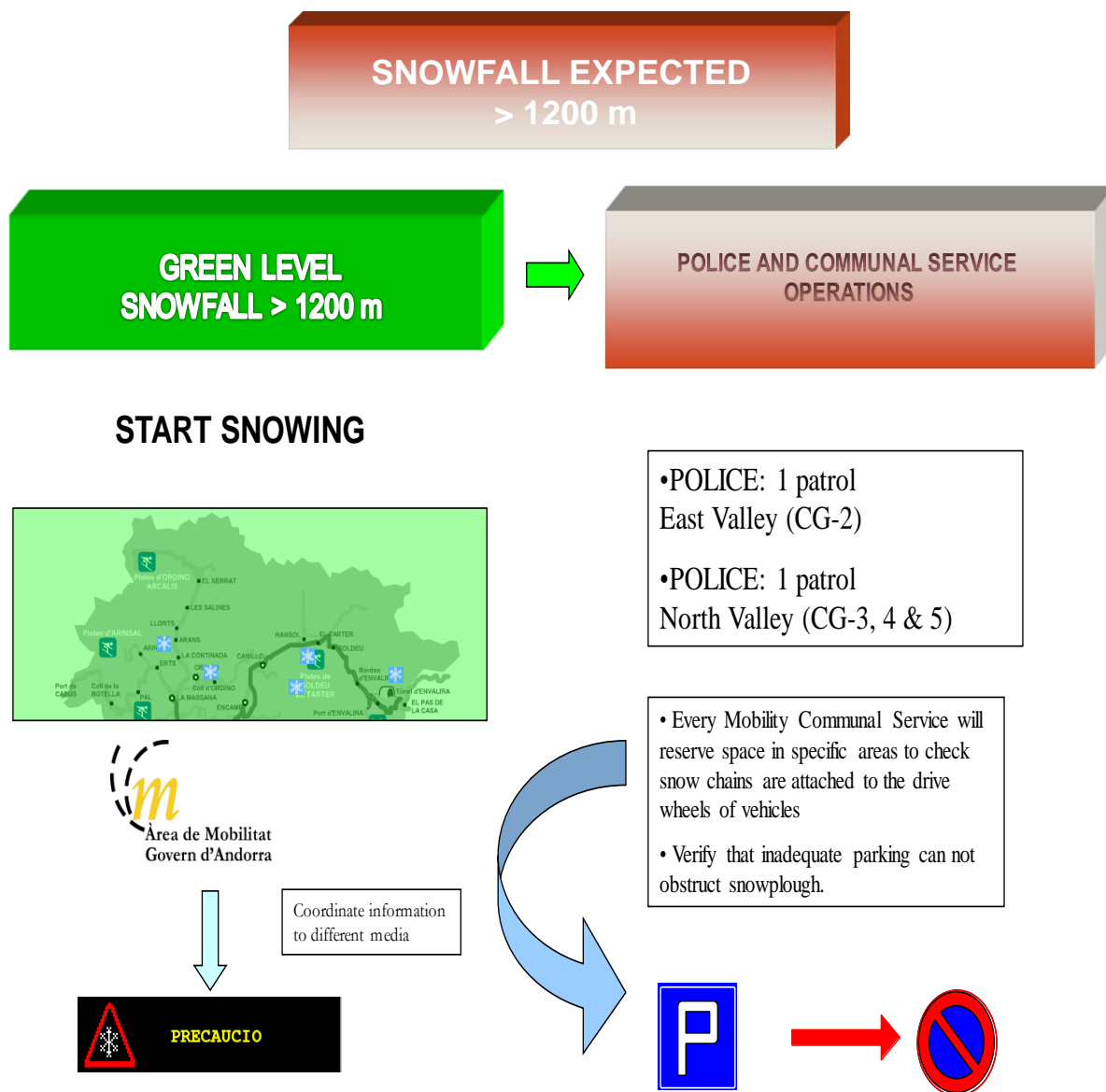


Figure 2 - Summary of intervention during green level

The reference of 1,200 meters altitud is taken because it coincides with the height of La Massana and Encamp population centres. This mainly affects communications with France and the ski resorts.

Given Andorran altitude and weather conditions, this situation is pretty usual.

Police and community circulation services begin their first interventions on traffic management so that the snow chains drop areas keep on unhindered and that the inadequate parking can obstruct the passage of the snowplough.

CENATRA constantly informs users of the road conditions. Snow plough services start preventive treatments with de-icing salt on the road.

4.2.2 - Yellow Level



Figure 3 - Summary of intervention during yellow level

The Yellow Level activation forbids the movement of light and heavy vehicles if the vehicles are not equipped with snow tires, chains or other specialty.

Police with assistance of communal services is responsible of ensuring that vehicles are equipped with these facilities, so it has to provide suitable places to stop vehicles and not obstruct traffic.

The snowplow services CENATRA inform the affected areas by snow or ice and the information is transmitted to the user. Furthermore, the information is used to activate or deactivate the new phases, depending on road conditions and weather forecasts.

4.2.3. - Red Level



Figure 4 - Summary of intervention during red level

In the red level the circulation of freight vehicles over 3.5 tonnes and school transport is forbidden.

Light vehicles and buses can run with special equipment, however circulation is not recommended unless necessary.

Regular police checks are necessary to control the use of special equipment and also for traffic control in areas that may be collapsed.

It is very important that main roads are not collapsed to allow proper work of snowploughs.

4.3.- INTERVENTIONS WHEN IT SNOWS BELOW 1200 METERS.

4.3.1- Green level

When snowfalls are below 1200 m, it is considered that almost all country is under snow effects.

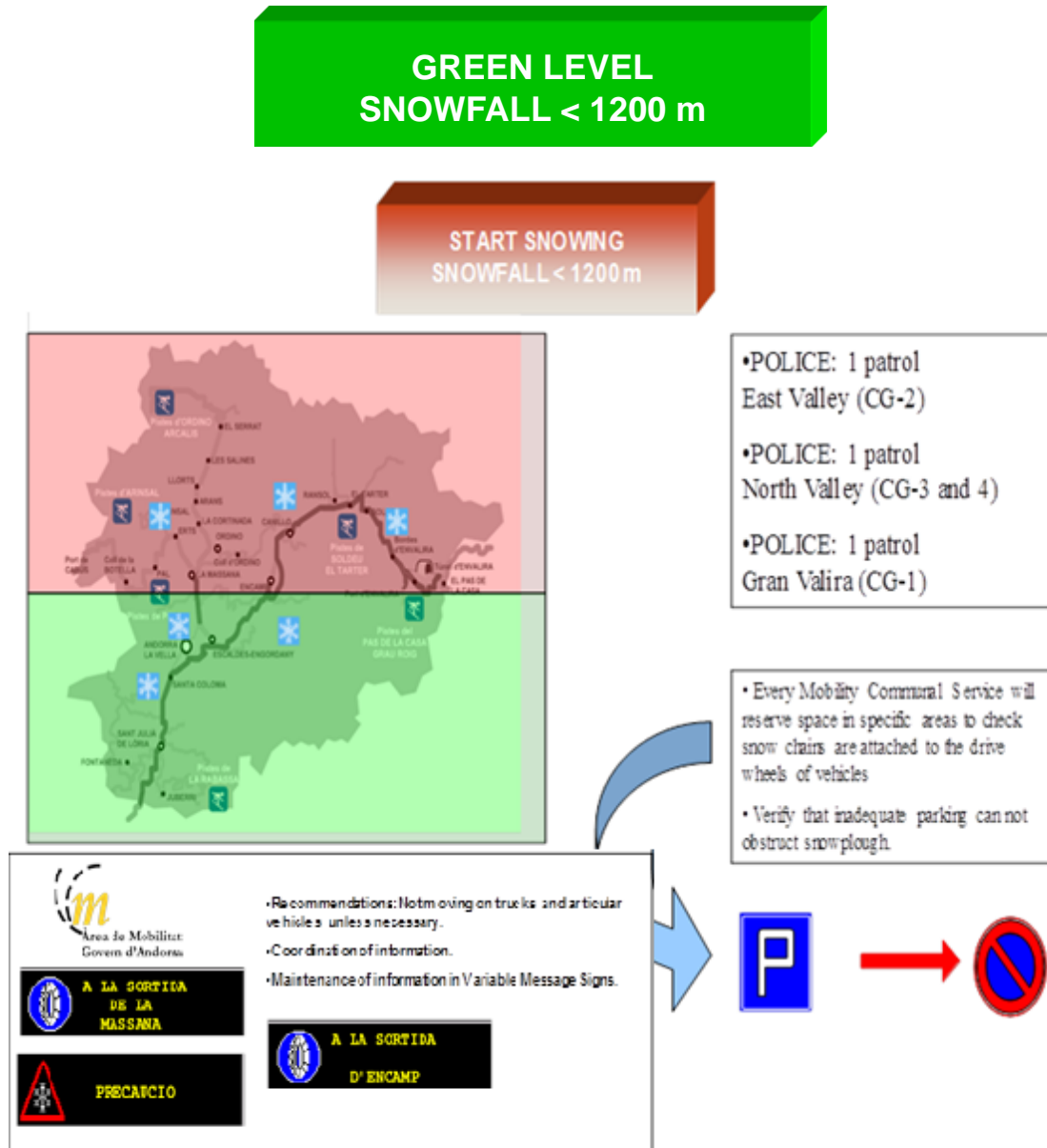


Figure 5 - Summary of intervention during green level

The protocols are the same with the difference that the police service has at least one patrol at the entrance of the road from Andorra to Spain (CG-1).

4.3.2 -Yellow level



Figure 6 - Summary of intervention during yellow level

CENATRA is responsible for managing all the information that is collected from the Police Service and community service agents to activate new phases or deactivate depending on the status of the road.

Police control all passing vehicles in order to have proper snow kits. CENATRA monitors traffic network to inform the police about the location of possible traffic incidents caused by vehicles without special equipment

The most important problems are those caused by vehicles without snow equipment.

4.3.3. - Red level

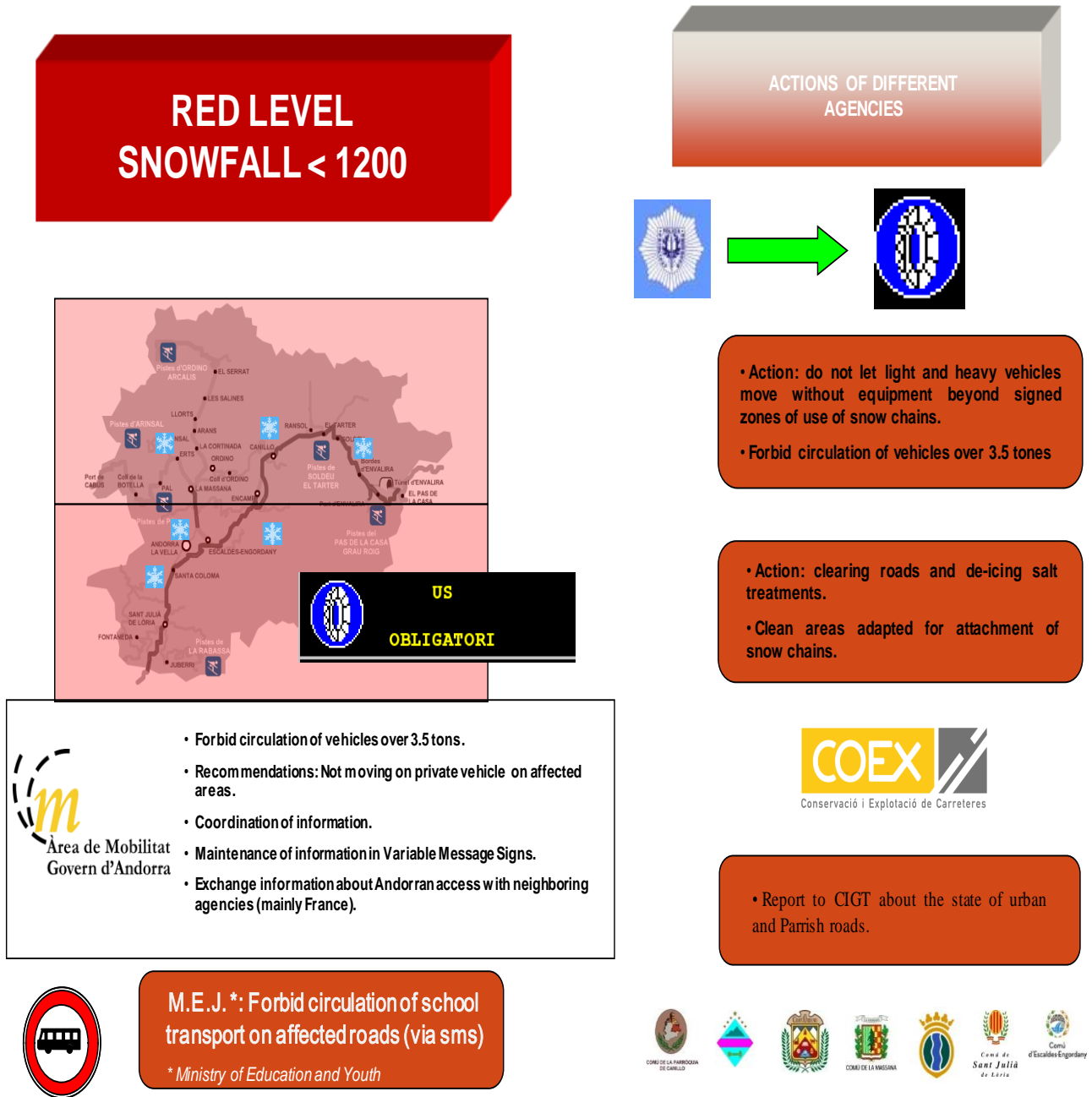


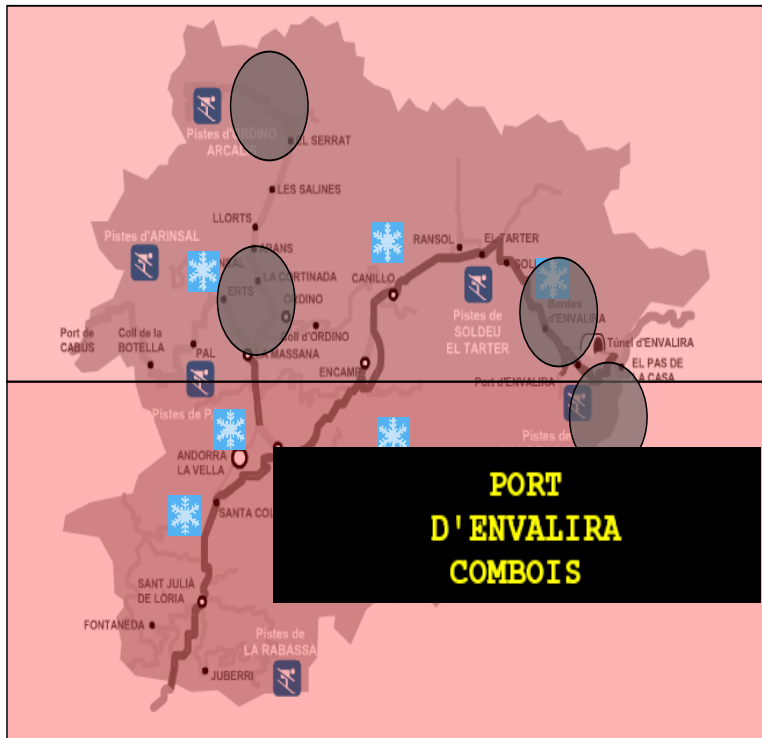
Figure 7- Summary of intervention during red level

When the red phase is activated, it is snowing below 1,200 m and weather forecasts predict worse or bad situations. Crisis Committee comprising representatives of the Ministry responsible for roads, Mobility, Police and municipal governments affected by the situation meet to discuss.

The coordination of emergency and traffic conditions is treated by the Crisis Committee.

4.3.4. - Black level

BLACK LEVEL RISK OF AVALANCHES



ACTIONS OF DIFFERENT AGENCIES



- Controlling access to restricted areas, activation of protocols in case of avalanches



- Coordination of information.
- Maintenance of information in Variable Message Signs.
- Exchange information about Andorran access with neighboring agencies (Spain / France).

Figure 8 - Summary of intervention during black level

The black level can be caused by two different situations:

- Risk of avalanches in areas with avalanche blasting ropeway (CATEX or GASEX type).
- Risk of avalanches in areas without blasting devices.

In the first situation, it is common to close the road long enough to carry out the blasting operations.

In the second one, in which snow has a significant magnitude, if possible make disengage by explosives, the road is closed the time required for operations. If it is not possible, there is no choice but to reduce the risk of landslides and proceed to close the road and if necessary to evacuate people if there are nearby buildings.

DISABLING PHASE

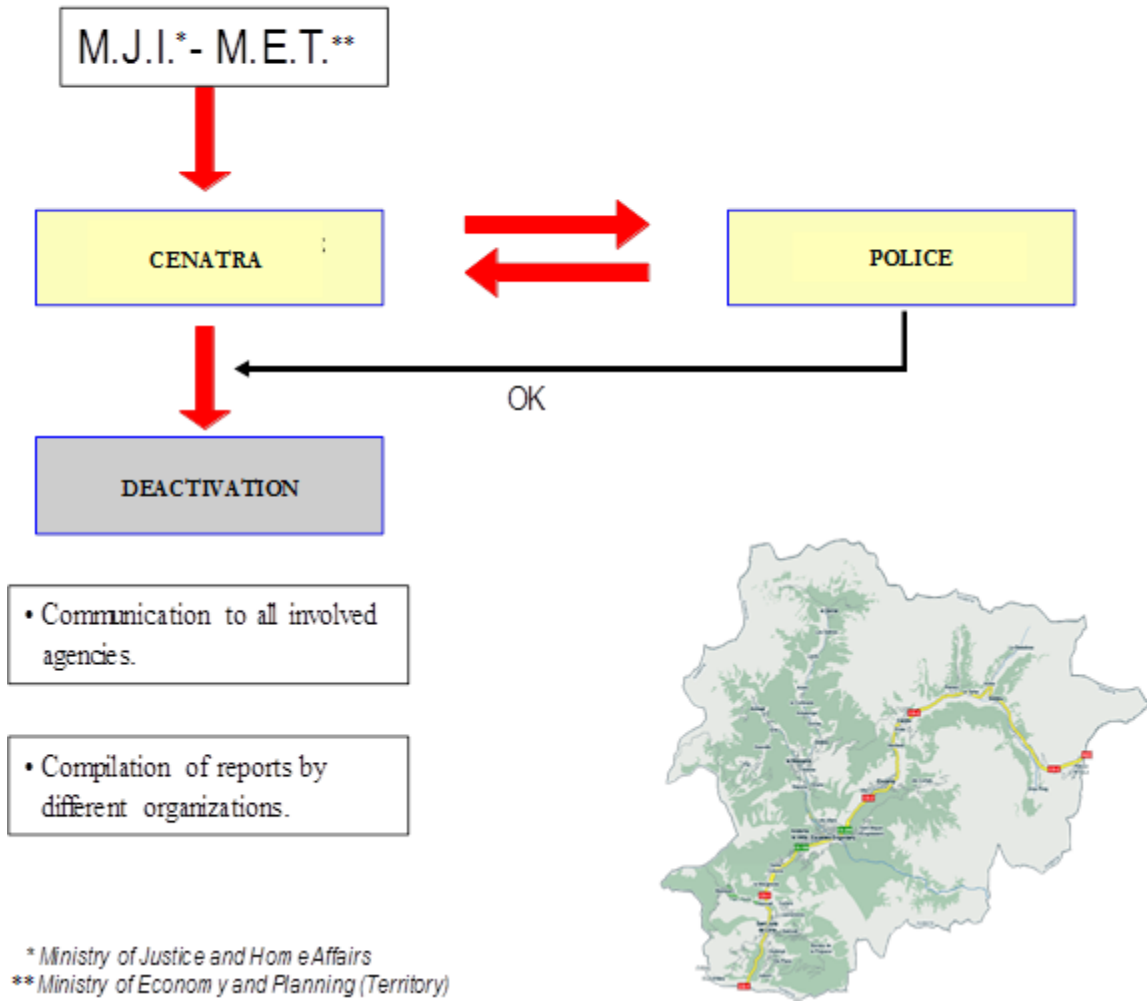


Figure 9 - Scheme of interventions for the deactivation phase.



Figure 10- User information: The Snow Colour (1)

- Alguns consells**
- Penseu a omplir el dipòsit de combustible.
 - Netegeu periòdicament la neu del vehicle.
 - Col·loqueu les cadenes a les rodes motrius.
 - No utilitzeu el fre de mà quan aparqueu, el gel podria bloquejar-lo.

- Algunos consejos**
- Piense en llenar el depósito de combustible.
 - Limpie periódicamente la nieve del vehículo.
 - Coloque las cadenas en las ruedas motrices.
 - No use el freno de mano al estacionar, el hielo podría bloquearlo.

- Quelques conseils**
- Pensez à remplir le réservoir de carburant.
 - Nettoyez périodiquement la neige du véhicule.
 - Placer les chaînes sur les roues motrices.
 - Ne pas utiliser le frein à main pour stationner, la glace pourrait le bloquer.

El que convé portar

- Ulleres • Aliments • Pala • Rascador • Llanterna • Cadenes • Roba d'abric

Lo que conviene llevar

- Gafas • Alimentos • Pala • Rascador • Linterna • Cadenas • Ropa de abrigo

Ce qu'il faut avoir

- Lunettes • Vivres • Pelle • Raclette • Lanterne • Chaînes • Vêtements chauds

Informació trànsit

Información tráfico
Information trafic

Tel. (+376) 1802 1802

Emergències - Policia

Emergencias - Policia
Secours - Police

Tel. 110

Informació estat de les carreteres

Información estado de las carreteras
Information état des routes

Tel. (+376) 84 88 84

www.mobilitat.ad



Els colors de la neu

Los colores de la nieve

Les couleurs de la neige

Figure 11- User information: The Snow Colour (2)

5.- COOPERATION IN THE BORDER

5.1.- OBJECTIVES

Andorra has signed with France several agreements for cooperation related to the roads on the border. In relation to the management of the road network, the documents are:

- Administrative coordination agreement in case of disturbance of the road network connecting Andorra with France's April 30, 2004.
- Additional Act No 1 of the Franco-Andorran April 30, 2004: Winter coordination plan between Andorra, Ariège and Pyrénées Orientales for managing some border roads (RN20, RN22, RN320 and RN116).
- Additional Act No 2 to the Franco-Andorran April 30, 2004: administrative coordination in the event of disruption on the road network linking Andorra and France.

The most important characteristics of cross border cooperation are the definition of the following aspects:

1. Organization and operation of decision circuit, operations centre and centres of traffic engineering and traffic management.
2. Operations organization of all services involved in plan application.
3. Planning based on:
 - A common level of surveillance
 - A common level of notice
 - Concomitant participation of operation centres
 - Control measures undertaken at the regulatory level and in the field
 - The organization of emergency and assistance services to users
 - Bilateral management of traffic related to mass movements and the necessary exchange of permanent information between the administrations concerned and stakeholders.

5.2.- ACTIVATION OF THE PLAN

5.2.1.- Action 1: Notification of the Surveillance Group

When the Météo-France monitoring yellow level is activated in Andorra or in one of the departments of the French border, the representative of the Government of Andorra and the Director of Staff from each department are contacted and ensure the transmission of information to all the services that make up the winter monitoring group (police, customs, etc.).

5.2.2.- Action 2: Implementation and activation of COD and CESI

At the time of Météo-France orange or red level activation or on demand of the authorities, the plan is activated. Services concerned departments 66 (Pyrénées Orientales) and 09 (Ariège) and Andorra meet simultaneously.

The French partner evaluates the implementation of the Departments Operations Centre (COD) and the International Security and Emergency Centre (CESI).

5.2.3.- *Action 3*: Blocking of the direct access to Pas de la Casa and Puerto de Puymorens.

5.2.4.- *Action 4*: Blocking of the direct access to the tunnel of the Puymorens.

5.2.5.- *Action 5*: Blocking the access to Andorra through the RN 116 Pyrenees Orientales and through Spain.

For Actions 3 and 4 the decisions are made together by the prefects of the departments 09 and 66. For Action 5, decisions are made by the department 09 only, after studying the meteorological conditions (red or orange alert levels), and/or the viability conditions based on the services proposal, activation of measures under the traffic management plan or other derogatory or complementary way that suits the situation. They also inform all stakeholders.

5.2.6.- *Action 6*: End of the blocked traffic situation at the access to Andorra through the RN 116 Pyrenees Orientales and through Spain.

5.2.7.- *Action 7*: End of the blocked traffic situation at the access to the tunnel of the Puymorens.

5.2.8.- *Action 8*: End of the blocked traffic situation at the access to Pas de la Casa and the Port of Puymorens.

The prefects who have previously taken restrictive measures in view of the weather conditions and serviceability adopt the decision to cancel all traffic restraint measures.

5.2.9.- *Action 9: Disabling the Plan*

The prefects of the departments 09 and 66 and the Andorran government representative adopt together this measure according weather conditions and serviceability.

5.3.- APPLICATION OF THE REGULATIONS CONCERNING THE MOVEMENT AND CONTROL EQUIPMENT OF VEHICLES

The plan predicts that as soon as the weather situation deteriorates and traffic conditions get more complicated, the following measures will be applied gradually:

- Control the use of snow chains on all vehicles. Use of signalized areas marked by the degree of snow.
- Block the traffic of buses, coaches and freight vehicles at certain areas.
- Prohibition of circulation for freight vehicles.
- Block the traffic of all vehicles in some places depending on road conditions.