

XIE CONGRÈS INTERNATIONAL
DE LA VIABILITÉ HIVERNALE

SÉANCE SPÉCIALE SUR LE
« SERVICE HIVERNAL AU 21^E SIÈCLE »

XITH INTERNATIONAL WINTER
ROAD CONGRESS

SPECIAL SESSION ON
“WINTER ROAD SERVICE IN THE 21ST CENTURY”

SOMMAIRE

AVANT-PROPOS (E/F)	4
MODERATORS AND PANELISTS	5
RÉSUMÉ (E/F)	6
PRESENTATIONS AND DISCUSSIONS	12
1. OPENING ADDRESS BY DR. HIROSHI MITANI	12
2. PRESENTATIONS OF REPRESENTING COUNTRIES	13
2.1 USA	13
2.2 CHILE	21
2.3 FINLAND	36
2.4 LITHUANIA	40
2.5 HUNGARY	51
2.6 UNITED KINGDOM	62
2.7 CHINA	68
2.8 JAPAN	80
3. COMMENTS AND DISCUSSION	89
3.1 TOPIC 1: MOBILITY IN WINTER AND WINTER SERVICE LEVEL	89
TOPIC 2: SAFETY AND ENVIRONMENT	89
3.2 TOPIC 3: SHARING RESPONSIBILITIES AMONG PUBLIC AND PRIVATE SECTORS	92
3.3 NEW TECHNOLOGIES AND OTHERS	95
4. SUMMARY AND CONCLUSION	97
4.1 SUMMARY BY MS. GINNY CLARKE	97
4.2 CLOSING BY DR. HIROSHI MITANI	103
ANNEXE - PROGRAMME DE LA SEANCE SPECIALE (E/F)	104

Note : E/F traduit en anglais et en français

CONTENTS

FOREWORD (E/F)	5
MODERATORS AND PANELISTS	5
EXECUTIVE SUMMARY (E/F)	7
PRESENTATIONS AND DISCUSSIONS	12
1. OPENING ADDRESS BY DR. HIROSHI MITANI	12
2. PRESENTATIONS OF REPRESENTING COUNTRIES	13
2.1 USA	13
2.2 CHILE	21
2.3 FINLAND	36
2.4 LITHUANIA	40
2.5 HUNGARY	51
2.6 UNITED KINGDOM	62
2.7 CHINA	68
2.8 JAPAN	80
3. COMMENTS AND DISCUSSION	89
3.1 TOPIC 1: MOBILITY IN WINTER AND WINTER SERVICE LEVEL	89
TOPIC 2: SAFETY AND ENVIRONMENT	89
3.2 TOPIC 3: SHARING RESPONSIBILITIES AMONG PUBLIC AND PRIVATE SECTORS	92
3.3 NEW TECHNOLOGIES AND OTHERS	95
4. SUMMARY AND CONCLUSION	97
4.1 SUMMARY BY MS. GINNY CLARKE	97
4.2 CLOSING BY DR. HIROSHI MITANI	103
APPENDIX PROGRAM OF THE SPECIAL SESSION (E/F)	105

Note: E/F English and French

AVANT-PROPOS

Le XIème Congrès international de la Viabilité hivernale a eu lieu à Sapporo, Japon, du 28 au 31 janvier 2002. Premier congrès organisé par l'AIPCR au 21ème siècle, le Congrès de Sapporo a connu un succès remarquable : 2285 délégués de 64 pays ont participé au Congrès et environ 77000 personnes ont visité l'exposition.

A l'occasion du Congrès de Sapporo, une séance spéciale a été organisée pour la première fois dans le cadre d'un congrès de la viabilité hivernale. Ce document rend compte de la séance spéciale qui a eu lieu le 30 janvier et dont le thème était "Le service hivernal au 21ème siècle".

Cette séance de trois heures a constitué un événement marquant, en ce qu'il a identifié les futures orientations du service hivernal. Des échanges riches s'appuyant sur des projets régionaux ont succédé aux communications présentées par huit experts de renommée mondiale. J'ai la conviction que notre discussion servira de base à une amélioration de l'entretien routier hivernal.

Enfin, et ce n'est pas le moins important, je voudrais exprimer mes remerciements les plus sincères à l'auditoire, ainsi qu'au rapporteur et aux orateurs qui ont permis le succès de cette séance.

Dr Hiroshi MITANI
Président de la Séance spéciale

FOREWORD

The XIth International Winter Road Congress was held in Sapporo, Japan on 28 – 31 January 2002. Being the first PIARC Congress in the 21st century, the Sapporo Congress has proven to be a huge success, drawing 2285 participants from 64 countries and about 77,000 visitors to its exhibition.

On the occasion of the Sapporo Congress, the Special Session was organized for the first time under the frame work of the Winter Road Congress. This document reports on the Special Session held on 30 January with the theme, “Winter Road Service in the 21st Century”.

The three-hour session was a milestone in signifying the future direction of the winter road service. Active exchange of views based on various regional perspectives took place following the presentations by eight distinguished experts. I trust that our discussion will serve as a basis for enhancing the winter road maintenance in the future.

Last but not least, I would like to extend my sincerest gratitude to all those who attended this session and the Rapporteur as well as all the members of the panel for leading this session to every success.

Hiroshi MITANI, Dr. Eng.
Special Session Chairman

MODERATORS AND PANELISTS

Moderators

Chairman: Dr. Hiroshi MITANI
Past President of PIARC
Rapporteur: Ms. Ginny CLARKE
PIARC ST3 Co-ordinator, Chief Highway Engineer, Highways Agency, U.K.

Panelists (in order of presentation during the session)

North America	U.S.A.: Mr. Elwyn G. TINKLENBERG Commissioner of Transportation, Minnesota Department of Transportation
South/Central America	Chile: Mr. Roland TOLOZA NORAMBUENA (Chile) Regional Director of Roads, XI Region, Ministry of Public Works
Northern Europe	Finland: Mr. Eero KARJALUOTO Director General, Finnish Road Administration, PIARC First Delegate of Finland
Baltic Region	Lithuania: Dr. Virgaudas PUODŽIUKAS Director General of the Lithuanian Road Administration PIARC First Delegate
Central/Eastern Europe	Hungary: Dr. Péter LÁNYI Head of Road and Bridges Division, Department for Roads, Ministry of Transport and Water Management
Western Europe	U.K.: Mr. Mike WILSON Team Leader of Operational Policy, Highways Agency
Asia	China: Mr. FENG Zhenglin Director General, Highway Department, Ministry of Communications PIARC First Delegate of China
Host Country	Japan: Mr. Nobuo KATSURA (Japan) Mayor of Sapporo

RESUME

Pour la première fois une séance spéciale a été organisée dans le cadre du XIème Congrès international de la Viabilité hivernale, afin de partager les informations et les expériences les plus récentes dans ce domaine.

La séance a été présidée par le Dr Hiroshi MITANI, ancien Président de l'AIPCR. Mme Ginny CLARKE, coordinatrice du Thème stratégique n°3 de l'AIPCR en a été le rapporteur.

Sous le titre "Le service hivernal au 21ème siècle", la séance comprenait les présentations de huit orateurs parmi lesquels se trouvaient le Maire de Sapporo et des représentants de plusieurs pays choisis pour mieux illustrer les points de vue régionaux. Ils ont traité de la vie et du transport routier dans les régions soumises à la neige, et en particulier de l'état actuel des réseaux routiers et du service hivernal. Les présentations, qui sont résumées ci-après, ont évoqué les mesures actuelles et les futures évolutions de la viabilité hivernale.

Pour l'Amérique du Nord, M. TINKLENBERG (Etats-Unis) a montré comment le Ministère des Transports du Minnesota mettait en œuvre les technologies les plus récentes pour le service hivernal. Les lames biaisées expérimentales équipées de GPS permettent d'améliorer la sécurité des exploitants et des usagers de la route quand la visibilité n'est pas bonne ou dans des conditions météorologiques difficiles. Au moyen d'Internet, le Ministère diffuse également au public des informations sur l'état des routes et la météo. L'orateur a souligné la promesse du Ministère : "On vous permet d'arriver en sécurité, avec sérieux et efficacement".

Représentant l'Amérique du Sud, M. TOLOZA a souligné l'importance du développement et de l'entretien du réseau routier au Chili. Il a mentionné les moyens opérationnels mis en œuvre afin d'assurer la mobilité sur les itinéraires menant aux cols situés à la frontière entre le Chili et l'Argentine et la hiérarchie établie selon cinq niveaux d'accessibilité et de service correspondant.

Pour l'Europe du Nord, M. KARJALUOTO a présenté l'histoire du service hivernal en Finlande et les tendances les plus récentes dans ce domaine, notamment le rôle et les responsabilités des autorités routières avec les concepts de clients et de fournisseurs apparus à la fin des années quatre-vingt dix.

Le Dr PUODŽIUKAS (Lituanie) a rendu compte des actions menées en coopération par les pays baltes (Estonie, Lettonie et Lituanie) dans le cadre de l'Association routière des pays baltes. Il a également décrit le système d'information météorologique opérationnel dans ces pays.

Représentant l'Europe centrale et orientale, le Dr LÁNYI (Hongrie) a présenté les différents niveaux de service hivernal selon les catégories de routes. De plus, il a décrit le futur système d'information météorologique qui conduira à une amélioration de la sécurité routière et de l'entretien. Il a également parlé des préoccupations concernant l'environnement et de l'utilisation des fondants chimiques.

EXECUTIVE SUMMARY

In the frame work of the XIth International Winter Road Congress the Special Session was organized for the first time, aiming to share the latest information and practice on winter road service.

The Session was moderated by Dr. Hiroshi MITANI, Past President of PIARC, as Chairman and Ms. Ginny CLARKE, PIARC Strategic Theme Coordinator for ST3, as Rapporteur.

Under the main theme, “Winter Road Service in the 21st Century”, the Session comprises the presentations by eight panelists including the Mayor of Sapporo, the host city of the Congress, and road administrators representing varied region around the world in order to better reflect regional perspectives. They covered topics related to the life and road transport in snowy regions, in particular, on present situations of the road networks and winter road maintenance. They further referred to the actual measures and future trends of the winter road service. Followings are the summary of Presentations:

From North America Mr. TINKLENBERG of the United States introduced the winter road maintenance in the Minnesota Department of Transportation, employing a state of the art technology. The experimental snowplow using GPS can increase safety for operators and the road users in low visibility and other hazardous winter weather condition. The department also provides road conditions and weather information to the public on internet. He underlined the department’s promise, “Getting You There: Safely, Responsibly, and Efficiently”.

From South America Mr. TOLOZA emphasized the importance of road development and its maintenance in Chile. He referred to the operational logistics for mountain passes between Argentina and Chile to assure mobility by giving priority to designated routes according to five accessibility levels and related service.

From Northern Europe, Mr. KARJALUOTO presented the history of winter road maintenance in Finland and the latest trend in this field; the shift of role and responsibility of road administrators with client/producer concept from late 90s onwards.

From Lithuania, Dr. PUODŽIUKAS reported on the collaborative activities in the Baltic countries linking Latvia, Estonia and Lithuania under the Baltic Road Association. He also introduced the road weather information system in operation in these countries.

From Hungary representing Eastern/Central Europe, Dr. LÁNYI presented the service level of winter road maintenance depending on road categories. He also introduced the plan for road weather information system which will bring about the improvement to the traffic safety as well as road maintenance, further referring to environmental factors on de-icing agents.

Pour l'Europe de l'Ouest, M. WILSON (Royaume-Uni) a fait état d'une demande toujours plus grande en matière de service hivernal et du transfert de responsabilité du secteur public vers le secteur privé afin que des contrats de partenariat à long terme puissent accroître l'efficacité dans ce domaine.

Représentant l'Asie, M. FENG (Chine) a rendu compte du développement rapide du réseau autoroutier dans son pays en soulignant l'importance d'un entretien adapté. Grâce à des techniques nouvelles comme les enrobés à liant modifié, la Chine met en œuvre des moyens efficaces pour l'entretien routier hivernal et améliore le niveau de service. Celui-ci bénéficie aussi de la réforme institutionnelle qui préconise une gestion moderne et le recours aux nouvelles technologies.

Enfin, pour le pays hôte, le maire de Sapporo a décrit les mesures de lutte contre la neige et le verglas mises en œuvre dans sa ville. Dans le cadre d'un schéma directeur, les autorités municipales ont défini quatre tâches prioritaires visant à lutter contre la neige. Ces mesures utilisent une source d'énergie jusqu'ici inemployée, provenant du réseau d'eaux usées et de la chaleur produite par les usines d'incinération d'ordures, ce qui est bénéfique du point de vue de l'environnement. Sapporo est aussi en train de promouvoir des opérations de déneigement qui font appel au volontariat des habitants.

Les communications ont été suivies par une discussion et un échange de vues entre les orateurs et l'auditoire, qui ont porté sur les points suivants :

1. La mobilité et les niveaux de service en hiver
2. La sécurité et l'environnement
3. Le partage des responsabilités entre secteurs public et privé
4. Les nouvelles technologies et autres sujets

1. La mobilité et les niveaux de service en hiver

Il est essentiel de connaître les besoins des usagers de la route et de répondre à ces besoins en utilisant les nouvelles technologies. Il est également important de fournir une information en retour pour garantir le niveau de service visé et améliorer encore le service.

2. La sécurité et l'environnement

Un participant a indiqué que si les statistiques nationales d'accidents étaient un outil précieux pour évaluer la sécurité routière, il était important d'analyser les paramètres d'accidents au cas par cas ainsi que les effets des opérations d'entretien. Il est important de garantir la sécurité d'une part des usagers, d'autre part des personnels d'exploitation qui, en cas d'accident travaillent pour éviter les sur-accidents et la congestion.

From Western Europe Mr. WILSON of UK introduced the increasing demands for winter road service and transfer of the related responsibility from the public to the private sector aiming at delivering in partnership with long-term contract more efficient winter service.

From Asia, Mr. FENG of China reported the rapid development of national motorway network in progress, stressing the importance of appropriate road maintenance. By applying new technologies such as modified asphalt mixtures China is implementing effective winter road maintenance to enhance the service. Also level of service is largely improved by the institutional reform to adopt advanced management and application of new technology.

Finally, from the host country, Mayor of Sapporo presented the snow and ice control measures implemented by the city. Under the master plan, the city sets four priority tasks for snow control making use of unused energy source generated from sewage systems and waste heat from refuse incineration plants in order to reduce environmental load. Sapporo is also promoting snow removal operation in cooperation with the citizens.

Following the presentations, discussion and exchange of views took place among panelists and audiences primarily focusing on the below topics:

1. Mobility in winter and service level of winter roads
2. Safety and environment
3. Sharing responsibilities among public and private sectors
4. New technology and others

1. Mobility in winter and service level of winter roads

It is very important to recognize and respond to the needs of road users by applying new technology. Also at the same time, by procuring information feed back it is important to assure the targeted service level and further improve the service.

2. Safety and environment

There was a comment that national accident statistic was an important tool to assess road safety, however, it is also important to analyze the relative accident parameters on roads one by one and the effects of the maintenance activities. It is important to ensure the safety for both users and those working on the roads to prevent accidents causing further accidents and congestion.

3. Le partage des responsabilités entre secteurs public et privé

Des quatre thèmes de discussion, c'est celui qui a suscité le plus grand intérêt et donné lieu au débat le plus fourni. Au cours des dernières années, le partage des responsabilités entre secteurs public et privé est devenu un sujet d'actualité. La discussion a porté en particulier sur la définition des responsabilités partagées entre les autorités routières (le client) et le fournisseur de service (l'entreprise) dans un processus de partenariat public-privé. Dans le cas d'un contrat à plus long terme, des primes sont allouées au fournisseur de service pour l'inciter à investir dans l'infrastructure et l'innovation technologique, ce qui permet d'atteindre un niveau de service plus élevé.

Par ailleurs, une autre forme de partenariat entre le secteur public et les citoyens a été présentée. Son but est d'améliorer la rentabilité et le niveau de service. On encourage les citoyens à emprunter les transports en commun en hiver, afin de diminuer le trafic des voitures particulières, facilitant ainsi les opérations de déneigement.

4. Les nouvelles technologies et autres sujets

Les techniques nous permettent de mettre en œuvre des moyens de service hivernal plus efficaces et plus respectueux de l'environnement. En utilisant les Systèmes de Transport Intelligent et les systèmes d'information météorologiques, on peut rendre le service hivernal plus rentable et avoir une politique plus volontariste en la matière.

Enfin, Mme Ginny CLARKE, rapporteur de la séance, a passé en revue les quatre thèmes traités. Elle a souligné l'importance du rôle de gestionnaires qui doivent identifier les besoins des usagers et y répondre. Bien qu'on ait insisté sur la sécurité routière, les impacts sur l'environnement devront être pris en compte dans l'avenir. Pour partager les responsabilités et les risques correspondants ceux-ci doivent être identifiés d'autant plus précisément que nous avons le plus souvent recours à des entreprises pour les opérations de service hivernal. Les nouvelles technologies permettent in fine de fournir un meilleur service, mais l'homme joue un rôle prépondérant dans l'utilisation de ces technologies. L'importance du développement et de l'application des technologies de l'information a été mentionnée par tous les orateurs.

La séance spéciale était destinée à faire une synthèse des orientations en matière de service hivernal pour le 21^{ème} siècle. Des expériences et des projets divers ont permis un échange entre les orateurs et l'auditoire qui représentaient différentes régions du monde. Cette séance a permis d'exprimer de nombreuses idées concrètes visant à améliorer la qualité du service hivernal, pour le bénéfice de la communauté routière dans son ensemble.

3. Sharing responsibilities among public and private sectors

Among the four topics, this topic attracted particular interest and active discussion took place. In recent years, the shift of responsibilities between the public and private sectors is recognized. In particular, the discussion focused on defining the responsibility shared by the road administration as a client and service provider (contractor) in the process of the public/private partnership. With longer duration contract, service provider is given incentive to invest in the network and technical innovation which enables to attain better service level.

On the other hand, another form of partnership between the public and civilians was presented aiming at improving cost efficiency and level of service. Civilians are encouraged to use public transportation in the wintertime to keep the roads free of cars for facilitating snowplow operation.

4. New technology and others

Technology allows us to implement more effective, efficient and environmentally-friendly winter maintenance. With application of ITS and weather information systems, we can carry out more cost-effective and proactive winter maintenance.

Finally, Ms. Ginny CLARKE, as Rapporteur, reviewed the entire session based on the four topics. She outlines the importance of the role of road administrators to identify and respond customer needs. Although the particular emphasis was placed for the safety, environmental impacts should be taken into consideration for the future. As for sharing the responsibility and the related risk, they should be clearly identified as we predominantly use contractors to undertake the winter maintenance operations. On the topic of new technology, it will ultimately deliver a better service but humans play an essential part in using technology. All the presentations shared a point in common in featuring the development and application of information technology.

The Special Session was intended to summarize the directions of winter road service envisaged for the new century. Various experiences and perspectives were shared between the panelists and audience effectively representing different regions around the world. This session afforded many practical ideas for upgrading the quality of winter road service for the global road community.

PRESENTATIONS AND DISCUSSIONS

1. Opening Address by Dr. Hiroshi MITANI

Good morning. Thank you very much for joining us today. My name is Hiroshi MITANI. It is my great pleasure to chair this important session together with Ms. Ginny CLARKE as Rapporteur. Ms. CLARKE is the Director of Safety and Research of the Highways Agency of the United Kingdom and its Chief Highway Engineer. She is a member of the PIARC Executive Committee and plays a crucial role as the coordinator of the strategic Theme 3.

The XIth International Winter Road Congress is to mark the first PIARC World Road Congress in the 21st century. To commemorate this significant event this special session is organized under the theme “Winter Road Service in the 21st Century”. This session aims at providing the latest information and exchanging the knowledge concerning winter road service in the future. It also intends to summarize the directions envisaged for the new century. The impact of winter varies from one region to another and in each country based on climatic and geographic conditions, therefore there are a number of approaches and solutions to winter road maintenance. We are amply lucky to gather here in Sapporo to solicit the opinions on the above-mentioned subject from leading experts from all corners of the world, a mayor and administrators. Eight distinguished speakers are here to share their experience and views on winter road maintenance.

I take great pleasure in introducing the panel members. On my left, first of all from America, Mr. Mark WIKELIUS, Minnesota State Engineer who is taking part in this session in place of Mr. Elwyn G. TINKLENBERG, Commissioner of Transportation of the Minnesota Department of Transportation in the United States. Mr. Rolando TOLOZA, NORAMBUENA, Regional Director of Roads of Chile. He is also a member of PIARC Technical Committee C17. Mr. Eero KARJALUOTO, Director General of the Finnish Road Administration. He is also the First Delegate of Finland to PIARC. Dr. Vigaudas Poudziukas is the Director General of the Lithuanian Road Administration, Ministry of Transport and Communication. He is also the First Delegate of Lithuania to PIARC. Mr. Péter Lányi from Hungary is the Head of the Road and Bridges Division of the Department for Roads, Ministry of Transport and Water Management. Mr. Lányi is also a member of the PIARC Technical Committee C4. Mr. Mike WILSON, team leader of Operational Policy, Highways Agency of the United Kingdom, he is also a member of the PIARC Technical Committee C6. And lastly from Asia, Mr. FENG Zhenglin, Director General of the Department of Road Transport Administration, Ministry of Communications of China, he is also the First Delegate of China to PIARC. And Mr. Nobuo KATSURA, Mayor of Sapporo, who has kindly offered to host this significant event, PIARC’s first Winter Road Congress in the 21st Century. I’d like to take this opportunity to thank him again for hosting our Congress. Thank you very much indeed.

2. Presentations of Representing Countries

Dr. MITANI:

Now let me go through the session procedure. Our session is divided into two parts by a break. The first part consists of presentations by eight panelists here, each member is asked to introduce the present situation of road networks and winter road maintenance, further referring to actual measures or future trends for winter road maintenance focusing in particular on the four major topics. Mobility in winter and winter service levels, safety and the environment, sharing the responsibility and new technology. After the break the second part will commence with discussion and exchange of views in the framework of the four topics that I just mentioned. At this time we also invite opinions from the audience. In order to facilitate the procedure, comment sheets are distributed to you, please fill out the form with your comments pertaining to these specified topics and kindly turn in to the box placed by the stage. Now I'd like to invite the first speaker to take the floor. Mr. WIKELIUS, please.

2.1 Mr. Mark WIKELIUS (U.S.A.)

Maintenance Engineer of Minnesota Department of Transportation, on behalf of
Mr. Elwyn G. TINKLENBERG (U.S.A.)
Commissioner of Transportation, Minnesota Department of Transportation
"Moving Minnesota through winter maintenance activities"

Mr. WIKELIUS:

Thank you Dr. MITANI and good morning. I am Mark WIKELIUS, the Maintenance Engineer for the State of Minnesota, Minnesota Department of Transportation. I am honored to be here representing Commissioner Elwyn TINKLENBERG, Commissioner of Transportation, Minnesota Department of Transportation. He apologizes for not being able to attend, however, the annual legislative session begins this week and he needed to stay back in Minnesota. I bring his greetings to the PIARC Winter Road Congress. Fortunately Commissioner TINKLENBERG was planning on using a video as part of his presentation this morning. I would like to share that video with you at this time.

(video)

Hello, I'm Commissioner, Elwyn TINKLENBERG from the Minnesota Department of Transportation in the United States. I am very sorry that I am unable to be with you in person for the XIth International Winter Road Congress. Thank you for the honor and the opportunity to present Minnesota's winter maintenance technology research and innovation. The following video highlights some of the most advanced practices used by our state maintenance forces. We are very proud of our maintenance professionals and happy to share with all of you the advances they have helped develop. Best wishes for a successful winter maintenance conference.

Minnesota, a snowbelt state located in the middle of North America, has long been recognized as a leader in snow and ice removal strategies.(Fig.1-1) Technology, research and innovation are crucial to the Minnesota Department of Transportation's (Mn/DOT's) efforts to provide safe and efficient transportation to citizens throughout the winter season.



Fig.1-1

Traditional plowing and application of chemicals -- de-icing, pre-wetting and anti-icing are routinely used to keep Minnesota roads clear during the winter months. Through monitoring of precise road surface temperatures, operators can determine the best sand/salt mix for the conditions.(Fig.1-2) The department's ongoing "Salt Solutions" program trains snowplow operators in the most effective and efficient use of salt. Mn/DOT continues to experiment with various de-icing methods and chemicals, including those containing calcium chloride and magnesium chloride, to lower the level of risk to the environment and human health.(Fig1-3)

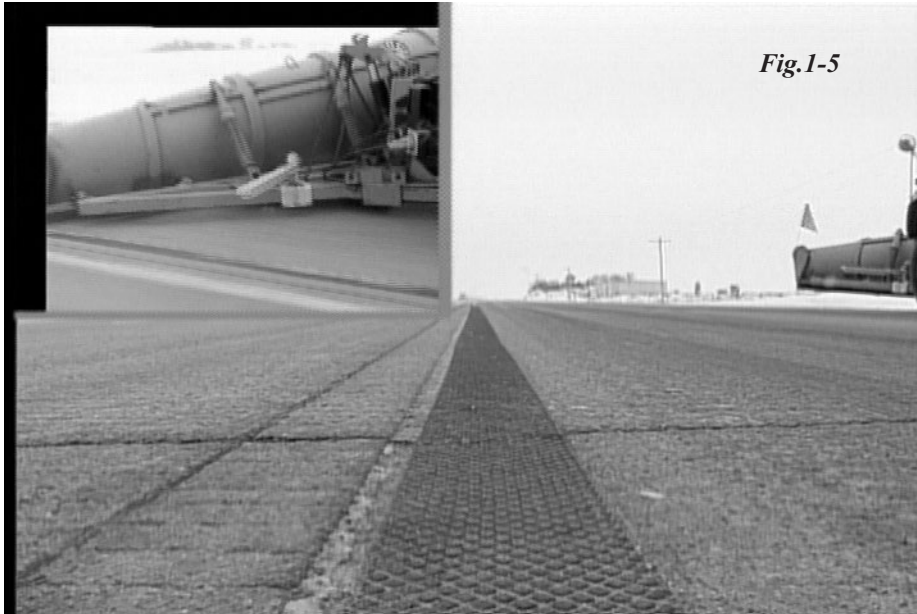


Fig.1-2



The department's experimental SAFE PLOW uses a Global Positioning System (GPS) and radar to increase safety for snowplow operators and the traveling public in low visibility and other hazardous winter weather conditions.(Fig.1-4) Several plow trucks, an ambulance and a state patrol squad car are currently in use to test the latest computerized technology.(Fig.1-5)





Technologies being tested include magnetic tape for lane awareness, 360-degree radar for collision warning, heads up display for vehicle guidance and driver interface and other audible and tactile warnings for the drivers.(Fig1-6) A single axle dump truck has been outfitted with various new and innovative equipment and serves as a “test bed” for these various new technologies. The test bed truck features a reversible, slotted trip front plow, rear-mounted wing with trip edge, underbody plow, joystick control and arm console, material placement system and various other components.(Fig.1-7) Rear lighting and on-board cameras are expected to decrease rear-end accidents. Operators and mechanics are evaluating the truck that is being moved around the state for their use.





Fig.1-7

Information from nearly 90 RWIS (Road Weather Information Stations) around the state provides almost real-time pavement and atmospheric information to maintenance forces 24 hours a day.(Fig.1-8) Sensors mounted in the road's surface, monitor pavement conditions and temperatures. When used along with above ground weather stations, RWIS better prepares Mn/DOT maintenance crews for snow and ice operations during winter weather. With advance warning, plows are able to begin spreading chemicals before conditions deteriorate, which lessens the impacts of icy roadway surfaces in the state. And the system on river bridges alerts workers to potential icing and slippery conditions.



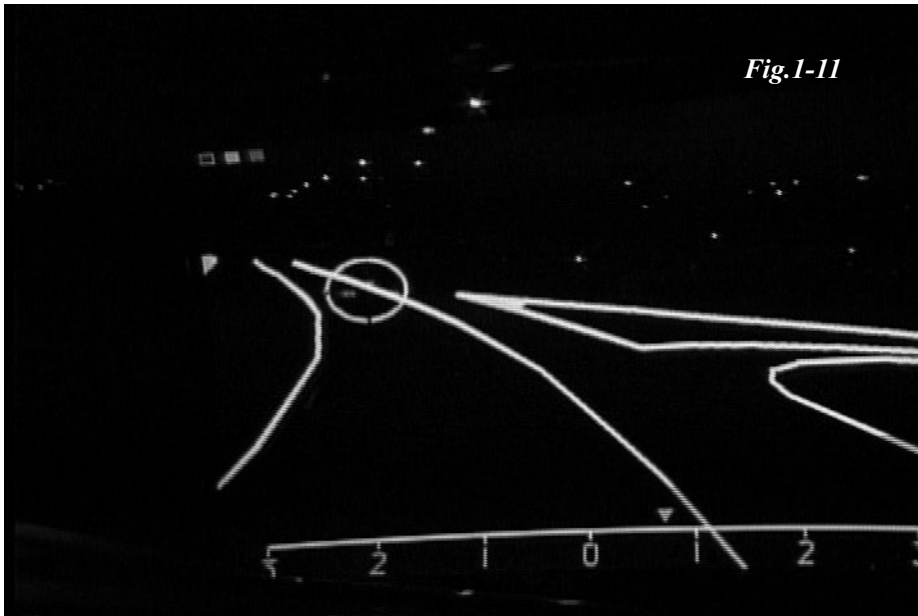
Fig.1-8



Public safety is enhanced through the use of gates along a major interstate route that crosses southern Minnesota. When roads become impassable because of heavy snow, icy road surfaces and strong winds, maintenance forces close and lock gates at the entrance ramps to prevent motorists from venturing onto the dangerous highway. Barring access to the interstate saves the lives of motorists and prevents the need to rescue stranded travelers from winter storms.

Regular performance management provides the department with customer feedback that in turn drives our winter maintenance activities. Through surveys of Minnesota motorists, Mn/DOT establishes service levels and sets targets to satisfy drivers' expectations of bare pavement following winter storms. Performance is routinely measured and reported to evaluate effectiveness. And our customers' expectations continue to lead an annual improvement in winter maintenance.

Mn/DOT's mission is to keep Minnesota Moving.(Fig.1-11) Although technology plays a large role in winter maintenance activities in Minnesota, the employees of the Minnesota Department of Transportation are truly our most valued resource. Without their knowledge and skills combined with their common sense and judgement, all the technology would sit idle. The department's promise -- Getting You There: Safely, Responsibly, Efficiently, Together -- captures the spirit of Mn/DOT's employees as they strive to keep Minnesota's roads clear every winter.



Dr. MITANI:

Thank you very much Mr. WIKELIUS. Do you have any questions concerning this marvelous video presentation? No questions? OK, please.

Mr. WILSON:

My only question is: Who decides, in your automated bridge de-icing system to activate it, is it a computerized decision making process?

Mr. WIKELIUS:

The bridge de-icing system can be either run on an automatic, based upon a road weather information system formula or it can be manually activated as well.

Mr. WILSON:

Thank you.

2.2 Mr. Roland TOLOZA NORAMBUENA (Chile)

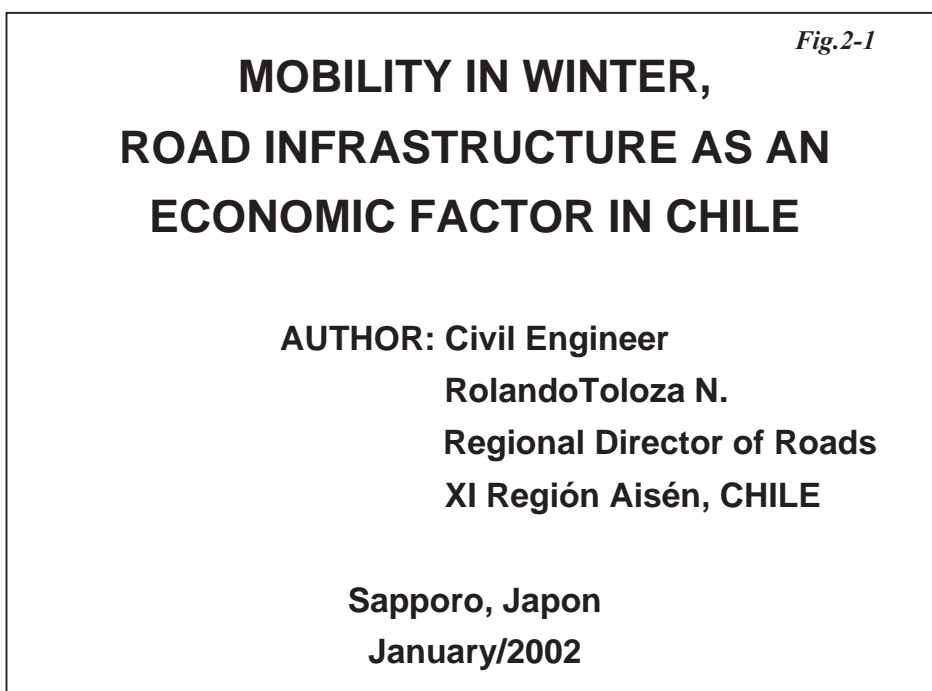
Regional Director of Roads, XI Region, Ministry of Public Works
"Mobility in winter, road infrastructure as an economic factor in Chile"

Dr. MITANI:

OK, now I will proceed to invite the next speaker. Mr. TOLOZA from Chile. I am very grateful that you came here after a 30-hour trip from Chile, thank you very much indeed.

Mr. TOLOZA:

Good morning Dr. MITANI. First of all, thank you to the organizers of the Congress. In the winter mobility on the road infrastructure as an economical factor in Chili is important because Chile has transformed into a service country and at the same time can provide solutions to our social and economical problems.(Fig.2-1)



Well this is Chile and this is my city on the south 45th parallel.(Fig.2-2) Chile is a leader in services in South America and through investments and infrastructure we would like this trend to continue in this direction.(Fig.2-3)(Fig.2-4)

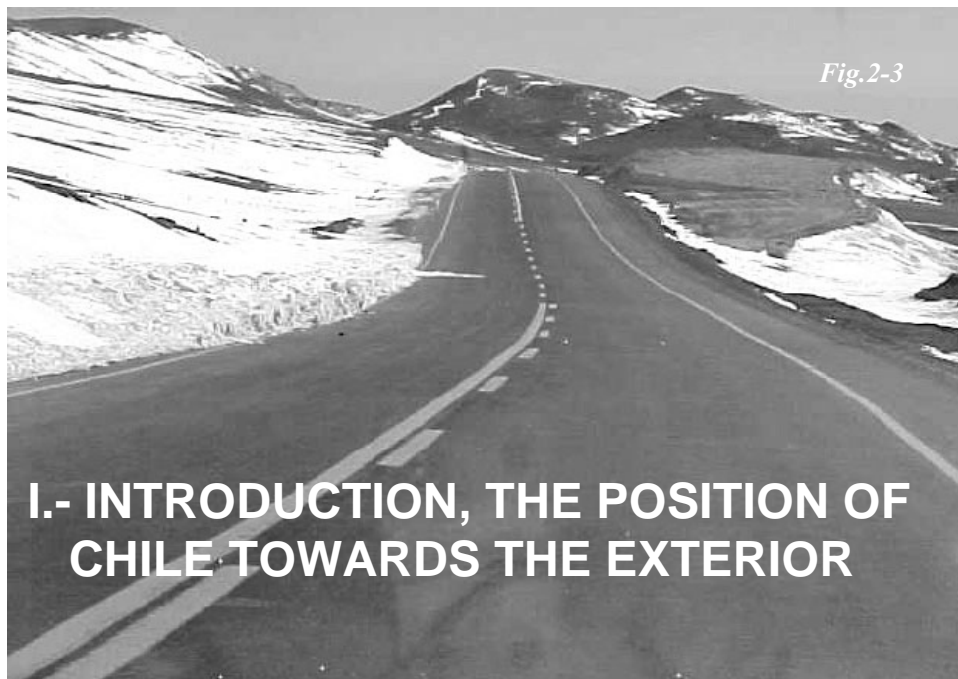
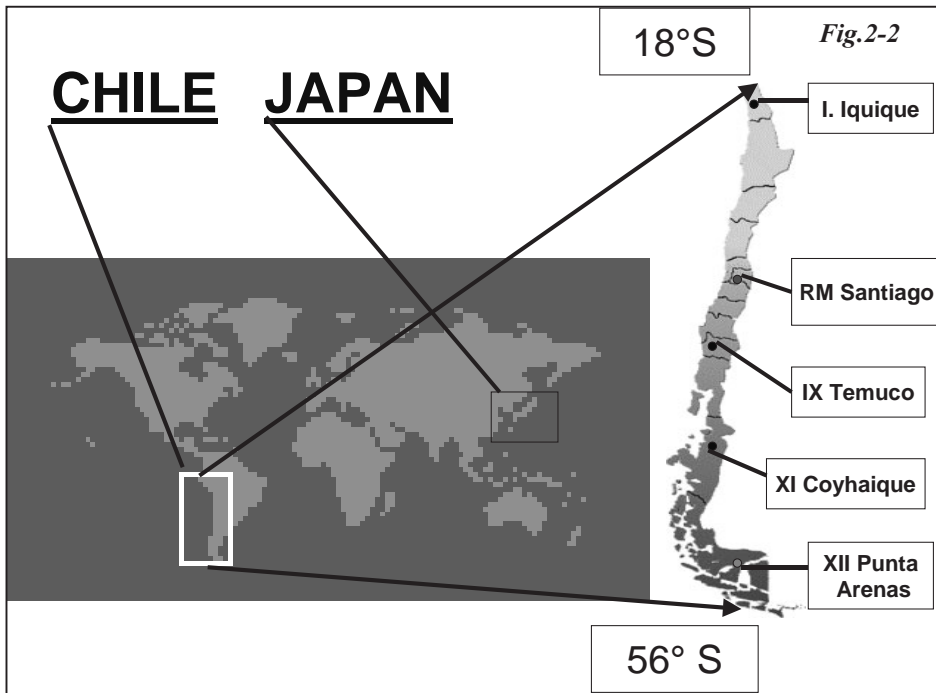




Fig.2-4

Transform Chile into a service country, serving as a gate of entrance and exit for the products and goods that are moved in the market of the Southern Cone of South America.

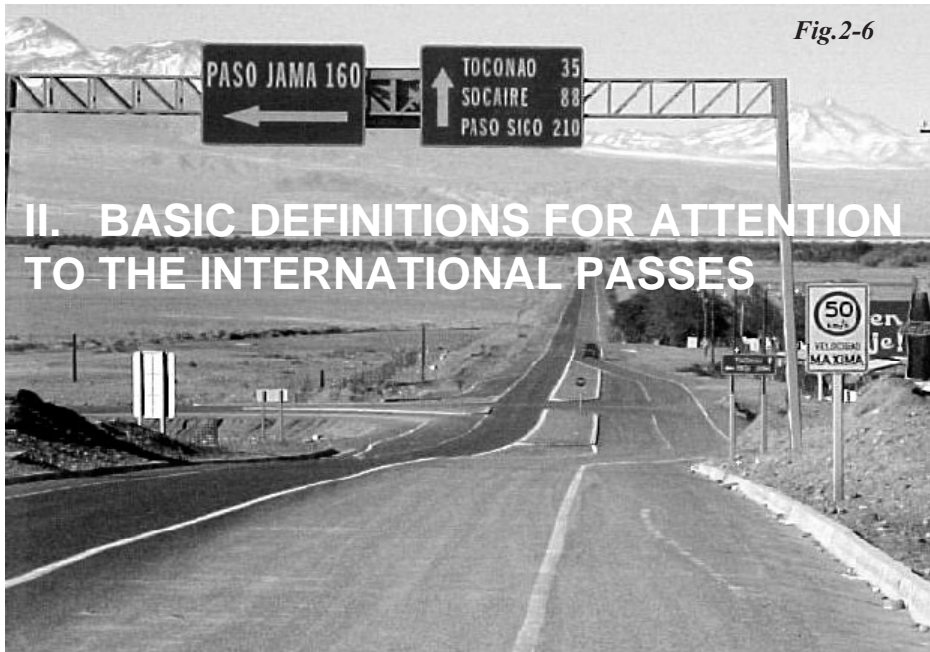
Chile's infrastructure continues in the same direction, particularly in the areas of energy, telecommunications, transport, and infrastructure for the port.

In this way at present there are 13 regional international passes between Chile and Argentina.(Fig.2-5) But the most important pass is the Cristo Redentor System because approximately 95% of all the chores are for the Cristo Redentor System.

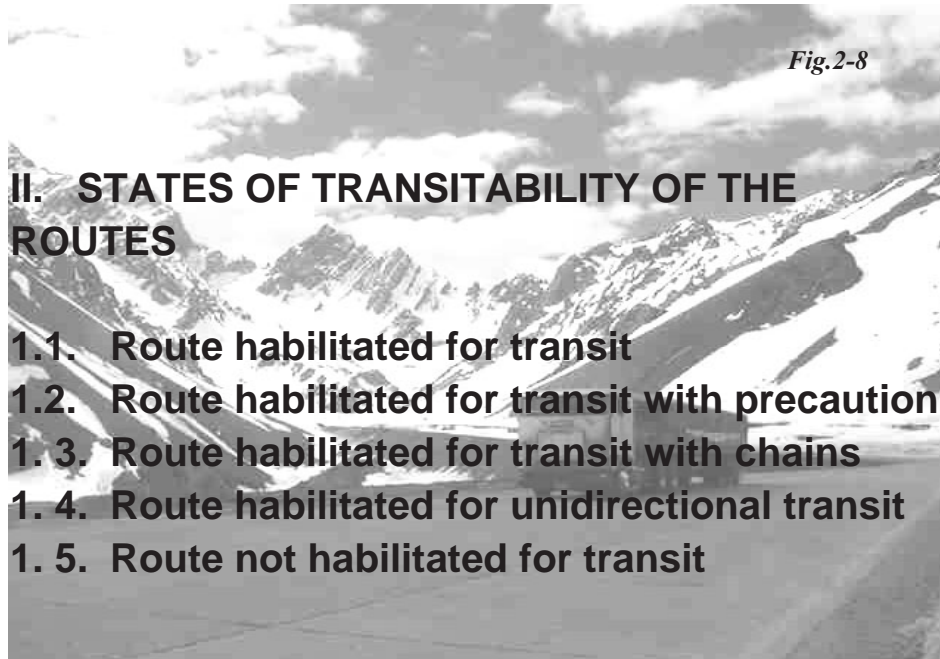
Fig.2-5

Region	Pass	Frontier	@ADAT	Mosl
I	Tambo Quemado	@@Chile – Bolivia	@	@@678
II	Jama	Chile – Argentina	@488	@4200
	Sico	Chile – Argentina	@240	@4092
III	San Francisco	Chile – Argentina	@650	@4750
	Pircas Negras	Chile – Argentina	@@60	@4164
IV	Agua Negra	Chile – Argentina	@658	@4750
V	Cristo Redentor	Chile – Argentina	@2200	@3149
VI	Pehuenche	Chile – Argentina	@129	@2550
IX	Pino Hachado	Chile – Argentina	@616	@1884
X	Card. A Samore	Chile – Argentina	@600	@1305
XI	Huemules	@@@@@Chile – Argentina	@120	@602
	Coyhaique Alto	Chile – Argentina	@@26	@295
XII	Integ Austral	Chile – Argentina	@275	@170
	San Sebastian	Chile – Argentina	@175	@21

For the intents of international passes, Chile and Argentina have different bilateral agreements.(Fig.2-6) At present there are 3 committees in operation the Borders Committee, Mixed Technical Committee and the Winter Technical Committee.(Fig.2-7)



The Winter Technical Committee has established 5 states for transitivity.(Fig.2-8) One, roads habilitated for transit, well no problem. Another being roads habilitated for transit with precaution, for example where conditions are slightly dangerous due to low visibility or roads are slippery due to light snow or rain in the next hour.

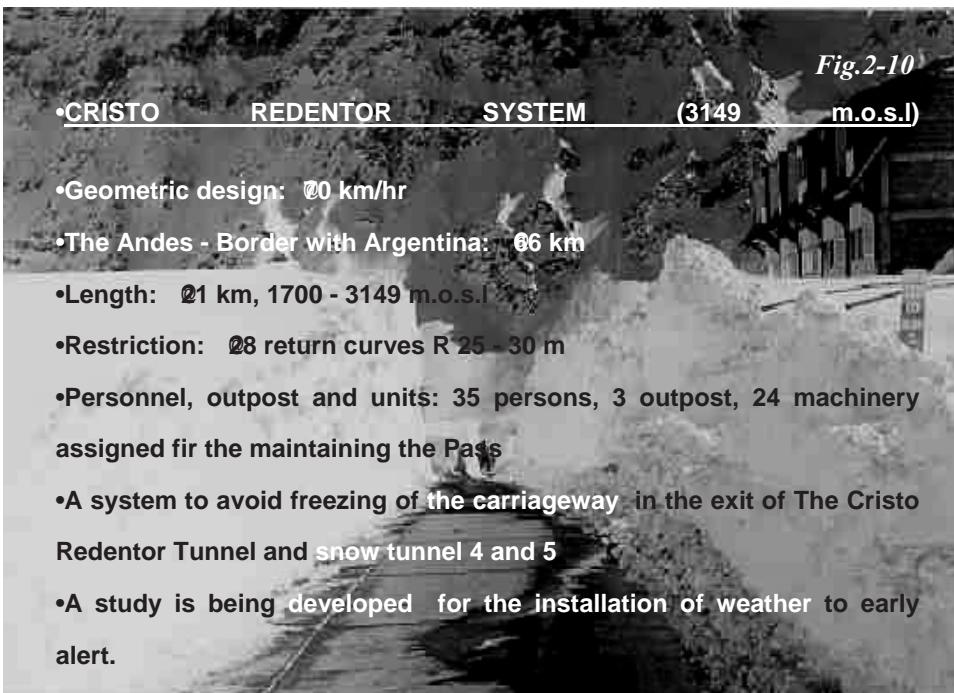


Roads habilitated for transit with chains, this situation is presently located on mountain roads in the Andes in ranges to an elevation over 800 M.A.S.L. on roads starting from the 41st parallel latitude south, between April and August normally. Roads habilitated for unidirectional transit, which is a form of habilitation of the passes that corresponds with extreme or emergency situations, where cleaning and clearing are constantly required and roads not habilitated for transit where the accumulation of snow and earth impedes the regular use of the pass.

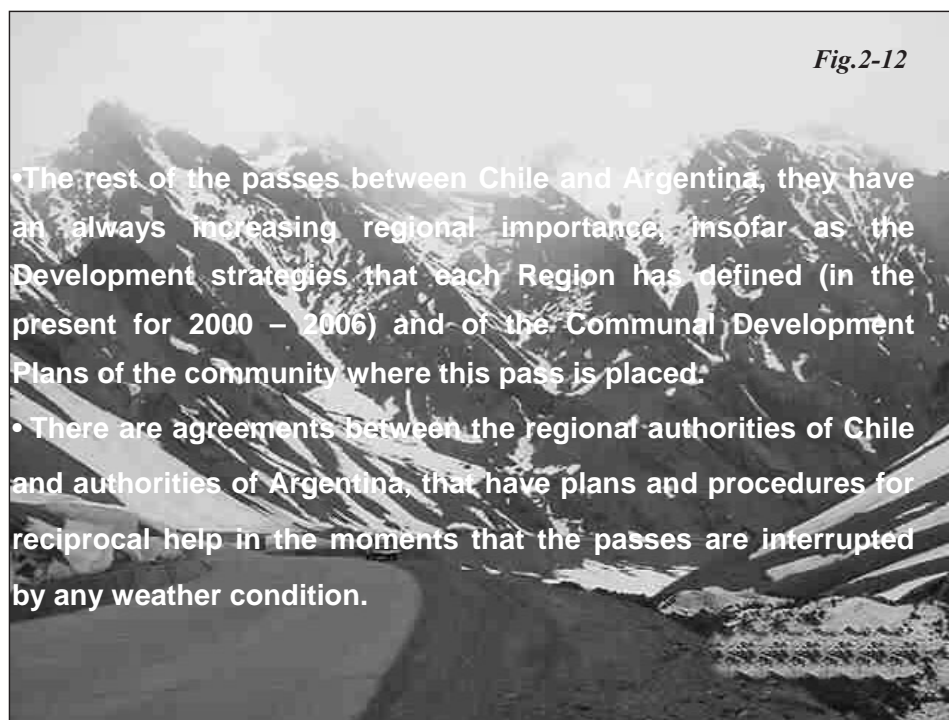
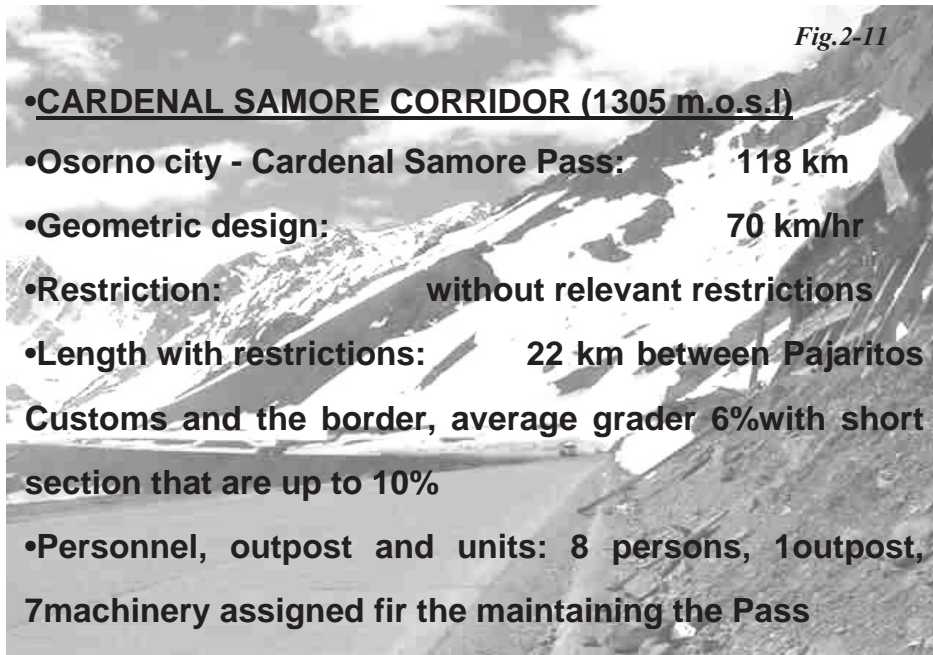
These are operational logistics on regard to the passes and the slides show the conditions of the Cristo Redentor System.(Fig.2-9) And you might notice the geometric design, 70km/h and more importantly is the 28 return curves that have radiuses from 25 to 30 meters.(Fig.2-10) And for 21km's we have to pass through roads of and above 1,700 meters above sea level to 2000 M.S.A.L.

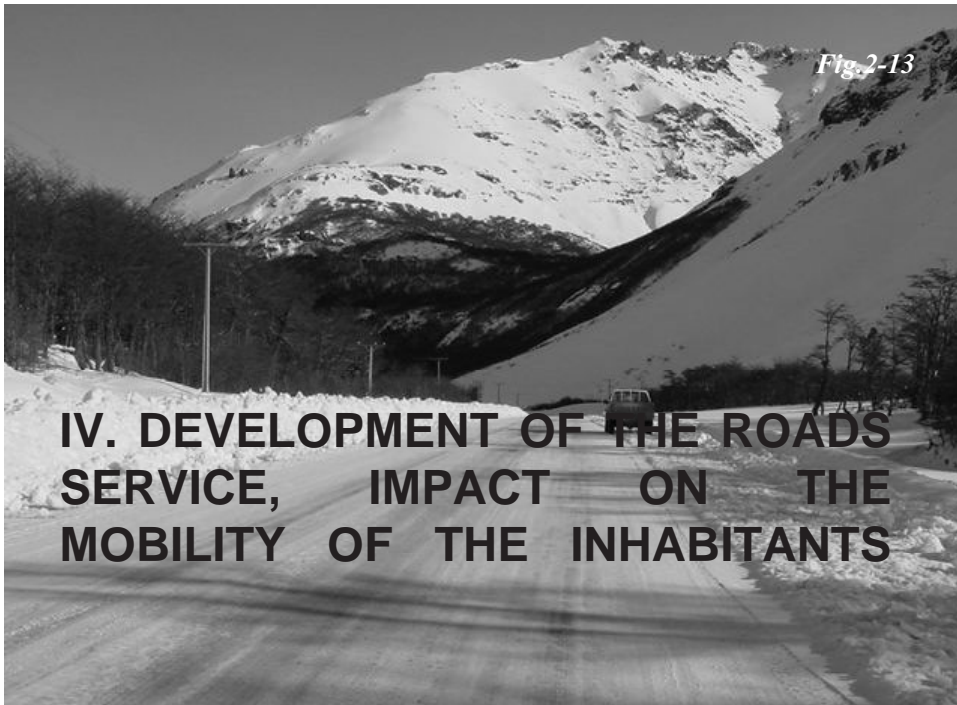


III. OPERATIONS AND LOGISTIC AID IN THE PRIORITIZED PASSES



The second international pass between Chile and Argentina is the Cardenal Samore Corridor that is 1,300 meters above sea level.(Fig.2-11) The rest of the passes have an important regional meaning to the different regions.(Fig.2-12) And so there are different, agreements between the regional authorities of Chile and the regional authorities of Argentina, which pertain to the passes. The level of the road maintenance directly affects the mobility of the local inhabitants, so the goal of the road department is to keep the roads clear and well maintained.(Fig.2-13)





For the different regions what is very important is the decentralization concept.(Fig.2-14) Decentralization can promote greater social and economical integration and generate equality and opportunity for all depending on the identity of the region. And is good for developing the region, the city and the territory. A plan for responding to emergency road network situations is necessary to see the greater project in different stages and to reduce costs.(Fig.2-15)

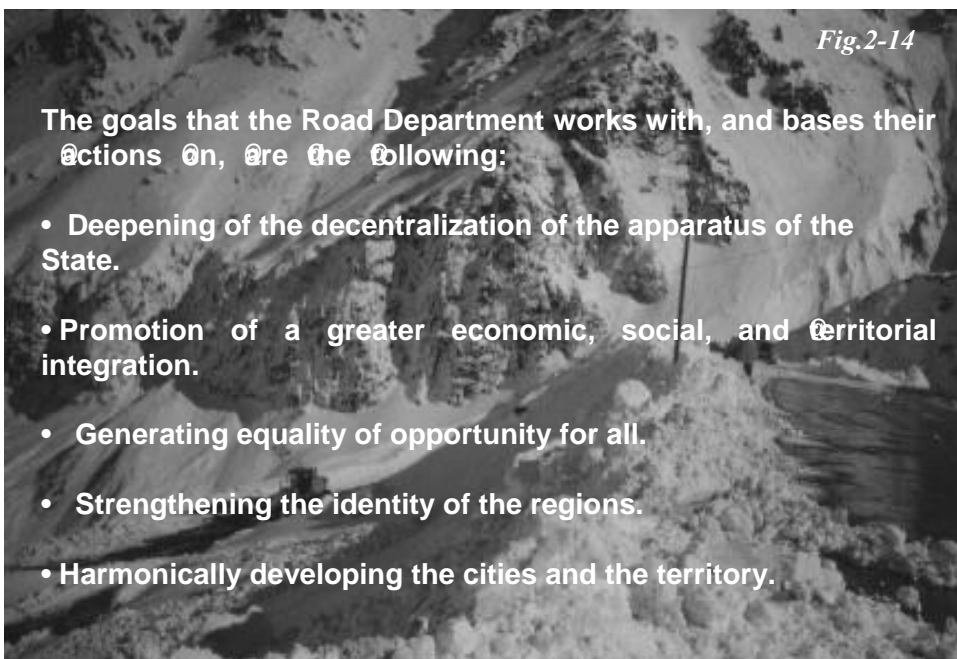




Fig.2-15

Plan for responding to emergency road network situations

1. Mobility in wintertime. Purpose: reduce the total cost.

- . designs of projects
- . Construction
- . Maintenance
- . Cost incurred during emergencies

The total costs for contracts for maintenance must be reduced as must the total costs of maintenance. Natural phenomena's and their impacts are also felt within Chile.(Fig.2-16) In our country we have snow, rains, volcanic eruptions, avalanches and seismic activity.

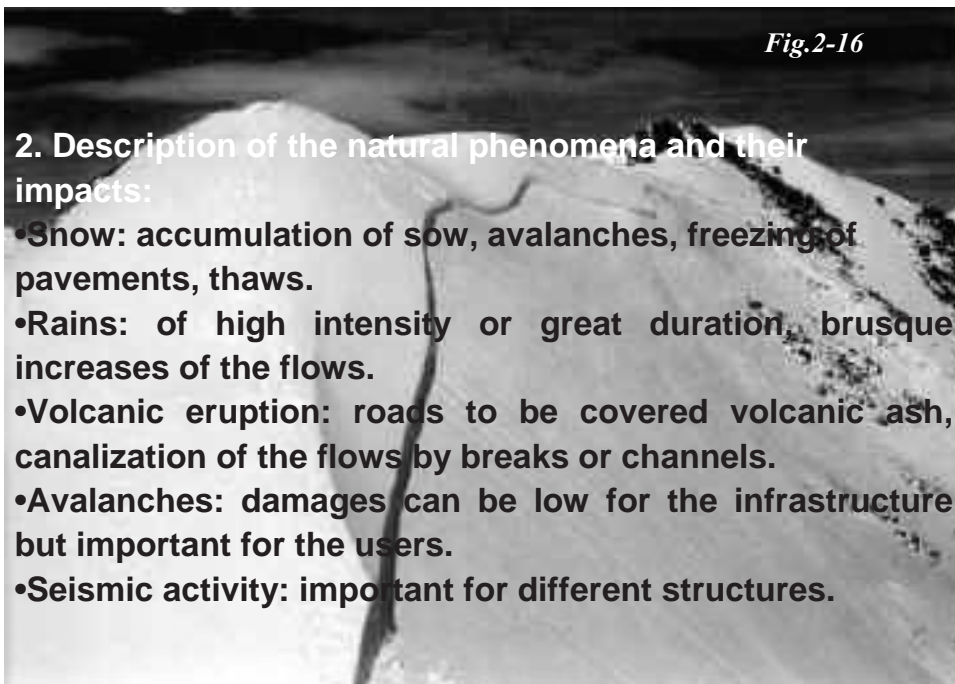
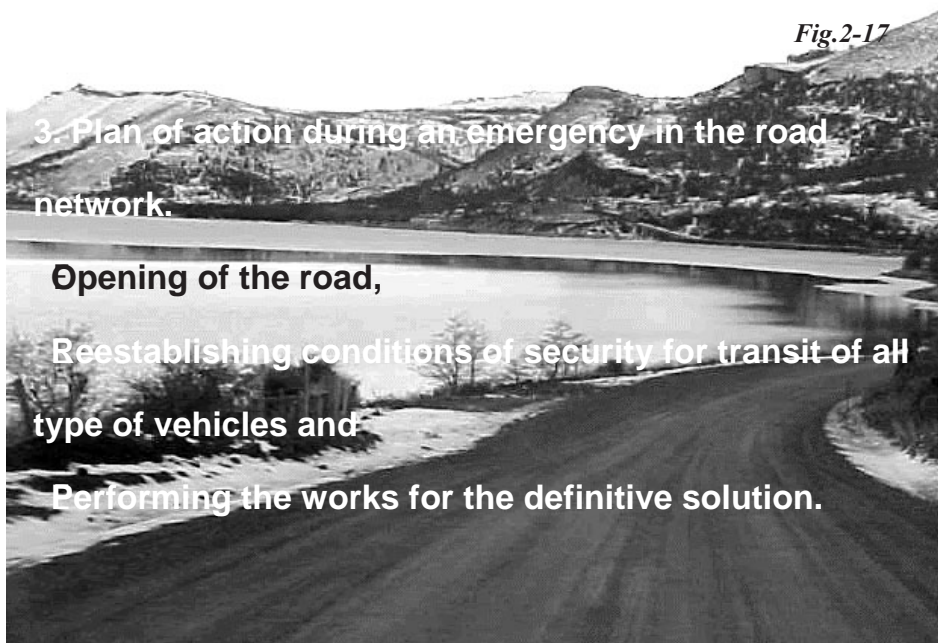


Fig.2-16

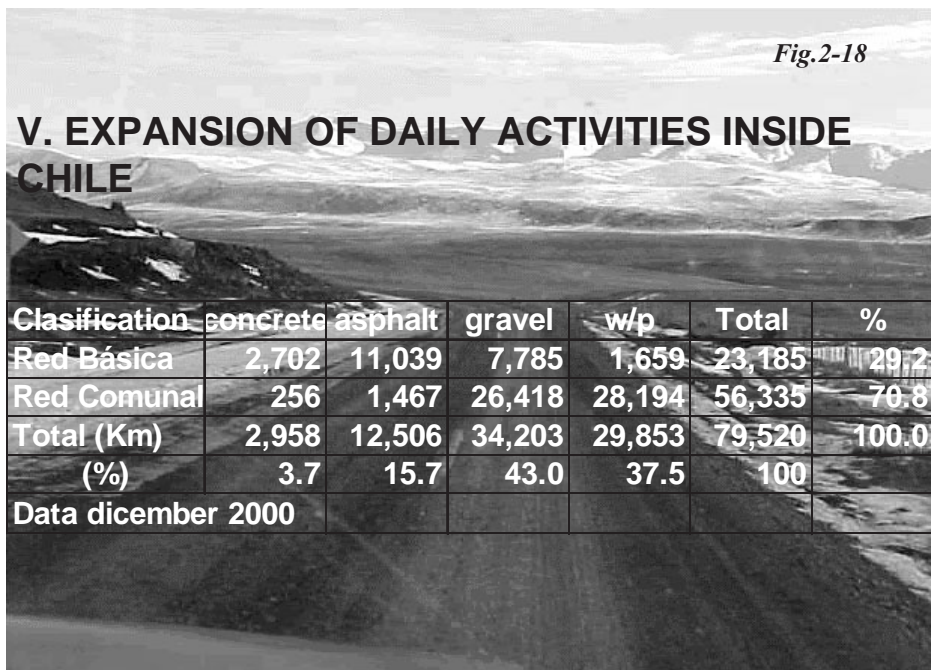
2. Description of the natural phenomena and their impacts:

- Snow: accumulation of snow, avalanches, freezing of pavements, thaws.
- Rains: of high intensity or great duration, brusque increases of the flows.
- Volcanic eruption: roads to be covered volcanic ash, canalization of the flows by breaks or channels.
- Avalanches: damages can be low for the infrastructure but important for the users.
- Seismic activity: important for different structures.

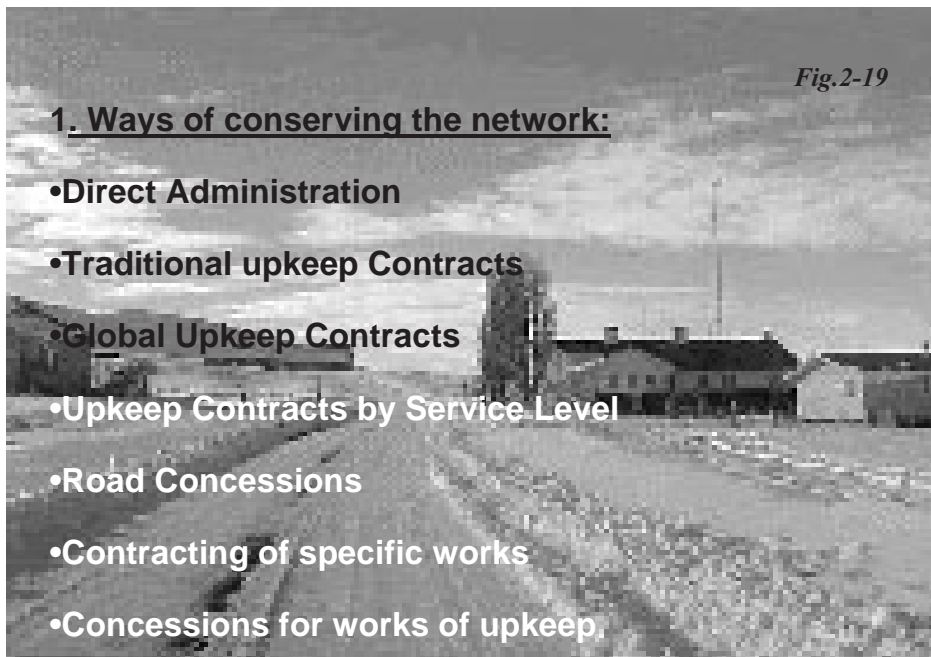
The sequence and importance of them are the following.(Fig.2-17) For opening roads and conditions for establishing conditions for security, for the transit of all types of vehicles and performing work for definitive solutions.



This slide shows the network of Chile.(Fig.2-18) We have only 24% of our roads paved. Asphalt pavement makes up for 60% and concrete pavement makes up for 40%. NORAMBUENA's network supports 80% of the traffic on the network. It is not known for labor, basically it is known for it's social aspects.



The road administration has different ways of conserving the network.(Fig.2-19). The technical administration has partnerships with human resources and with the road departments unit who has the task of routine and periodic road upkeep and emergency cases. Traditional upkeep contracts are annually reported on by the contractor or person in charge and are formed on the basis that they principally perform the duty of upkeep maintenance as defined by quality and quantity and is a specific section of the road maintenance section. Global upkeep contracts and a universal upkeep contract pay complete attention to the network for 300 to 500 kilometers in routine periodic upkeep terms. The upkeep contracts at the service level are prolonged to 5 years in the primary stages. The contractor assumes full responsibility for a determined network of 300 to 400 kilometers.



Road Concessions. The Ministry of Public Works is concerned with engineering design, contracts and upkeep and development uses. The concessionary society finances all the stakes for the projects and is made responsible for its development for a time of up to 20 to 30 years. In extreme situations the concessionary assumes all the management responsibilities. The investment in this instrument goes towards the structural network of the country. In the year 1999 investment in road concessions reached \$700 million. Contracting for specific work is designed for people to give a standard and to conserve the roads and finally concessional work for upkeep. At present there is a study of metals in the upkeep of the road network. The study seeks to get financing, in a period of time, from the network, two types of roads, toll road types etc.. Now we only have preliminary information. There are more questions that need answers with the plan describing the road network to the Chilean Road Department. And at the height of accumulation for winter coverage some 60% of the network could possibly be covered.

The network from natural network, the annual investment from 1996 to 2000 is the following.(Fig.2-20) This slide shows the Global upkeep contracts worth \$35 million to \$54 million in 4 years. It's made up of 10% of the total budget for the road administration. In conclusion, road infrastructure mobility plans are very important as a social and economical factor but particularly in a country like Chile that has a fixed objective and is a developing country in the intermediate range.(Fig.2-21)

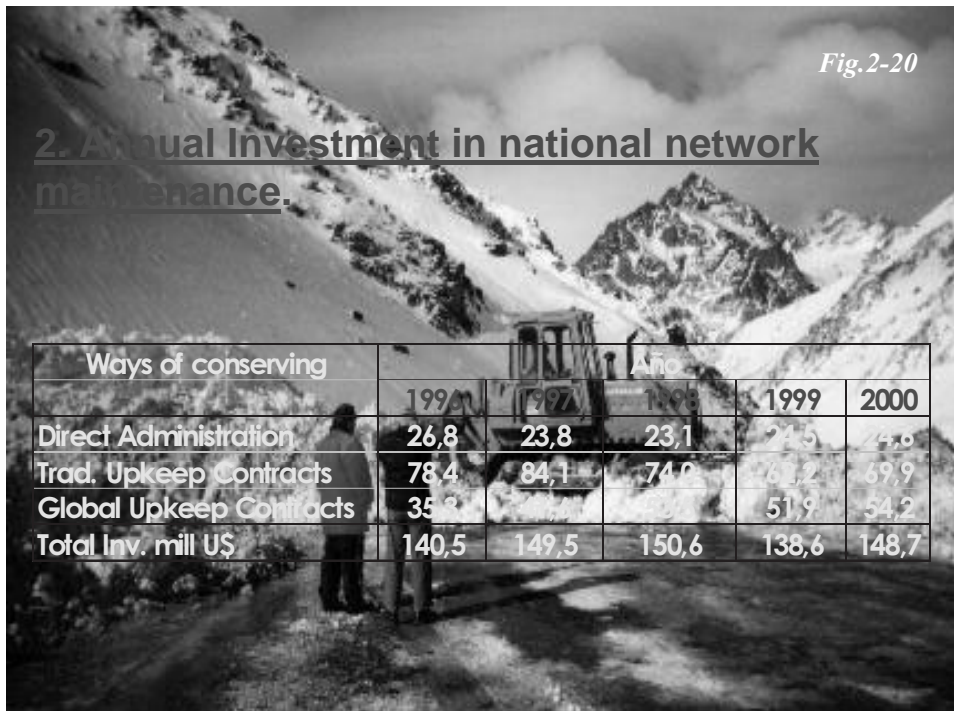


Fig.2-21

CONCLUSIONS

1. Road infrastructure plays a relevant role in the mobility of the population as an economic and social factor, particularly in countries like Chile that fix their objective as transforming themselves into developed countries in the medium range.

Chile, referring to the outside is defined as a service country for all is the southern corner of the Americas. So its policies with respect to the international passes must be complimented with the policies for the change of the network and a productive social system and a workable road network.(Fig.2-22) The task of maintaining the network is an ongoing surface project that year round has different demands, amplified by the improving network in so far as that only 20% of the network is paved, the rest is gravel and earth and a greater demand for a higher level of service.(Fig.2-23) Chile has, as a state, a standard in transit and a demand for a workable network. A network located in the mountains and very definitely in the lowlands.

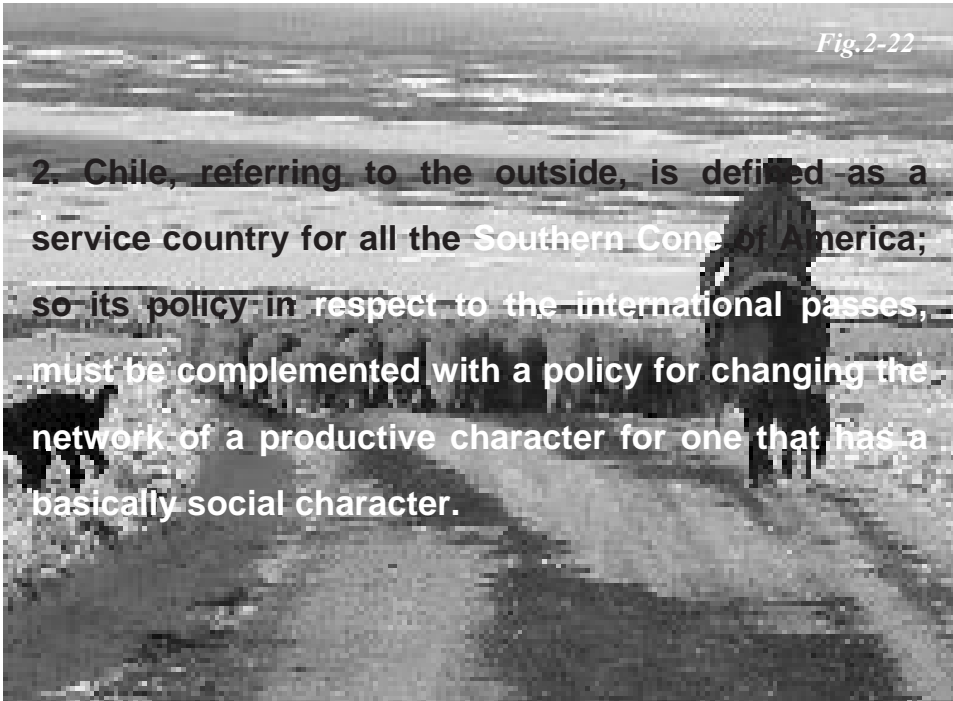


Fig.2-22

2. Chile, referring to the outside, is defined as a service country for all the Southern Cone of America; so its policy in respect to the international passes, must be complemented with a policy for changing the network of a productive character for one that has a basically social character.

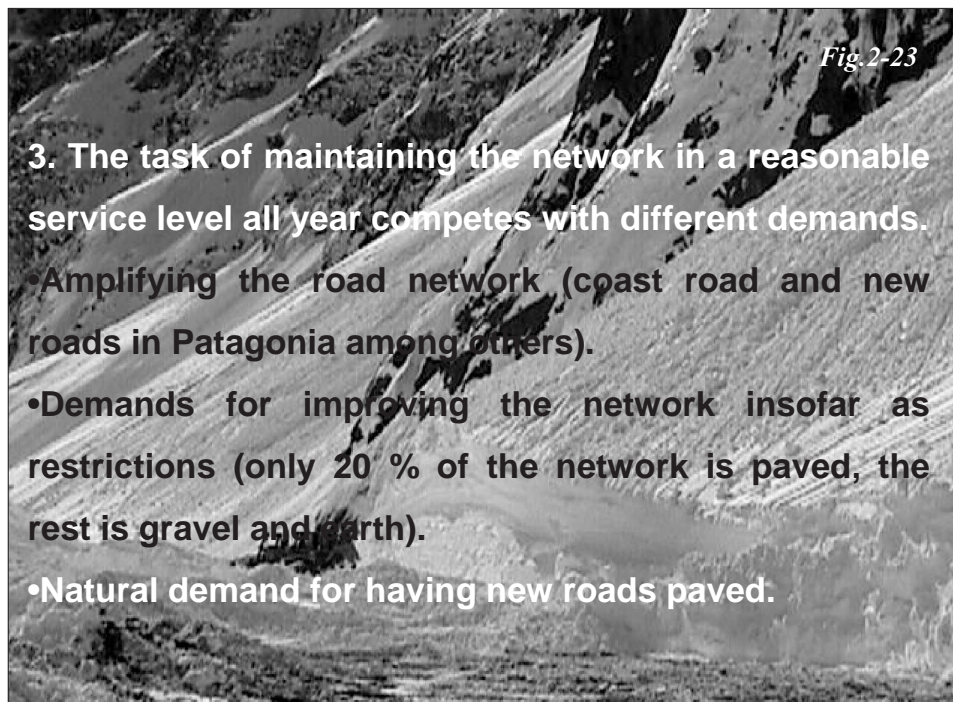


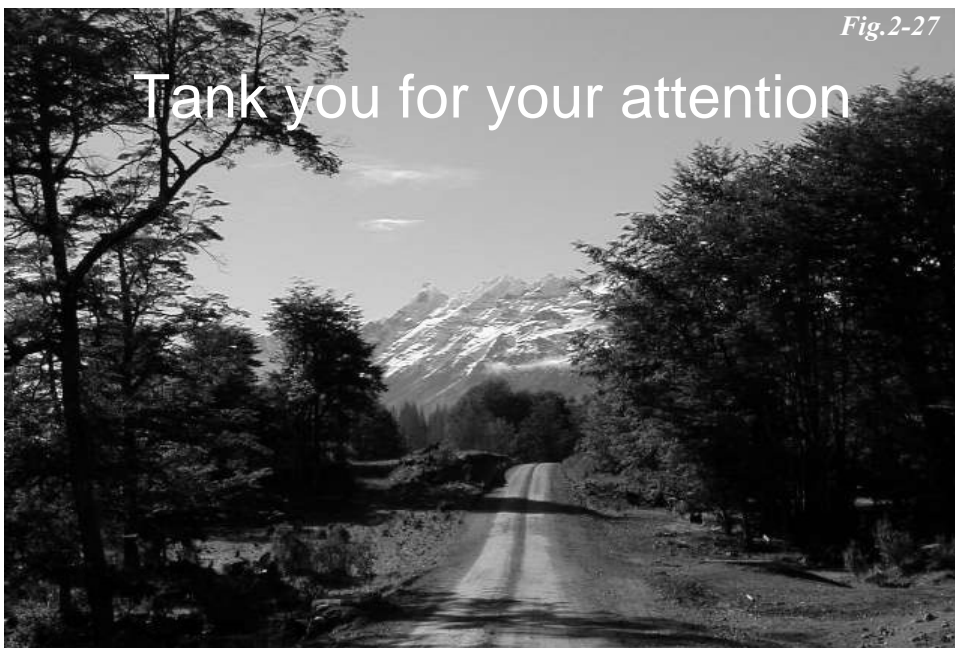
Fig.2-23

- 3. The task of maintaining the network in a reasonable service level all year competes with different demands.**
- **Amplifying the road network (coast road and new roads in Patagonia among others).**
 - **Demands for improving the network insofar as restrictions (only 20 % of the network is paved, the rest is gravel and earth).**
 - **Natural demand for having new roads paved.**

Chile's first intention is to incorporate new innovations and new technologies in the roads area and the creation of a center of technology for transportation.(Fig.2-24) The country's constant search for new and better alternatives such as material design, units of contraction and measurements as a management model, which can also serve in additional roles by helping other countries in the region that might have similar problems.(Fig.2-25)



And finally the infrastructure as an economical factor, it constantly propagates financial activities and facilitates social activities. We must bear in mind these facts in terms of the development of the regions of the country. The Road Administration of Chile is tackling these present challenges.(Fig.2-26) Thank you for your attention.(Fig.2-27)

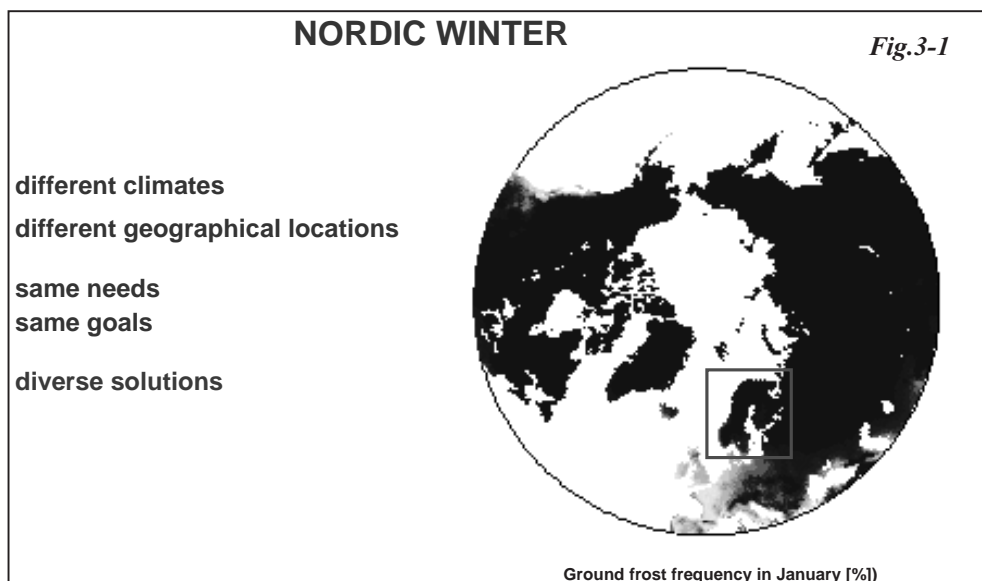


2.3 Mr. Eero KARJALUOTO (Finland)

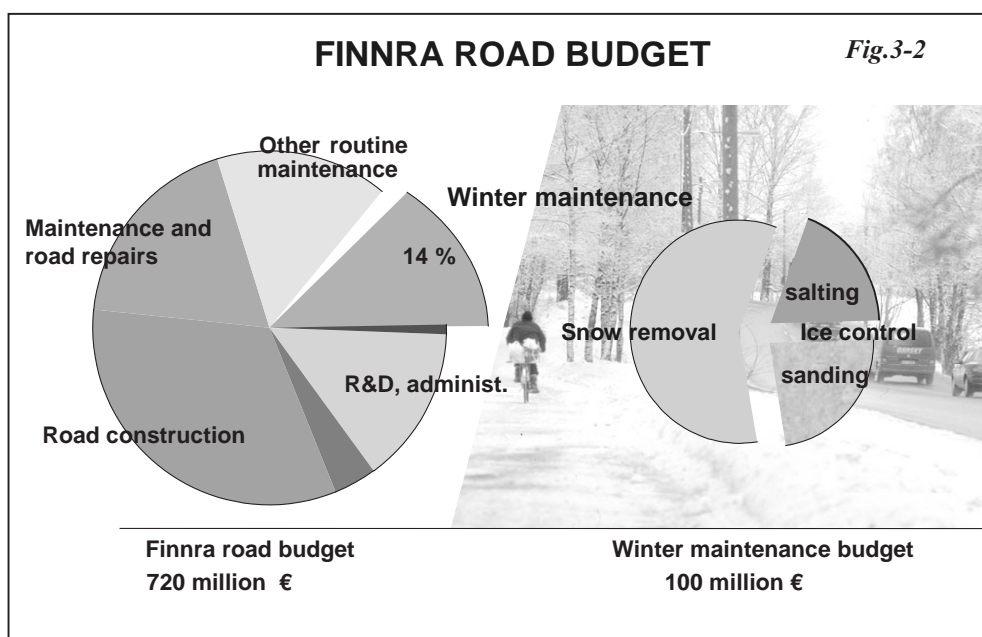
Director General, Finnish Road Administration
 "Winter road service in the 21st Century"

Mr. KARJALUOTO:

Mr. Chairman, ladies and gentlemen, this picture displays the snow bound north, Scandinavian countries and including Finland. The Arctic Circle crosses through Sweden, Finland and Norway. All countries have different micro-climates. Because of different geographical locations, we almost have the same needs and goals for road management and maintenance. There are diverse solutions and we also are here to benchmark each other's solutions.(Fig.3-1)




Winter maintenance in Finland's is about 40% of the road budget and is about half of all the routine maintenance. Winter maintenance for snow removal is about 60% and ice control is about 40%.(Fig.3-2)



This picture shows some features of winter and road traffic in Nordic countries and Finland.(Fig.3-3) Winter condition duration in Finland are approximately 4 to 5 months of and sometimes even 6 months in the northernmost part of Finland, called Lapland or sometimes Santa Claus' land. Winter maintenance enables smooth, timely and safe transport in winter conditions. The risk of having accidents in winter is about the same as during the summer time in Finland. There are many conditions with freezing/icy conditions, but we have learned to cope with this condition and have used innovative solutions. We see that severe winter conditions give us many new challenges versus problems. We love winter!

NORDIC WINTER *Fig.3-3*



- **4-5 months in winter conditions**
- **Winter maintenance enables smooth, timely and safe road transport around the clock also in winter conditions**
- **Freezing adds bearing capacity on minor roads. Frost penetration even > 3 m**

This slide shows some focal points from past decades in order to understand the future.(Fig.3-4) In the 1920's and 1940's we used localized private resources. In the 1950's and 1960's the public sector centrally management most of the maintenance by its own labor forces. During this period the development work was concentrated on technical skills and know-how. In the 1970's we utilized resource based planning and cost based management. We also began to outsource more of the physical work contracts. The 1980's provided quality management and the late 1990's brought forth the concept client/producer model. And now in Finland the client and producer are totally separated. Now we are facing new challenges and possibilities. Today we are now progressing toward customer/producer concept. New procurement methods are being developed, that promote the sharing of responsibilities and risks between the client and producer. Information technology and mobile systems enables the simultaneous use of road related information for clients, contractors and road users needs.

FOCAL POINTS DURING PAST DECADES

Fig.3-4



- 1920s - 1940s • use of decentralised private resources
- 1950s - 1960s • public sector use of own labor forces
development of basic technical skills
- 1970s • resource - based planning
cost based management, contracting out
- 1980s • quality management
- 1990s ... • Client-producer concept in progress

- 2000
- * New Client-Producer concept
 - * New procurement methods, new share of responsibilities between client and producer
 - * Information as an essential asset
 - * New mobile information technology enables simultaneous use of road related information for client's, contractors' and road users' needs

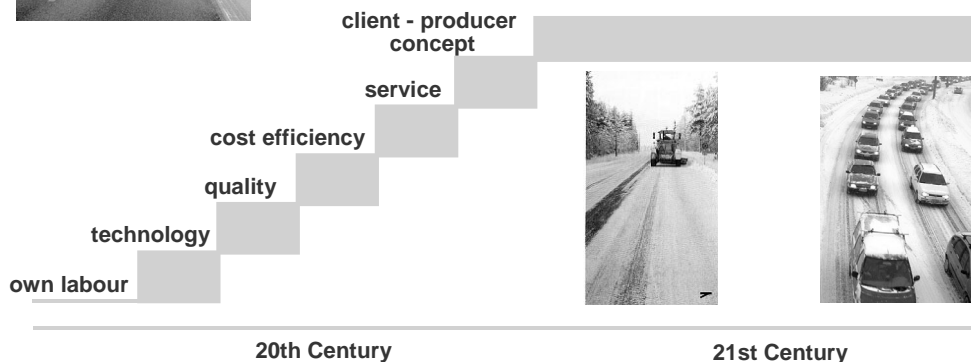


This picture gives us almost the same idea, step by step.(Fig.3-5) May I point out two important ideas. In the future, winter maintenance will be more and more part of a larger and integrated maintenance contract including rehabilitation and repair work of roads. Responsibility for quality and technical developments will shift to the contractor and the roles for winter maintenance will be changed. In short, the client will be responsible for traffic fluency and safety and responsible for national property assets.(Fig.3-6) Presently we do not have the organizational resources for road construction, maintenance and other services, but we will procure these services as a part of larger integrated contracts. We plan to implement a whole life-cycle concept which includes planning, design, construction tendering, and maintaining the road network. This places new demands upon the contract agreements. This means that more responsibilities will be shifted to the contractors including their own business activities (profitability). Also contractors will be responsible for the research and development aspects and for creating and utilizing new innovations. Broader responsibilities include quality and movement towards outcome-based criteria in long-term maintenance contracts.

FOCAL STEPS IN WINTER MAINTENANCE DEVELOPMENT

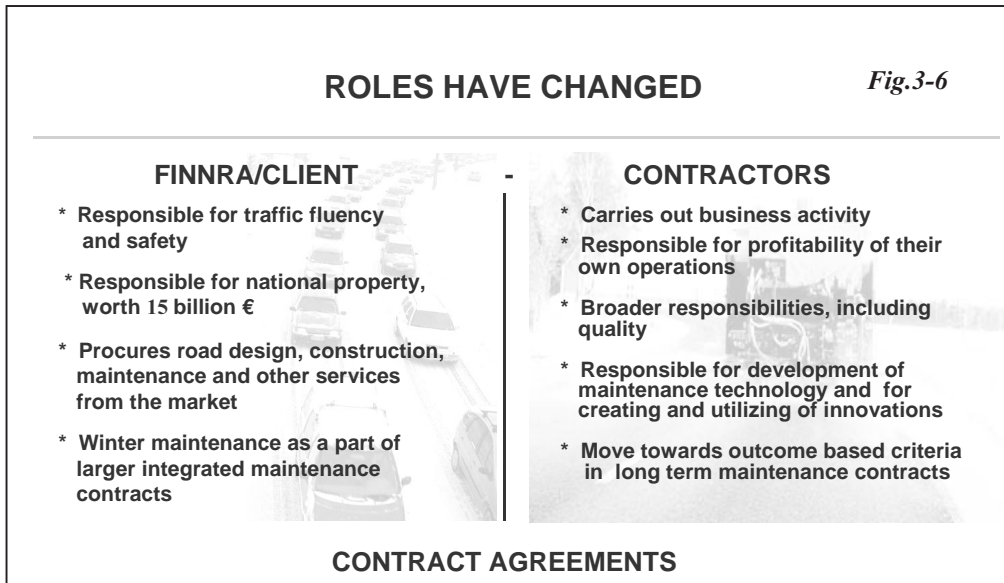


New procurement methods: *Fig.3-5*
 Winter maintenance as a whole
 a part of larger and integrated
 maintenance contracts
 Responsibility for quality and
 technical developments to contractors

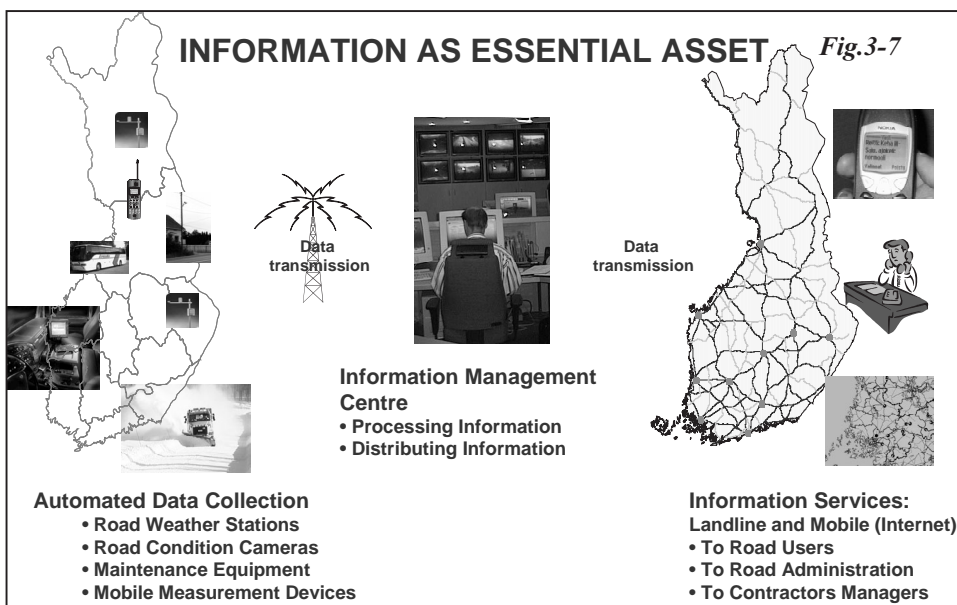


ROLES HAVE CHANGED

Fig.3-6



Information technology will be a key tool and very essential aspect in asset management.(Fig.3-7) Mobile technology makes it possible to collect data automatically from road weather stations, road condition cameras, maintenance equipment, and different kinds of local measurement devices. Information services will connect customers, clients and other service providers and users. Information management center will process information and distribute to all parties. These new information services will allow the road administration to effectively manage and care for all the assets. It's so that only the imagination gives the limits to create more and more sophisticated solutions. Thank you for your attention.



Dr. MITANI:

Thank you, Mr. KARJALUOTO for your very significant presentation on new challenges and possibilities. Do you have any questions?

Mr. WILSON:

I'd like to ask a question, I'm a bit afraid of asking all the questions. If you are moving your responsibility to the contractor, how do you, as a road authority, measure the performance of your contractor?

Mr. KARJALUOTO:

That's very demanding work and we are working with these issues now. We collect experiences from long-term winter maintenance contracts and process the information. In the future, when we analyze the data, I can answer this question properly.

Dr. MITANI:

Anyone else? Thank you. Now our next speaker from Lithuania, Dr. PUODŽIUKAS.

2.4 Dr. Virgaudas PUODŽIUKAS (Lithuania)
Director General of the Lithuanian Road Administration
"Winter road service in the Baltic countries"

Mr. PUODŽIUKAS:

Mr. Chairman, ladies and gentlemen, dear colleagues I would like to shortly introduce the winter maintenance situation in all Baltic countries and Lithuania in particular.(Fig.4-1)



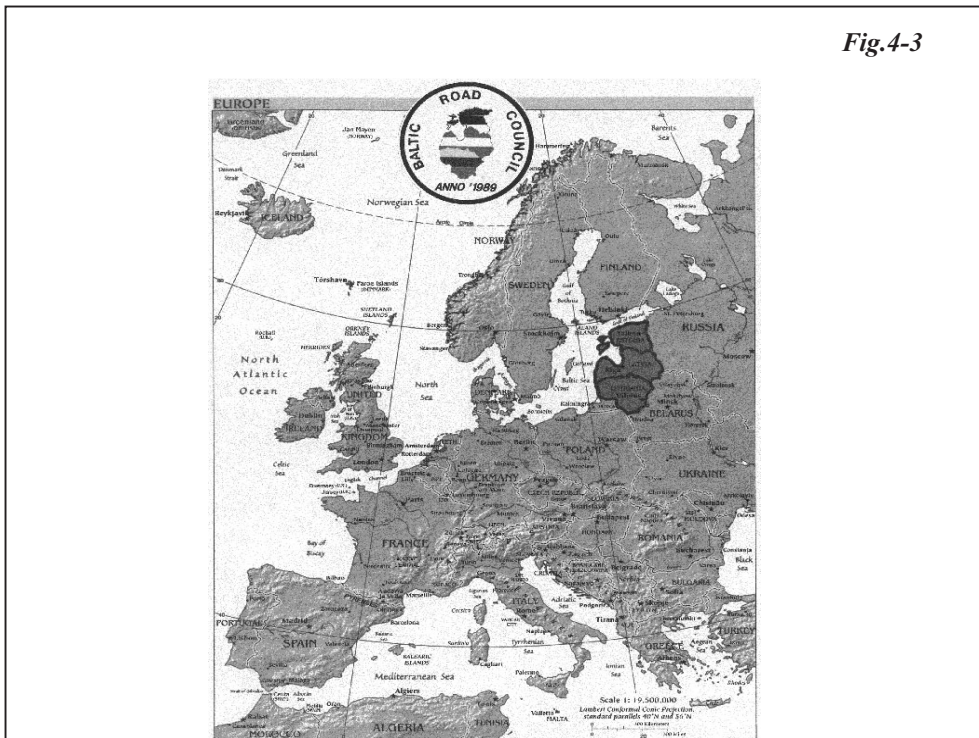
The three Baltic countries, Latvia, Estonia and Lithuania, are situated on the eastern border of the Baltic Sea.(Fig.4-2) It is a transitional area between eastern and western European countries, the population in the region is 7.5 million; it has a well-developed road network. There are about 300 vehicles per one thousand people, the growth has been particularly rapid during the last five years, particularly, that of heavy vehicles, that is why improving road conditions is among the top priority goals in the region.(Fig.4-3)

Fig.4-2

General

The three Baltic countries, Lithuania, Latvia and Estonia, are situated on the eastern border of the Baltic Sea. This is a transitional area between eastern and western countries. The population of the region is 7.5 million. It has a well-developed road network. It can be expressed in figures - there are about 300 vehicles per 1000 population. The growth has been particularly rapid during the last five years, particularly that of heavy vehicles, that is why improving road conditions is among the top priority goals in the region.

Fig.4-3



To effectively develop the road network management, the three Baltic States have combined their efforts and established the Baltic Road Association.(Fig.4-4) It is a regional international organization uniting professionals of Estonia, Latvia and Lithuania, the three Baltic States with a similar economic situation, similar historic background and facing similar problems. To ensure effective co-operation and to work out common strategies in the region, the Baltic Road Association operates at three levels: international (maintaining the relationships with other organizations, like Nordic Road Association, PIARC and IRF), regional working on issues concerning all three Baltic states, and national working in narrowly specialized fields in each country.

Fig.4-4

BRA, its activities and structure

To effectively develop the road network management, the three Baltic States have joined their efforts and established the Baltic Road Association. It is a regional international organisation uniting road specialists of Estonia, Latvia and Lithuania, the three Baltic States with a similar economic situation, similar historic background and facing similar problems. To ensure an effective co-operation and to work out common strategies in the region, the BRA operates at three levels: international, regional and national.

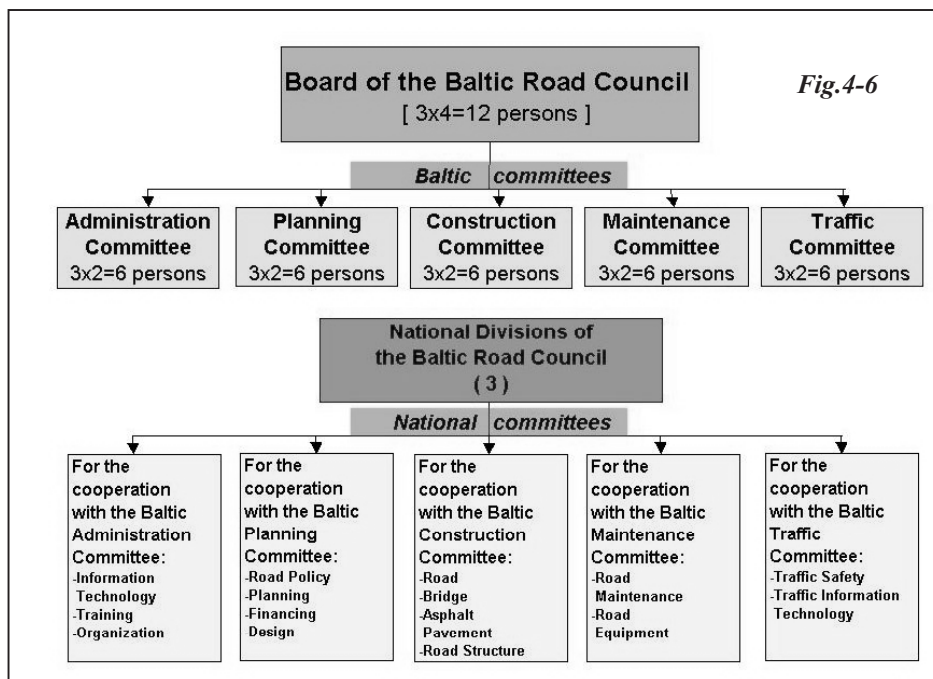
The Baltic Road Association is a three level organization comprising the Board of the Baltic Road Association, Baltic Committees and national committees.(Fig.4-5) The leadership of the Baltic Road Association activities is based on a rotation principle.(Fig.4-6) Every three years the leadership is transferred to another country. Since the end of August 2000 Lithuania has been the leader of the Baltic Road Association. The Board of the Baltic Road Association includes 12 members, 4 from each country. It manages all the activities in the Association. The chairman of the leading national board is the Chairman of the Baltic Road Association.

The BRA is a three-level organisation *Fig.4-5*

The Board of the BRA

Baltic Committees

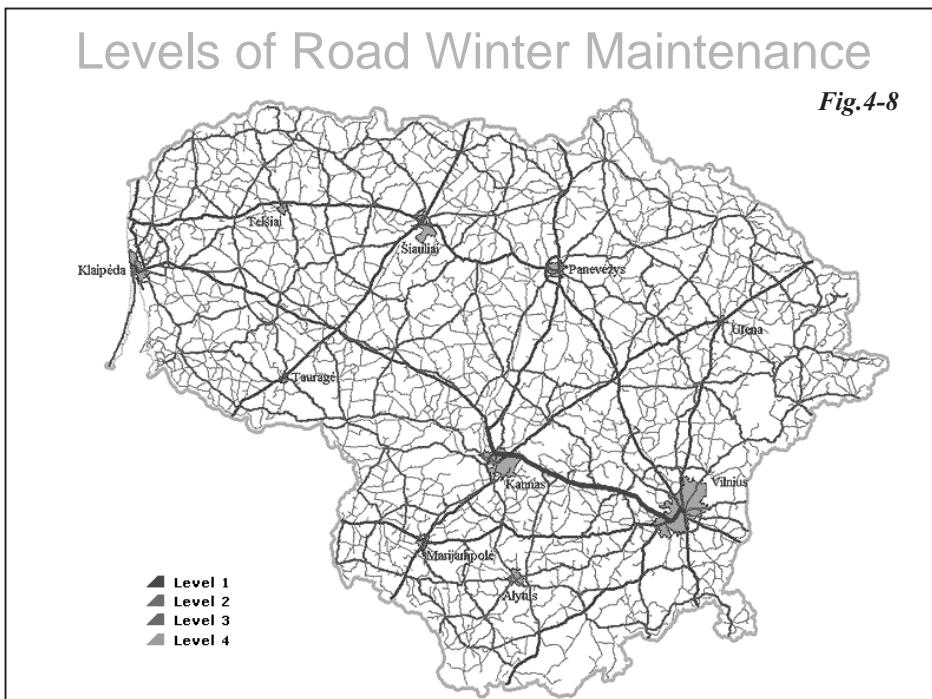
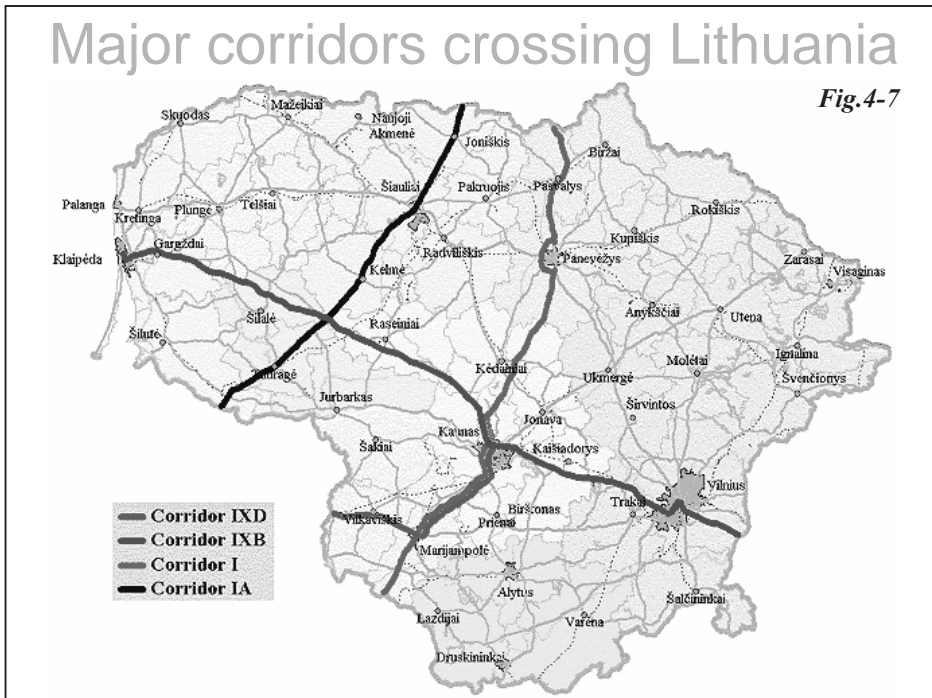
National Committees



Road maintenance, and winter maintenance in particular, is among top priorities in our region. The level of services in the area is strongly influenced by our climatic conditions in the region. The Baltic countries are situated in a transitional climatic region. Winters here last for 5 months, from the beginning of November until the middle of March.

The snow coverage is sometimes as thick as 70 centimeters; the average, however, is about 30 centimeters. Frequently temperatures fluctuate from below to above zero and are particularly problematic, road maintenance requires a sustainable snow cleaning, and de-icing measures are to be taken. The quality of winter road maintenance is extremely important for our Baltic countries since it influences the mobility of our population and their economic activities throughout a major part of the year. Nonetheless, as I stated, main roads are within the state responsibility and are intensively maintained in winter.

Now, let me focus on Lithuania, the largest country in the region.(Fig.4-7) State roads in Lithuania are divided into 4 maintenance levels depending on the intensity of winter maintenance operations.(Fig.4-8)



Roads of the 1st, 2nd and 3rd maintenance levels make up 7,000 kilometers in total. They are constantly and intensively maintained. Approximately 14,000 kilometers of regional roads are regularly cleaned but salted only on hazardous sections: up the slopes and curves, on turns and so on. You can see all these levels in this picture. Level 1 maintenance operations are applicable only on road sections, where the volume of traffic is higher than 20 – 25 vehicles/day.(Fig.4-9)

Level 1

Fig.4-9

Maintenance operations are applicable on the section Vilnius-Sitkunai (road Vilnius-Kaunas-Klaipeda). The maintenance service is on duty on this road round the clock. During snowstorms, the road is cleaned; and during freezing rain, de-icers are spread at any time of the day. Normally, the road is cleaned and de-icers spread until 7:00 AM. When it snows, the road has to be cleaned and de-icers applied not later than 2 hours after the snow stops. Under normal weather conditions, the pavement should be free of snow, while under difficult weather conditions the thickness of snow on the carriageway should not exceed 3 cm.

The maintenance services on this road are on duty round the clock. During snowstorms, the road is cleaned and during freezing rain, de-icers are spread at any time of the day. Normally, the road is cleaned and de-icers spread until 7:00 AM. When it snows, the road has to be cleaned and de-icers spread not later than 2 hours after the snow stops. Under normal weather conditions, the pavement should be free of snow, while under difficult weather conditions the thickness of snow on the carriageway should not exceed 3 centimeters.

Maybe to save time, I'll talk about the 2nd, 3rd and 4th levels of service.(Fig.4-10) (Fig.4-11) (Fig.4-12) Generally I'd like to say that under extreme weather conditions the traffic on the first maintenance level should not be interrupted for more than one hour; on the second maintenance level the traffic should not be interrupted for more than 3 hours; on the third maintenance level of roads, the traffic flow cannot be interrupted for longer than 8 hours.

Level 2

Fig.4-10

Maintenance operations are applicable on all main roads and several national roads with a total length of 1,700 km. The maintenance service is on duty on these roads from 4:00 to 22:00 hours. In the morning de-icers should be spread before 7:00 AM. Under normal weather conditions, the snow layer on the road pavement in ruts should not exceed 0.5 cm, under extreme conditions the permitted layer is not more than 5 cm. After the snow or blizzard stops, the roads should be cleaned and de-icers spread within 3 hours.

Level 3

Fig.4-11

Maintenance operations are applicable on national roads and several regional roads with a total length of 5,500 km. These roads are maintained from 6:00 to 19:00 hours. They first have de-icers spread on them before 8:00 AM. Under normal weather conditions the snow layer on the pavement should not exceed 1 cm and under extreme conditions the permitted limit is 7 cm. After the snow or blizzard stops, the roads should be cleaned and de-icers spread within 4 hours.

Level 4

Fig.4-12

The remaining regional roads extend over more than 14,000 km. They are maintained from 8:00 to 18:00 hours. These roads are only cleaned after the first three level maintenance roads have been cleaned. De-icers are spread only on hazardous road sections (steep rises, turns), after strong freezing rain or glazed frost and only after the de-icers have been spread on main and national roads. Under normal weather conditions, the permitted snow layer should not exceed 10 cm and under extreme conditions the layer is up to 20 cm. When the snow or blizzard stops, the roads should be cleaned within 48 hours.

The remaining regional roads cannot have the traffic interrupted for longer than 48 hours. By extreme weather conditions, which you can see on the screen, I mean that more than 6 hours of uninterrupted snow or blizzard; more than 24 hours of snow and blizzard with intervals; frozen road is covered with ice after rain or freezing rain and if the road has been covered with ice more than twice in 24 hours. The daytime temperature does not rise above minus 8.(Fig.4-13) (Fig.4-14)

Extreme Weather Conditions

Fig.4-13

More than 6 hours of uninterrupted snow and/or blizzard;

More than 24 hours of snow and/or blizzard with intervals;

Frozen road is covered with ice after rain or freezing rain;

The road has been covered with ice more than twice in 24 hours;

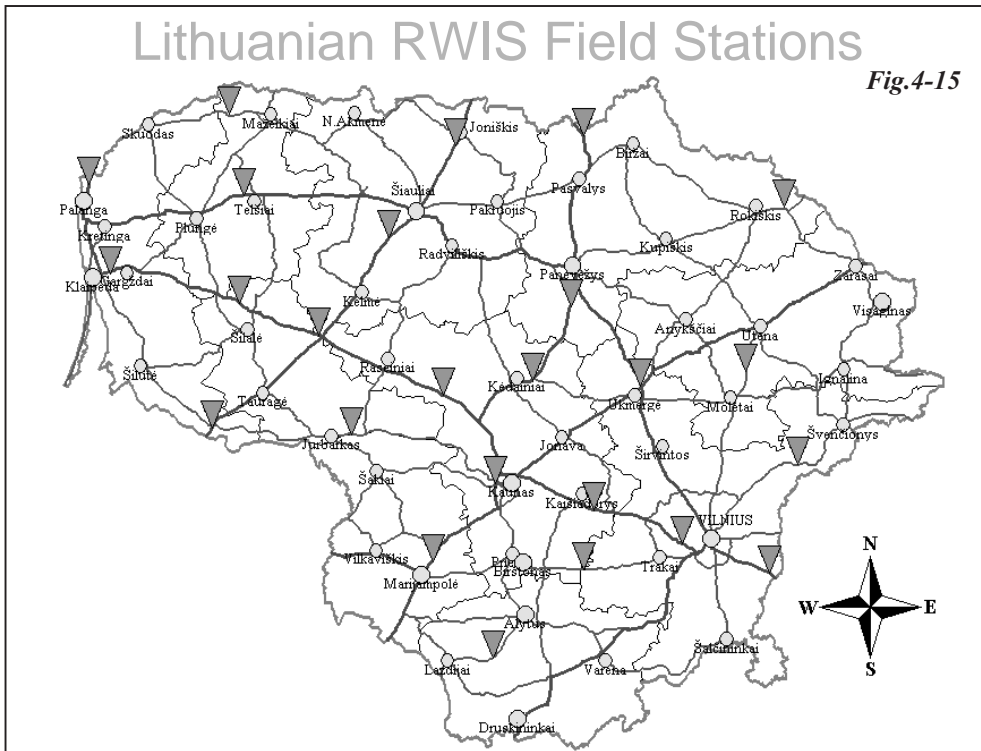
Daytime temperature does not rise over -8°C.

Road Maintenance Operations *Fig.4-14*

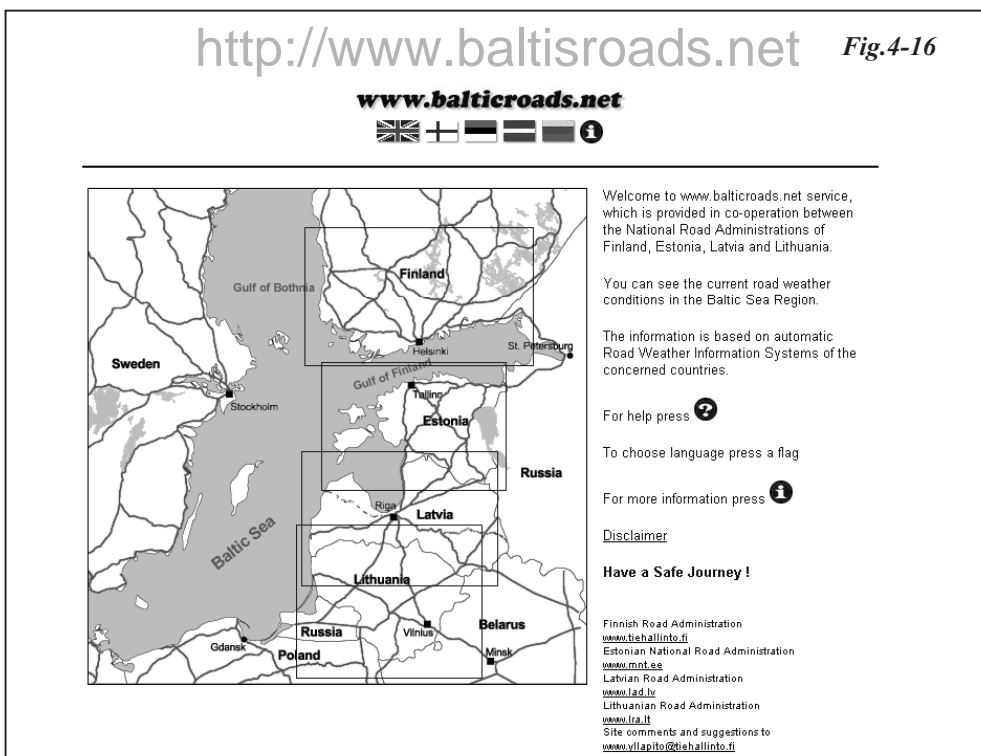
Under extreme weather conditions, the traffic on the first maintenance level roads may not be interrupted for more than an hour, on second maintenance level roads the break should not exceed 3 hours, on third maintenance level roads the traffic flow cannot be interrupted for longer than 8 hours. The remaining regional roads cannot have the traffic interrupted for longer than 48 hours.

In road winter maintenance the implementation of technologies of pure and wet salt was started in Lithuania from 1994 - 1995, adopting the experience of Scandinavia and other western countries. At present Lithuania is able to produce all the equipment needed for wet salt technology.

One of the key innovations operating in the three Baltic countries and ensuring timely winter maintenance operations is the road weather information system.(Fig.4-15) With Finland's assistance, the implementation of the system was started in 1997-1998. In Estonia, there are now 23 road weather information field stations, in Latvia 25 and Lithuania 25 stations. This system has largely contributed to the improvement of road maintenance operations in winter: the roads are effectively cleaned and de-icing materials are spread on them immediately, salt consumption has decreased, the negative impact on the environment has decreased and part of the salt purchasing money was saved.



The implementation of the road weather information system and a number of other winter road maintenance measures have brought about an improvement in traffic safety as well. From 1998 to the year 2000 the number of fatalities has decreased from 829 to 641. Particularly the measures of winter maintenance helped to do the following. The Baltic countries together with Finland have a joint Internet site which gives information on road weather conditions in all countries.(Fig.4-16) The Internet page gives access to information on road traffic and driving conditions in all four countries at the same time.



With a close and sustainable co-operation, the three countries were able to adopt new technologies, harmonize road maintenance levels on all major roads in the region.(Fig.4-17) This would obviously lead to improve traffic safety. In the future, joint activities in the three Baltic countries would be mainly concerned with a further development of new technologies, harmonization of the road management systems and the implementation of traffic safety measures. For example, to protect the pavement from the damaging effect of studded tires, which are still common in Nordic and Baltic countries, there are discussions held about prohibiting them in the region. This and many other issues could be the topic of joint seminars and conferences. The XIth PIARC Winter Road Congress I hope will help us to implement new road maintenance technologies and management innovations during the next four years until the next Congress. Thank you for your attention, I would be glad to answer any of your questions, thank you.

Conclusion

Fig.4-17

With a close and sustainable co-operation, the three countries are able to adopt new technologies, harmonise the road maintenance levels on all major roads in the region. This would obviously lead to improving traffic safety. In the future, joint activities in the three Baltic countries would be mainly concerned with a further development of new technologies, harmonisation of the road management systems, implementation of traffic safety measures. For example, to protect the pavement from the damaging effect of studded tyres, which are still common practice in Nordic and Baltic countries, there are discussions held about prohibiting them in the whole region. This and many other issues could well be topics of joint seminars and conferences.

Dr. MITANI:

Thank you, Dr. PUODŽIUKAS from Lithuania. Do you have any questions? No, no questions, thank you very much Dr., maybe in the second phase we would like to discuss these matters. Now I'd like to invite our next speaker from Hungary Dr. LÁNYI, please.

2.5 Dr. Péter LÁNYI (Hungary)

Head of Road and Bridges Division, Department for Roads
Ministry of Transport and Water Management

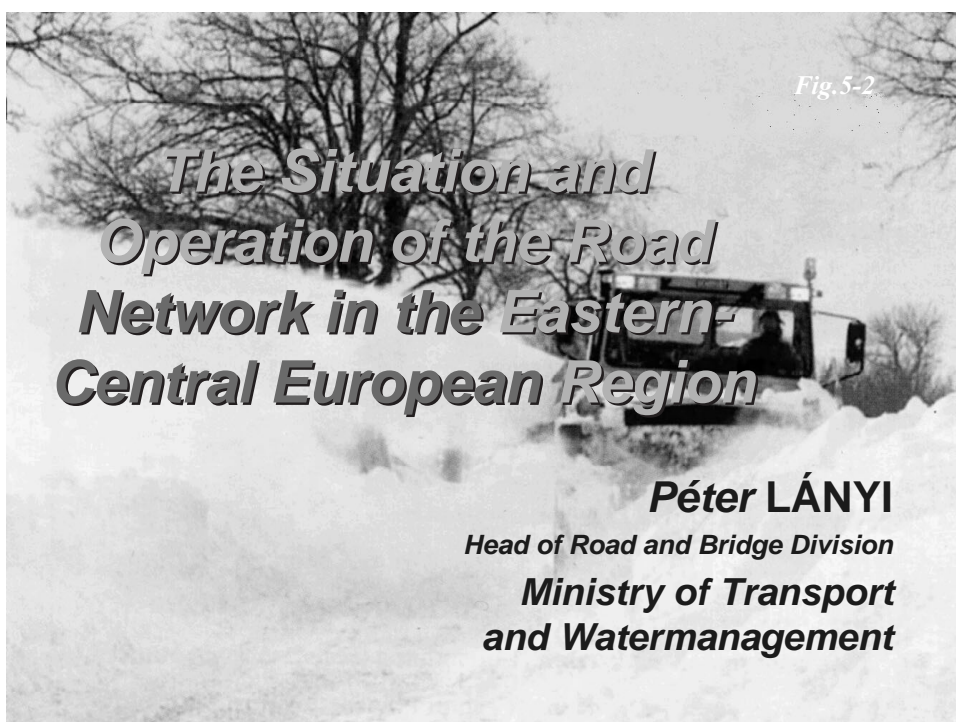
“The situation and operation of the road network in the eastern and central operation region, including Hungary, under winter weather conditions-problems and solutions”

Dr. LÁNYI:

Mr. Chairman, ladies and gentlemen, I am very glad to be here in Sapporo at the PIARC Winter Congress and also represent the Eastern Central European Region.(Fig.5-1)



In my presentation I will show you the situation in the region and also the Hungarian proposal for the winter management system development.(Fig.5-2)



The Eastern Central European Region consists of relatively small countries such as Poland, Slovakia, Czech Republic, Hungary, Romania and so on.(Fig.5-3) They have similar and common economy and history in the past and futures too. All these countries want to join the European Union.



The major weather influential factors in wintertime are the effects of the Atlantic Ocean and the Gulf Stream from the west, large cold air mass accumulating over the North Pole and the Eastern European Plain from the north and the north-east, and the Mediterranean and African subtropical air currents from the south.(Fig.5-4) The weather conditions in this region, the annual average mean temperatures is between 8 and 11 °C.(Fig.5-5) The annual amount of precipitation varies between 400 mm and 1400mm. The average number of snow days is 18 to 40 in lowland areas and around 30 to 60 in mountainous areas. Over 500 meter high mountains this number would be higher.

Major weather influence factors Fig.5-4 in winter

- *From the west: the effects of the Atlantic Ocean and the Gulf Stream*
- *From the north and northeast: large cold air mass accumulating over the North Pole and the Eastern European Plain*
- *From the south: the Mediterranean and African subtropical air currents*

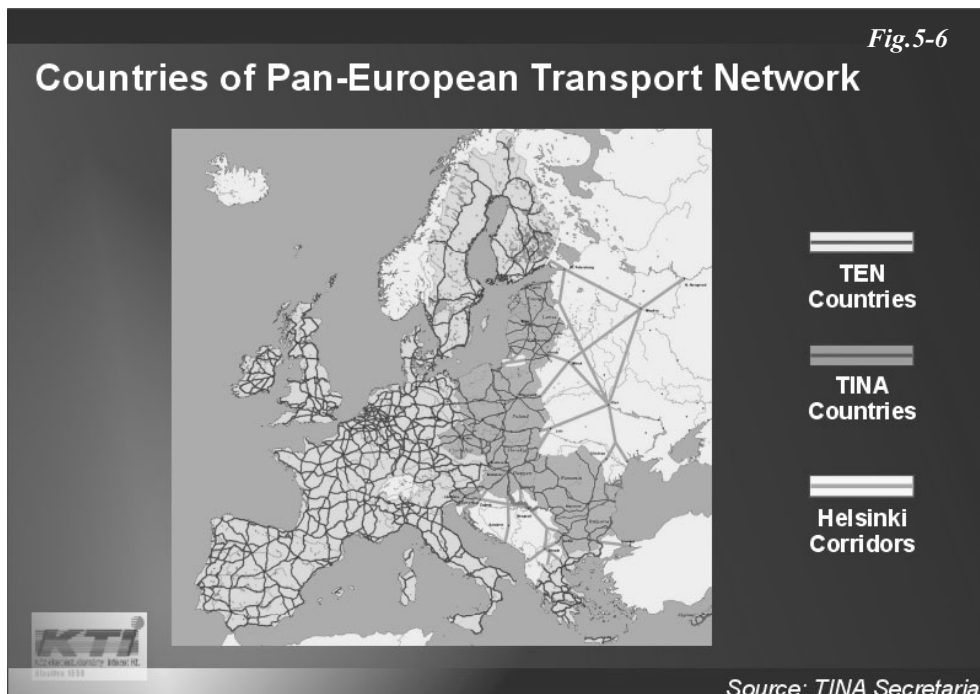
Fig.5-5

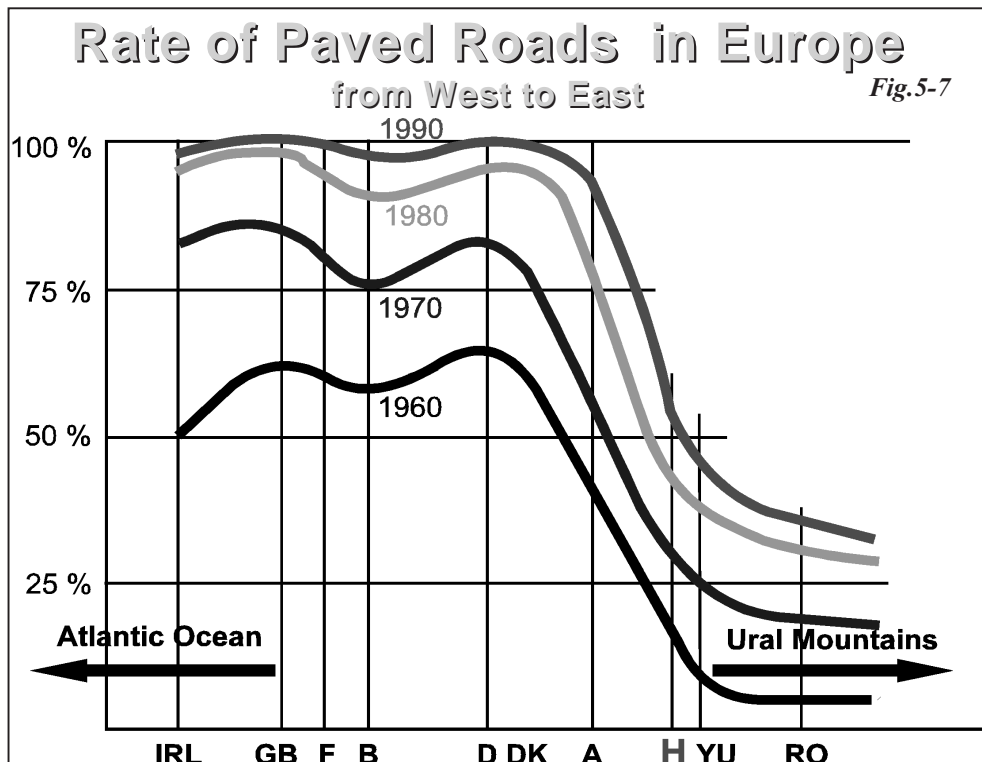
The weather conditions in the region

- *Annual mean temperature is around 8-11 °C*
- *Annual number of sunny hours is between 1700 and 2100*
- *Annual amount of precipitation varying between 400 mm and 1400 mm*
- *The average number of snow days is 18-40 in lowland areas and around 30-60 in mountainous areas*

We are developing road networks, mainly motorway systems because today the road density is relatively low compared with that of the Western European countries.(Fig.5-6) In this figure I'd like to show the rate of paved roads in Europe, this is a cross-section from East Europe to West Europe.(Fig.5-7)

Fig.5-6



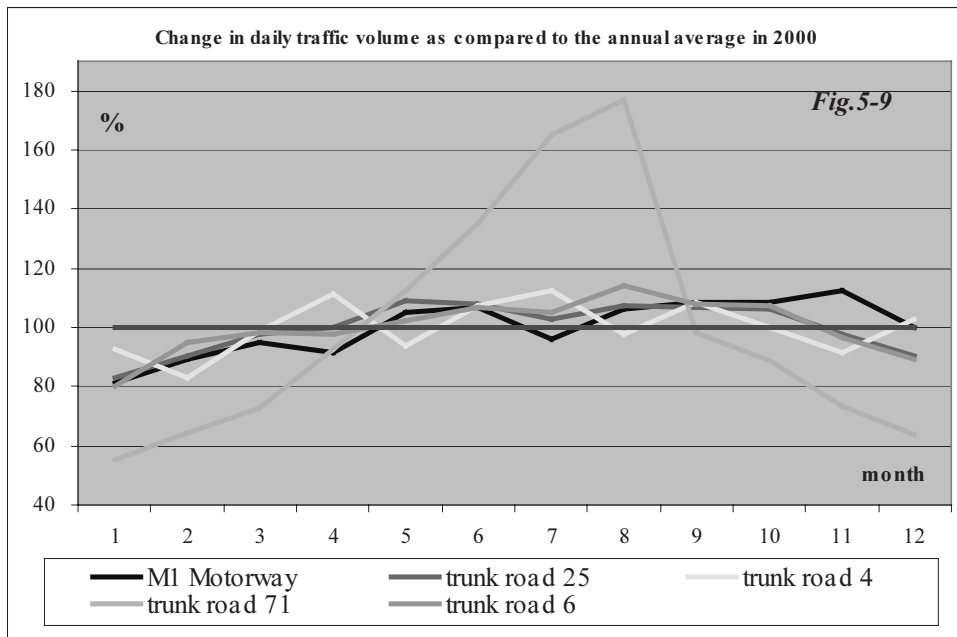


In the western countries we found that the paved roads rate is between 80 and 90% and in the Central Eastern region it is only 30 to 50%. I tried to collect some data of the road network in this region.(Fig.5-8) I could say that in about 8,000 square kilometres the population is more than 100 million, the motorway network is less than 10% of the whole road network and the density of the road network is less than 1.8 kilometres/square kilometres.

Data of the Road Networks in the Region *Fig.5-8*

	Unit	Croatia	Yugoslavia	Poland	Hungary	Romania	Slovakia	Slovenia
Motorway	km	330	560	268	438	133	288	249
National roads	km	7 378	5 928		29 630	14 570	3 222	1 154
Local roads	km	10 193	12 680		~105 000	58 478	3 773	4 654
Other	km	10 269	29 443		25 000	80 198	10 427	13 529
Total roads	km	27 840	48 603		~160 000	153 359	17 710	19 586
Proportion of solid pavement	%	84.4	59.3		43.4	67.6	99.0	90.6
Territory of the country	10 ³ km ²	89.8	39.4	312	93	238	49	20.2
Population	10 ⁶	4.8	11.2	38.6	10.1	22.7	5.5	2.0
Density of road network	km/km ²	0.5	0.5	1.2	1.8	0.7	0.4	1.0

By Hungarian experiences I would like to show the change in the daily traffic volume as compared with the annual average.(Fig.5-9) We found that the traffic volume in wintertime is 20% less than the annual average, on some special roads it could be 40% less.



The level of service of winter maintenance depends on responsibilities, road operations standards and service rated by road categories and environmental impacts and accident situations for the distribution of information.(Fig.5-10) The responsibilities of the road operators, the National Road Administration is governed by a law, ministerial decree which consists of duties and responsibilities and specified schedule limits for interventions.(Fig.5-11) Especially, in some countries, currently, there are no regulations for municipal roads.

Level of service

Fig.5-10

- *Responsibilities*
- *Road operation standard and service in breakdown by road categories*
- *Environmental impact and accident situation*
- *Distribution of information*

Responsibilities 1.

Fig.5-11

- *The national road administration are governed by a law and ministerial decree*
 - Determined duties and responsibilities*
 - Specified time limits for interventions*
- *Currently there's no regulation for municipal roads*

The responsibilities of national road operators, national transport policy decisions, could be one of 3 categories within the service levels.(Fig.5-12) It depends on the financial resources. It's very important to be prepared for winter service such as personnel conditions, the technical conditions and conditions on the roadside. For regional decisions the service categories could be patrolled roads, zoning roads and widening roads. I'll show you the percentages of these kinds of roads in Hungary.

Responsibilities 2.

Fig.5-12

- *Three categories within the service levels (A, B, C)*
- *Preparations for winter service*
 - Personal conditions*
 - Technical conditions*
 - Conditions on roadside*
- *Service categories*
 - Patrolled roads – 29,6 %*
 - Zoning roads – 55.2 %*
 - White roads – 15,2 %*

For environmental impacts, the most frequent used anti-skid materials are magnesium chloride and calcium chloride.(Fig.5-13) We found, while monitoring the environmental impacts that the emission impacts in a 30 to 40 m wide strip of road are 30 to 40 cm deep in the soil. The chloride iron content of soils average in a year 41 mg/litter but after the wintertime is more than 100. The chloride contents of storm waters in a yearly average are 25 but after the winter it could be more than 700.

Environmental impact

Fig.5-13

- *Antiskid materials – NaCl, CaCl₂, etc...*
- *Monitoring of environmental impact*
 - *Immission impact: 30-40 m wide strip along roads – 30-40 cm depth in soil*
 - *Chloride ion content of soils*
 - average 41 mg/l*
 - spring 105 mg/l*
 - *Chloride ion content of storm waters*
 - average 25 mg/l*
 - spring 690 mg/l*

The responsibility of drivers is an important question, the traffic code rules that you have to drive considering the road, weather and sight conditions.(Fig.5-14) In some countries studded tires are not permitted, in Hungary there is a new rule, and new traffic signs concerning the use of snow chains. We can use this sign at border crossings and also locally.

Responsibility of drivers

Fig.5-14

- *Traffic Code – drive considered road, weather and sight conditions*
- *Barbed winter tyres are not permitted*
- *Rule, regulation and traffic signs about the use of the snow-chain – since may 2001.*

We seek to develop the winter management system in the future in this region to supply more information for the drivers and the users and to collect more effective meteorological data.(Fig.5-15) In many countries central information services are working on the national roads and sometimes in main cities, too through public service radio stations, RDS and public service TV channels broadcasting teletext information. We see that the road weather information system would solve this problem to collect reliable material data. In Hungary, the steps of the development were, first experimentally installation of road weather observation stations on the main motorway

sections. Two years ago the state made a decision to have a complete national system of international standards for 200 road weather information systems which will provide motorways with one unit per about 9km and on other roads with one unit per 63 km road.(Fig.5-16)

Information supply and technological preparation

Fig.5-15

- *Central information service for national roads (UTINFORM)*
 - *Public services Radio station*
 - *RDS-TMC broadcast*
 - *Teletext information on public services TV channels*

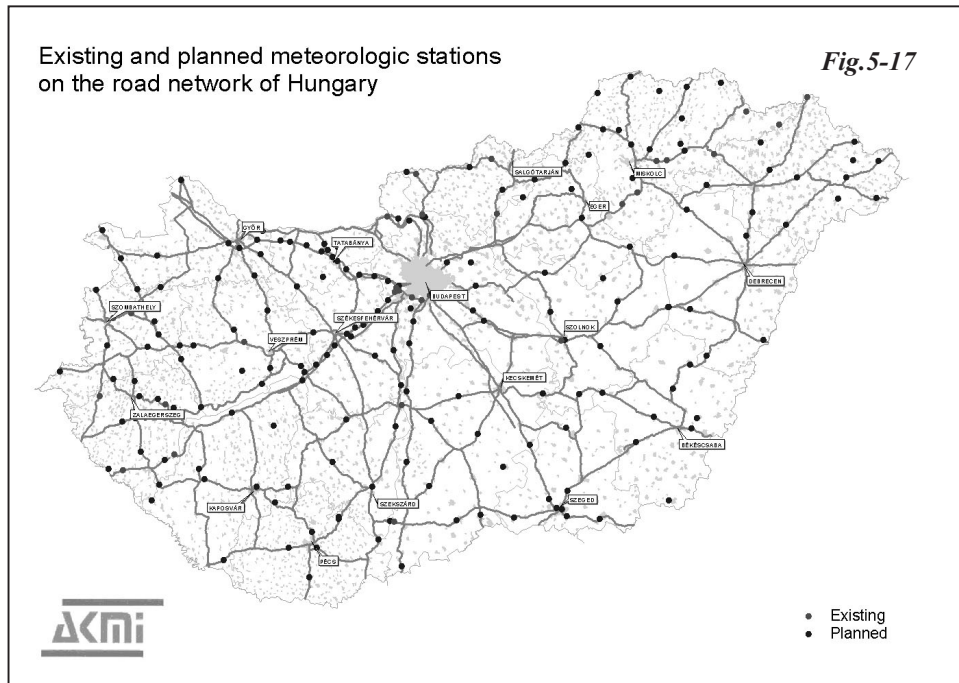
Measures to solve problems

Fig.5-16

- *Road weather observation stations – experimentally*
- *Road weather information systems on M3 and M5 motorway*
- *Tender for public procurement of 198 new RWIS stations*
 - *density of RWIS stations*

<i>on motorways:</i>	<i>9,5 km/piece</i>
<i>on other roads:</i>	<i>63 km/piece</i>

The Hungarian map shows that the existing and planned meteorological stations located on the motorways and high importance rural roads.(Fig.5-17) The system features 83 terminals of road maintenance units, communication by Internet, about 200 new meteorological stations which can be developed up to 300 GSM connections to a server, ISDN connection to the National Weather Forecast Service.(Fig.5-18)

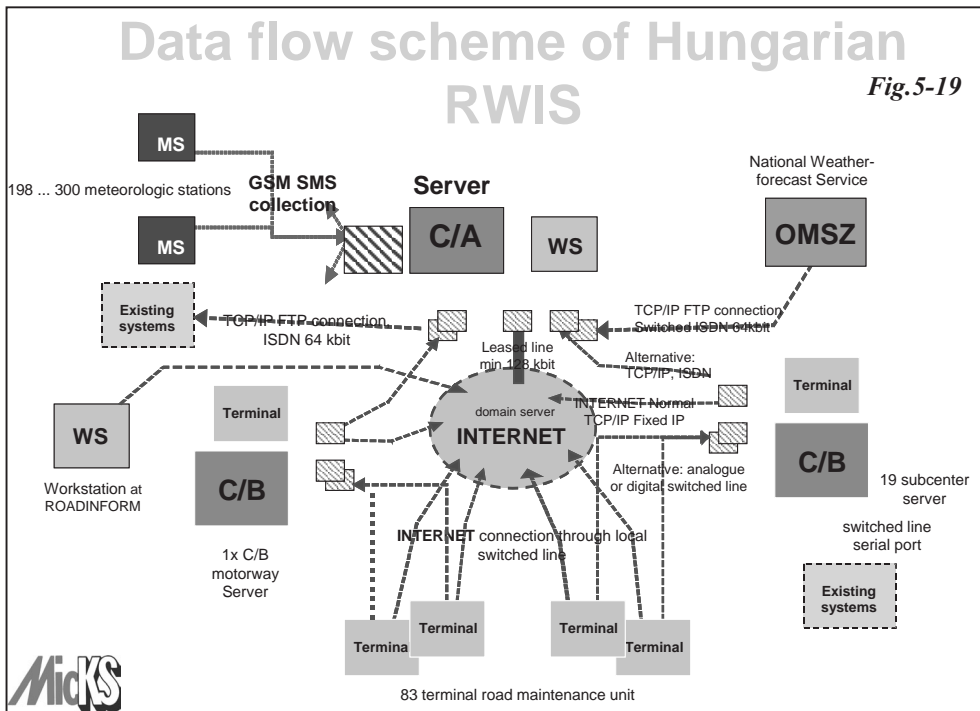


Features of MickS – RWIS in Hungary

Fig.5-18

- 83 terminal at road maintenance units
- Communication by INTERNET
- 198 new meteorological station (can be improved up to 300)
GSM connection to server
- ISDN connection to the National Weather-forecast Service

This is a data flow scheme of the Hungarian system which contains all the elements mentioned before.(Fig.5-19) I've summarized the goals of this road weather information system.(Fig.5-20)



- ### Goals of RWIS in Hungary 1. Fig.5-20
- *Additional meteo roadside infos to National Weather-forecast*
 - *Special meteo infos from typical and extreme roadside sites*
 - *Increase the reliability of meteo data*
 - *Reduce running of patrol cars*
 - *Optimise the amount of used salt*

Additional meteorological roadside information to the national weather forecast, special meteorological information from typical and extreme roadsides from the main network increases the reliability of meteorological data, reduce the running of patrol cars, optimize the amount of used salt, minimize the reaction time of maintenance staff, increase the level of service on roads, reduce accidents under winter conditions, optimize the maintenance costs of roads and we will estimate the rate of return within two or three years.(Fig.5-21)

Fig.5-21

Goals of RWIS in Hungary 2.

- *Minimise of reaction time of maintenance staff*
- *Increase the level of service on roads*
- *Reduce of accidents in winter conditions*
- *Optimise the maintenance costs of roads*
- ***Estimated rate of return 2 – 3 years***

Thank you for your attention.(Fig.5-22)



***Thank You for your
attention.***

Dr. MITANI:

Thank you. Any questions? OK, now our next speaker, Mr. Mike WILSON from the UK, please.

2.6 Mr. Mike WILSON (U.K.)

Team Leader of Operational Policy, Highways Agency
"21st Century winter service in the United Kingdom"

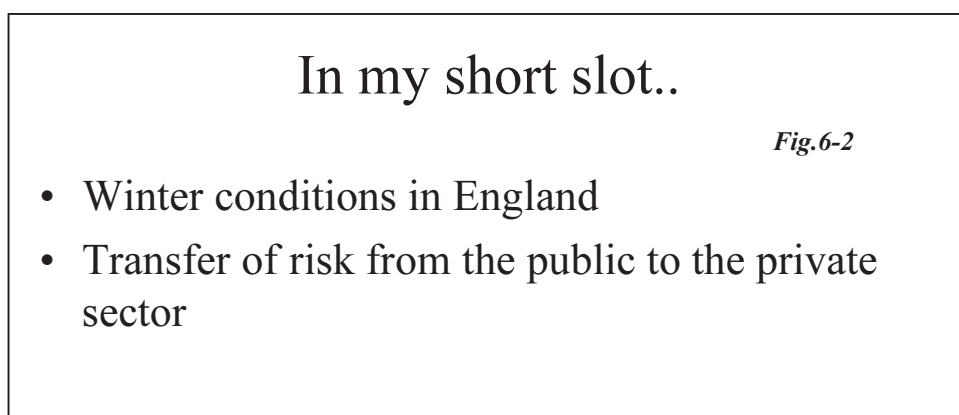
Mr. WILSON:

Good morning ladies and gentlemen. Thank you, Dr. MITANI for your kind invitation to speak this morning. My name is Mike WILSON, I work for the Highways Agency in the United Kingdom.(Fig.6-1)



The Highways Agency is the strategic road authority in England, only part of the United Kingdom. The strategic road network only constitutes some ten and a half thousand kilometers, although it provides vital links within the country. It is only 4% of all the roads and carries some 136 billion vehicle kilometers/year, which represents 34% of all traffic and it carries 67% of all freight by vehicle kilometer. So as I say, it is a very important part of the United Kingdom's road infrastructure, or infrastructure as a whole.

Briefly this morning, I'm going to, I feel somewhat fraudulent speaking to you this morning but a bit more about that in a moment.(Fig.6-2) I'm going to talk about winter conditions in England and my comments are solely about England this morning and I'm going to talk a little bit about the work that we've been doing to transfer risk from the public to the private sector and the benefits we see from that process.



OK, here's a picture of a part of the trunk road network in England, this is the M-6, just south of Birmingham, which is our second city.(Fig.6-3) You'll note that the road is heavily congested, in fact 7% of our network suffers heavy peak and occasional off peak congestion. And a further 13% suffers heavy congestion on at least half the days of the year. It has been estimated that the travel demand on this network is likely to increase

by 29% over the next 10 years. This creates, for the Highways Agency a serious problem, this problem was recognized in a government white paper, published in 2000 entitled "Transport 2010, the 10 Year Plan". This white paper set out how the government was going to tackle the travel problems that England was facing. Included in these proposals was a new role for the Highways Agency as a network operator and a traffic manager. And the Agency was set targets including targets for easing congestion, safer travel, better information and delivering in partnership, both with our suppliers and with the general public and also with other agencies that have responsibilities on our roads and of course to do all this whilst achieving best value over time.



OK, so, onto winter maintenance. Here is a picture of a road in England in the middle of winter, and your eyes do not deceive you, it is exactly the same picture as the one of the road I showed you in summer and this is why I feel somewhat fraudulent standing in front of you.(Fig.6-4) Our biggest problem is that England has a temperate maritime climate and sustained low temperatures are very rare. The winters are mild and we have little snow so I have very much enjoyed coming to Sapporo and seeing all the lovely snow here. Road Temperatures however tend to hover around 0 degrees centigrade and there in lies our problem. Not only have I shown you the same picture, this is how our users perceive the road network, there is little change between the seasons in travel demand or travel usage by our users, they see no difference in the seasons and see no difference in terms of journey times, they require journey times to be similar throughout the year.(Fig.6-5)



Fig.6-4

WINTER Conditions



Fig.6-5

Highways Agency Objectives

**combat congestion by better operation
and selective improvement of the network**

So as I said our biggest winter maintenance issue on marginal nights is to treat or not to treat.(Fig.6-6) On these marginal nights, treatment saves lives, it reduces the number of accidents and reduces congestion following these incidents or accidents. However, inappropriate treatment causes unnecessary expenditure, damages the environment and of course damages the infrastructure and therefore we require good decisions whether to treat or not to treat and good decisions rely on excellent and local weather information, appropriate management systems and highly trained and experienced personnel in that part of the network.

Fig.6-6

Biggest Winter Maintenance Issue



To treat or...

- Prevent accidents
- Reduce driver risk
- Reduce likelihood of congestion
- Reduce risk of litigation

not to treat

- Cost
- Environmental impact
- Infrastructure cost

Winter service has been delivered by the Agency ever since the Agency was formed in about 1994.(Fig.6-7) Before 1997 we used about 90 local highway authorities and have used the private sector since about 1997 when we moved from the 90 areas to 20 managing agents and term maintenance contracts. The Agency has had a very risk adverse perspective with respect to winter maintenance. We used a strict method specification telling the agents what to do, where to do it and even when to do it. We have used short contracts with little incentives to contractors to invest in the service that they deliver. And we have provided weather data based on a national contract, however the Agency believes that to deliver its objectives under the 10 year plan it needs to change the way it buys its services and very recently we published a new procurement strategy that set out some themes which I will briefly speak to you about.

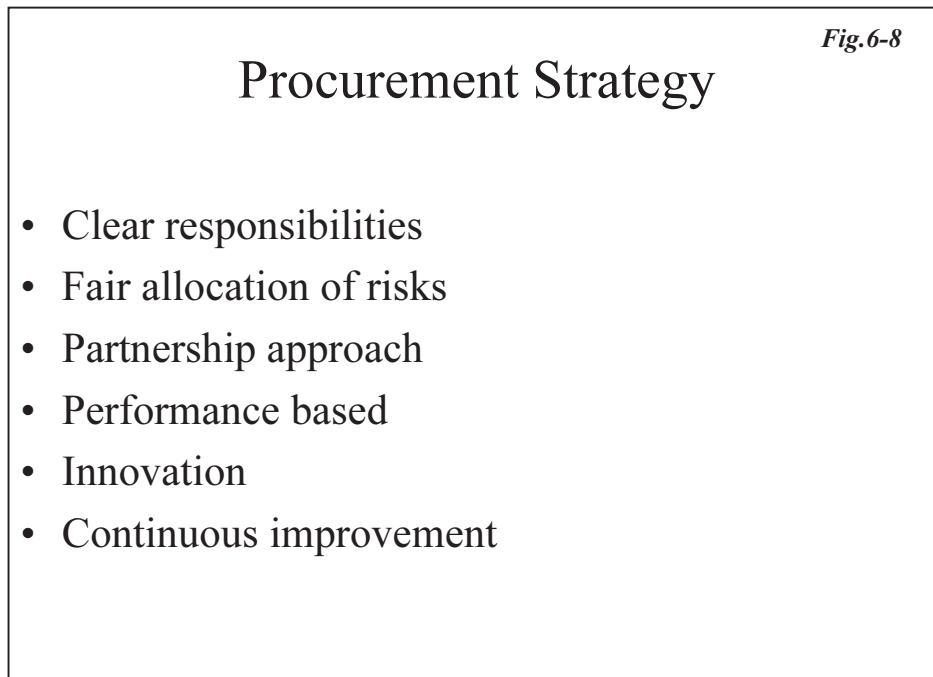
Fig.6-7

Winter Service was delivered..

Private sector involvement since 1997 based on:

- Strict method specification
- Provision of winter maintenance fleet
- Provision of weather data

One of those is about clear responsibilities with no unnecessary layers of supervision, we require a fair allocation of risk to the person or party best able to manage them.(Fig.6-8)



We will be delivering in partnership with long-term relationships with our contractors and suppliers and much better supply chain management. We will be using performance based contracts to encourage innovation and we will require continuous improvement. So how does this manifest itself in winter maintenance or winter service, well since September of this year we have had a new form of contract called the “Managing Agent Contractor Contract”.(Fig.6-9) The contract has a single point of responsibility that combines the former managing and doing functions which were previously contracted as managing agent and term maintenance contractors. We have longer contracts, typically 5 to 7 years as opposed to 3 to 5 previously.

Managing Agent Contractor

- Single point responsibility
- Decisions to treat at a local level
- Longer contracts
- Performance Specification
 - 'A carriageway free from ice and snow'*
- Continuous improvement

We have a performance specification. The performance specification has a clear objective and I list it here, it is simply, I say simply, that we require a carriage way free from ice and snow and there are performance indicators within those contracts and the contractor is required to deliver continuous year on year improvements in the quality of the service that is delivered, either that service more efficiently or that, or an improved service or level of service. The performance specification is there to encourage innovation, we believe. It also will encourage investment in information gathering, in the management systems, in equipment and especially in staff retention and training.

OK, the title of this session was "Into the 21st Century", I've given you a snapshot of where we are at the moment. Where do I see us in the future?(Fig.6-10) Well we currently pay for our winter maintenance service, even in the new managing agent contractor contracts on a lump sum basis. I believe in the future we will try to provide a financial incentive to deliver a better service based on performance, the level of service that we actually provide. The Agency is required to consider the introduction of private finance in our managing of the network. These contracts will have much longer duration giving greater incentive to contractors to invest in the network and much more flexibility to deliver the service because from the Highway Agency's perspective value for money over time becomes less important. And finally if we are going to gather all this useful information for the management of the network we need to provide it to our users so that their perception of the network in winter may change. Thank you for your attention.

Future?

Fig.6-10

- From lump sum to performance based payment
- Private finance
- Better provision of information to users

Thank you

Dr. MITANI:

Thank you, Mr. WILSON. I am afraid that we are running out of time, so I'd like to invite the next speaker from China. Mr. FENG, please. Thank you.

2.7 Mr. FENG Zhenglin (China)

Director General, Highway Department, Ministry of Communications
"State-of-the-art and trend of road maintenance in China"

Mr. FENG:

Mr. Chairman, My dear colleagues, Ladies and Gentlemen.(Fig.7-1) It will be of great significance for all the road administrators and technicians from all over the world to gather here today to discuss the common issues encountered in winter highway maintenance in the 21st century with a view to improve highway maintenance and its technology. Hereby, I'd like to have a brief introduction to all of you about the highway maintenance management in China.

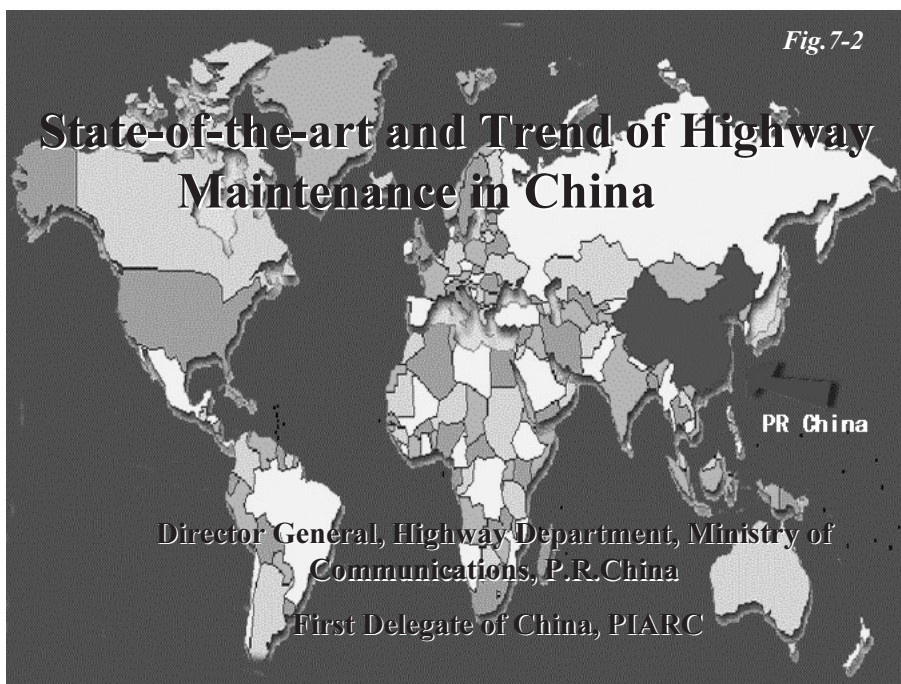
Fig.7-1

**XI th Winter Road Congress, 28-31 January
2002 in Sapporo, Japan
State-of-the-art and Trend of Highway
Maintenance in China**

**Feng Zhenglin
Director General, Highway Department,
Ministry of Communications, P.R.China
First Delegate of China PIARC**

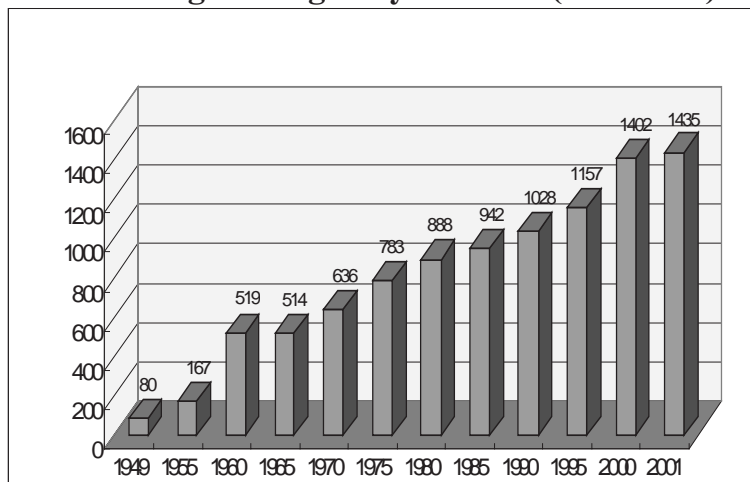
1. The General Situation of Highway in China

China is a developing country whose transportation once constrained the development of its national economy for quite a long time.(Fig.7-2) In recent years, China has been implementing an active fiscal policy with increased investments in infrastructure and construction including highway transportation which has led to support the development of our national economy.(Fig.7-3) By the end of last year, the total road mileage in mainland China has surpassed 1.43 million km, of which 19,000 km for expressway road density has reached 14.6km per hundred square kilometer, a national highway network which is well connected, rationally distributed and leading to all directions has basically taken its shape.(Fig.7-4) According to the statistics, the total highway mileage of China amounts to 19% of that of Asia, in which expressway amounts to 67% of that of Asia. So far, the 18 trading ports can be connected to 10 countries through 21 routes.(Fig.7-5)



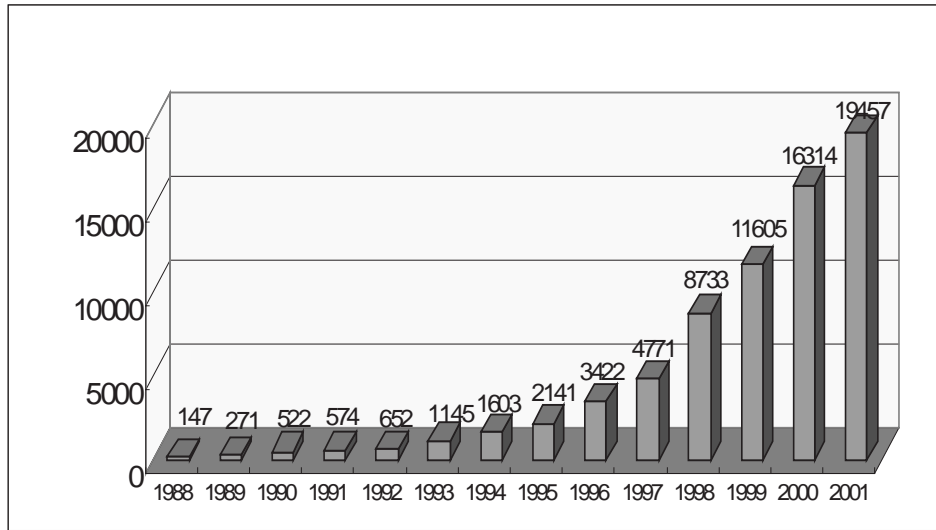
1. The General Situation of Highway in China

Total Mileage of Highway in China(1000 KM)

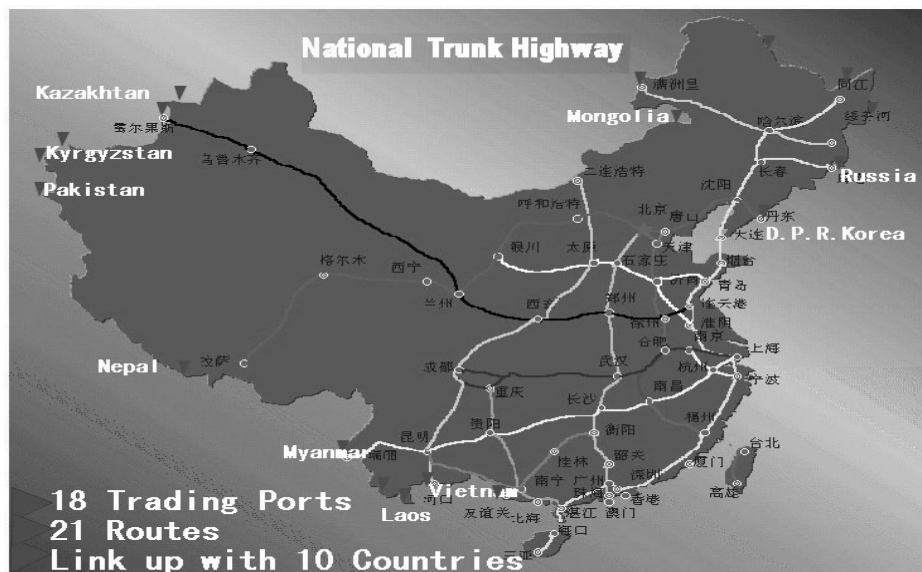


1. The General Situation of Highway in China

Total Mileage of China Expressway:Km Fig.7-4

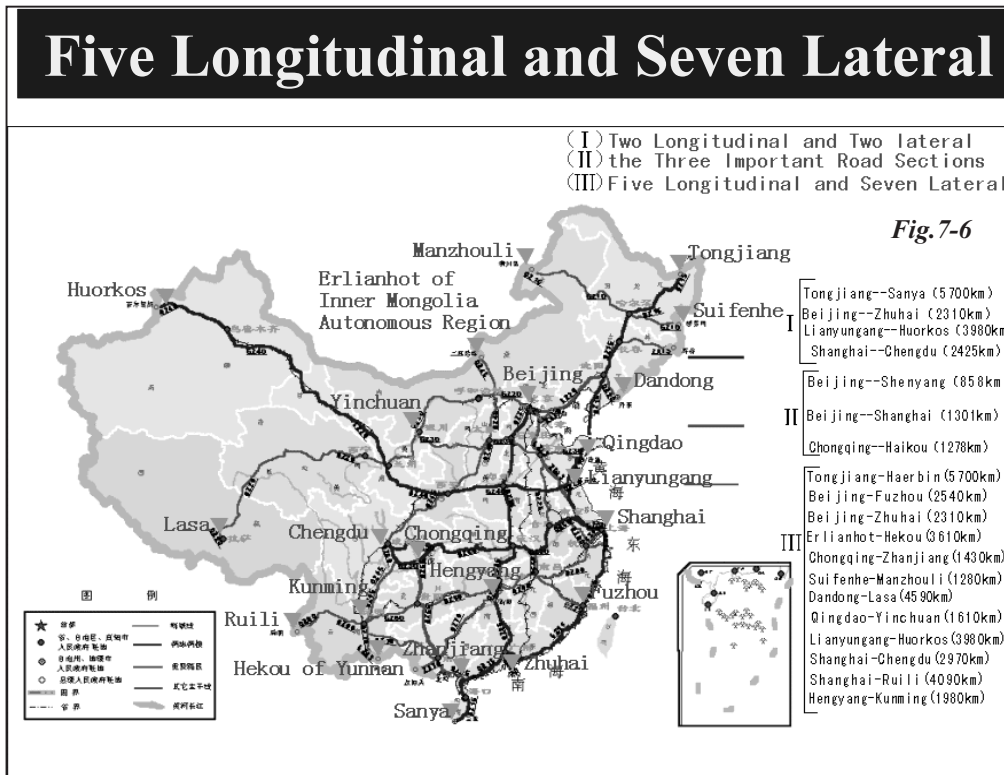


The Significance of China Highway in Asian Highway Networks Fig.7-5



To meet the future need of economical and social development of China, the economical and cultural exchange of China with the neighboring countries and the economical exchange between China and other countries in Asian and in the world as well, the Ministry of Communications of China has made a three-step planning for highway development which can be put in the following:

Step I, by 2010, the intense situation of short supply of highway transportation and its constraints to the development of national economy will be totally improved.(Fig.7-6) The “Five Longitudinal and Seven Lateral” national trunk highway system will be fully finished, which will connect all the cities with population over 1 million and most cities with population over 500,000. Total highway mileage will reach 1.8 million km and total mileage of expressway will reach 35,000 km.



Step II, by 2020, highway and transportation will basically meet the need for the development of national economy. The highway framework of national trunk highway and major national mainline highway will basically be formed. The trunk highway network can be reached in 3 hours in most areas of China. Total mileage of national highway will reach 2.3 million km and that of expressway will reach 55,000 km.

Step III, by 2040, highway transportation will basically be modernized, reaching the level of a secondarily developed country. The highway framework of national trunk highway and major national mainline highway will be fully formed. A national expressway network will take shape. All the neighboring cities of prefecture level will be connected with high-grade highways. Total mileage of national highway will reach 3 million km and that of expressway will reach 80,000 km.

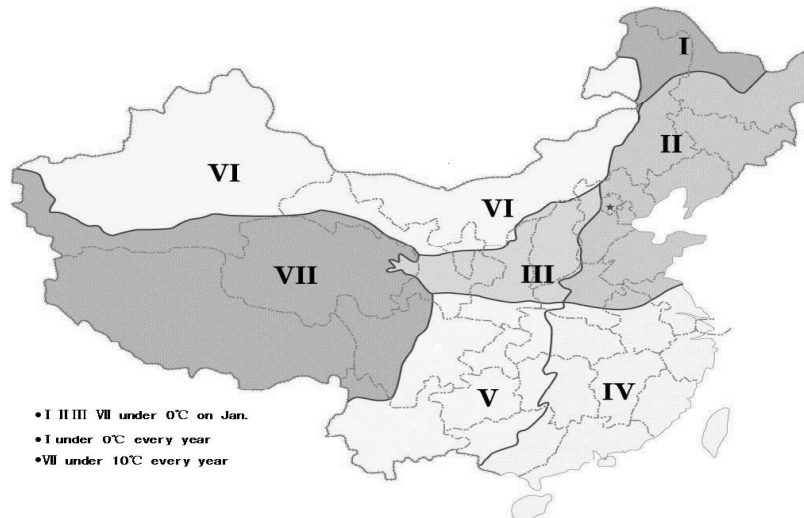
2. The Influence of Climatic Features of China on Winter Maintenance

China is large in both population and territory and has a big difference in climate nationwide.(Fig.7-7) So problems faced in highway maintenance are also complicated. From the north to the south there is a big difference in temperature in winter and the climate in summer is basically the same.

2. The Influence of Climatic Features of China on Winter Maintenance

Fig.7-7

The Map of China's Natural Geographical Area



According to the Map of China – Natural Geographical Area (which is divided into 7 areas as I to VII), area I, II, III and VII have an average monthly temperature lower than 0 °C in January and average annual temperature in area I is lower than 0 °C and average annual temperature in area VII is lower than 10 °C. Because of the special climatic features in these areas, highway maintenance in winter is largely influenced and problems in highway maintenance in winter are rather bothersome. Main disease harms of road are frost heave, snow harm, salivation ice, boiling, icicle and permafrost, etc.(Fig.7-8) Through several decades of research and practice, we have found measures to prevent and treat with such disease harms and gradually increased the fund input in highway maintenance in winter and thus secured the normal operation of highways of all grades.

2. The Influence of Climatic Features of China on Winter Maintenance

Fig.7-8

- Frost Heave, Snow Calamity, Salivation ice, Boiling, Icicle Permafrost



3. The Present Situation of Highway Maintenance Management

An important measure in improving the efficiency and quality of highway maintenance operation is to adopt advanced management technique and technology.(Fig.7-9)

3. State-of-the-art of Highway Maintenance Management

Fig.7-9

1) Principle for Highway Maintenance

2) The Application of New Materials, New Technologies and New Process for Winter Maintenance



Much progress has been made in the research and promotion of advanced and practical management techniques and technology in highway maintenance since the adoption of the reform and opening policy.

(1) Principle for Highway Maintenance

The main principle for highway maintenance in China is: “Precautionary measures, combined with aftermath treatment measures”.(Fig.7-10)

1) Principle for Highway Maintenance

Fig.7-10

The main principle for highway maintenance in China is following the main principle of “Precautionary measures as dominant, combined with aftermath treatment measures”



To enhance the standardization of highway maintenance management, “The Technical Specification of Maintenance for Highway” has been established which has given a series of comprehensive stipulations to the technical policies and measures, classification and management of project, quality examination, and the technical management systems pertaining to highway maintenance, and presented detailed requirement to maintenance for permafrost area and winter maintenance.(Fig.7-11)

1) Principle for Highway Maintenance

Fig.7-11

The specification has given a comprehensive stipulation about the technical policies and measures, classification and management of project, quality examination, and the technical management systems pertaining to highway maintenance, and presented detailed requirement to maintenance of permafrost area and winter maintenance.



(2) The Application of New Materials, New Technologies and New Process for Winter Maintenance

Science and technology are the primary productive forces.(Fig.7-12) In winter maintenance, a series of new technologies, new materials and new processes have been invented and adopted, such as low temperature bituminous mixtures, pot hole patching technology for asphalt pavement, polymer concrete patching technology, boiling processing for mountain roads, the studies and development of snow removal equipment, antiskid spreading equipment. The quick and wide application of such new materials, new technologies and new processes in winter maintenance has greatly improved the efficiency of operation and highway maintenance management and secured the persistent improvement of the quality of maintenance projects.

The following is one practical case:

2) The Application of New Materials, New Technologies and New Processes for Winter Maintenance

Fig.7-12

- Low Temperature Bituminous Mixtures
- Pot Hole Patching Technology for Asphalt Pavement
- Polymer Concrete Patching Technology
- Boiling Processing for Mountain Roads
- The Studies and Development of Snow Removal Equipment
- Antiskid Spreading Equipment



The area of Qinghai-Tibet Plateau permafrost accounts for more than 60% of the total amount of that of our country.(Fig.7-13) The total mileage of Qinghai-Tibet Road reaches 632 km across the permafrost area, among which the continuous distribution area of permafrost reaches more than 520 km. The climate is bitterly cold in this area, the average temperature is -2 - -7 °C, the crisis lowest temperature reaches -39.7 °C, the crisis highest temperature reaches 20.1°C, it is 4500 m above sea level, the period of freezing reaches more than 7 - 8 months every year. Air is rare and the weather is bad on the high plateau.

Case One: SBR was mixed into the Lanlian no.160 bituminous in winter maintenance of Qinghai-Tibet Road in our country, in order to improve the low temperature performance of asphalt mixture and the stability of anti-freezing water.

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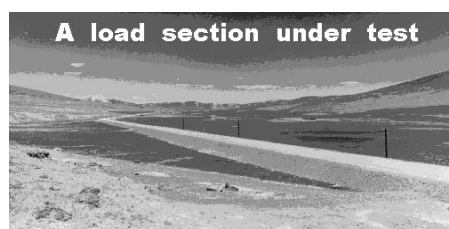


Fig.7-13

The low temperature cracking and fatigue destruction and winter thawing destruction are the main form of bituminous pavement destruction of Qinghai-Tibet Road.(Fig.7-14) To enhance the service life of the bituminous pavement of Qinghai-Tibet Plateau, the focus is to improve the performance of bituminous aggregates.

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Modified asphalt mixtures were paved, so the crack spacing of Qinghai-Tibet Road bituminous pavement extend from 3 to 15m of the original general bituminous pavement to 20 to 60m, the fracture of bituminous pavement was reduced and the service life of pavement was enhanced. *Fig. 7-14*



With modified asphalt mixtures paved, the crack spacing of Qinghai-Tibet Road bituminous pavement extend from 3 - 15m of the original general bituminous pavement to 20 - 60m. The cracking of bituminous pavements was reduced and the service life of pavements was enhanced.

4. The Directions of China Highway Maintenance Management

In order to improve the cost-effectiveness of funds for highway maintenance, a series of innovations and reform has been adopted in the operation mechanism of maintenance management.(Fig.7-15)

4. The Directions of China Highway Maintenance Management *Fig.7-15*

1) The guiding principle, and the building of the system of policies and regulations for highway maintenance in China

The guiding principles for highway maintenance in China is Emphasizing coordinated development of both construction and maintenance; deepening reform; enhancing management; improving quality, assuring unblocked transportation.

(1) The guiding principles and the building of the system of policies and regulations for highway maintenance in China (Fig.7-16)

1) The guiding principle, and the building of the system of policies and regulations for highway maintenance in China

Fig.7-16

Fulfill the “three changes”, i.e.,

- 1 Turning the public institution for highway maintenance and construction into enterprise;**
- 2 turning the command maintenance into contract maintenance;**
- 3 Turning small highway management teams into larger ones to form specialized maintenance centers.**



The guiding principles for highway maintenance in China are “emphasizing coordinated development of both construction and maintenance; deepening reform, enhancing management; improving quality, assuring unblocked transportation.”

The highway management authority of China will observe market laws in accelerating the reform of operation mechanism in highway maintenance and fulfill the “three changes”, that is:

- 1) Turning the public institution for highway maintenance and construction into enterprise;*
- 2) Turning the command maintenance into contract maintenance;*
- 3) Turning small highway management teams into larger ones to form specialized maintenance centers to improve the cost-effectiveness in highway maintenance.*

At the same time, the establishment of the system of laws, regulations and technical specifications will be strengthened. An especially important point is the absorbing, importing and promotion of advanced technical experience in winter maintenance from other countries.

(2) Improve the Level of Highway Maintenance Management by Relying on Scientific and Technology Progress (Fig.7.17)

(2) Improve the Level of Highway Maintenance Management

Fig.7-17



We will continue to increase the financial input in technology, research and development of highway maintenance and carry out soft projects to deliver scientific basis for management decisions in highway management. As for the informatization in highway maintenance, a census of highway conditions has been carried out and enhanced the development and utilization of information resources. A highway database has been put into practical use.

(3) Set Up New Ideas in Highway Maintenance and Persistently Improve Highway Maintenance Management.(Fig.7-18)

(3) Set up New Ideas in Highway Maintenance and persistently Increase the Level of Highway Maintenance Management

Fig.7-18

- 1 Firmly set up the idea that “construction is development, And maintenance is also development”**
- 2 Firmly set up the idea of service that “take people as the Final aim, take vehicle as the final aim”**
- 3 Firmly set up the idea of pushing forward maintenance Management through institutional innovation**
- 4 Firmly set up the idea of fulfilling sustainable highway Development through technological innovation.**

1. First, firmly form the concept that “construction is development, and maintenance is also development.”
2. Second, firmly form the service concept of “take people and vehicles as the final aim.”
3. Third, firmly form the concept of pushing forward maintenance management through institutional innovation.
4. Fourth, firmly form the concept of fulfilling sustainable highway development through technological innovations.

A lot of problems and difficulties still exist in winter highway maintenance in China. We sincerely wish to further enhance the cooperation with the PIARC members and the technical exchange with highway circles in all countries to improve highway maintenance together so that highway infrastructure will play its proper role in the development of our national economies.

Thank you for your attention.(Fig.7-19)



Dr. MITANI:

Thank you, Mr. FENG. As the Chairman, I'm so sorry to rush you, but I'd like to proceed to the last speaker, the Honorable Mayor of Sapporo, please.

2.8 Mr. Nobuo KATSURA (Japan)

Mayor of Sapporo

"Snow- and ice-control measures in Sapporo – toward convenient and pleasant winter life-"

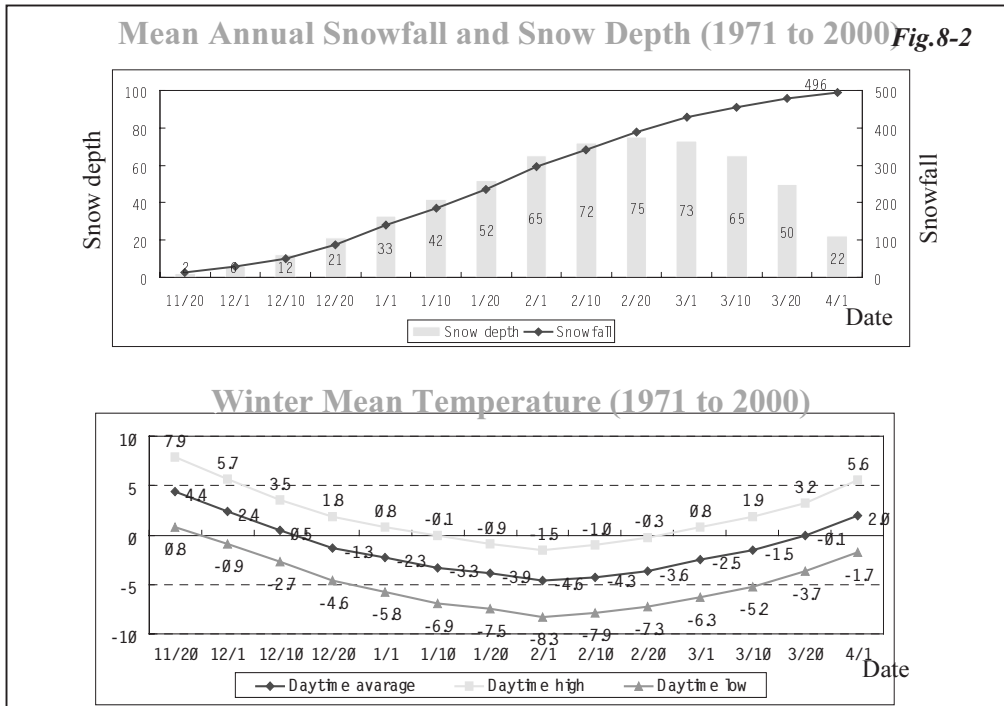
Mayor KATSURA:

Thank you very much for the introduction, Mr. MITANI. I understand that time is passing by but I'd like to ask you for a little more patience to listen to my presentation. I would like to explain about the outline of the snow and ice control measures that Sapporo city has implemented up to now, as well as about the future direction of the approaches.(Fig.8-1)



As you know the city of Sapporo is located at 43 degrees northern latitude and it enjoys fresh and crisp weather in summer but snowy cold weather in winter, and one of the major features is that we can enjoy clear seasonal changes. And more than 90% of citizens responded to a questionnaire saying that they liked Sapporo.

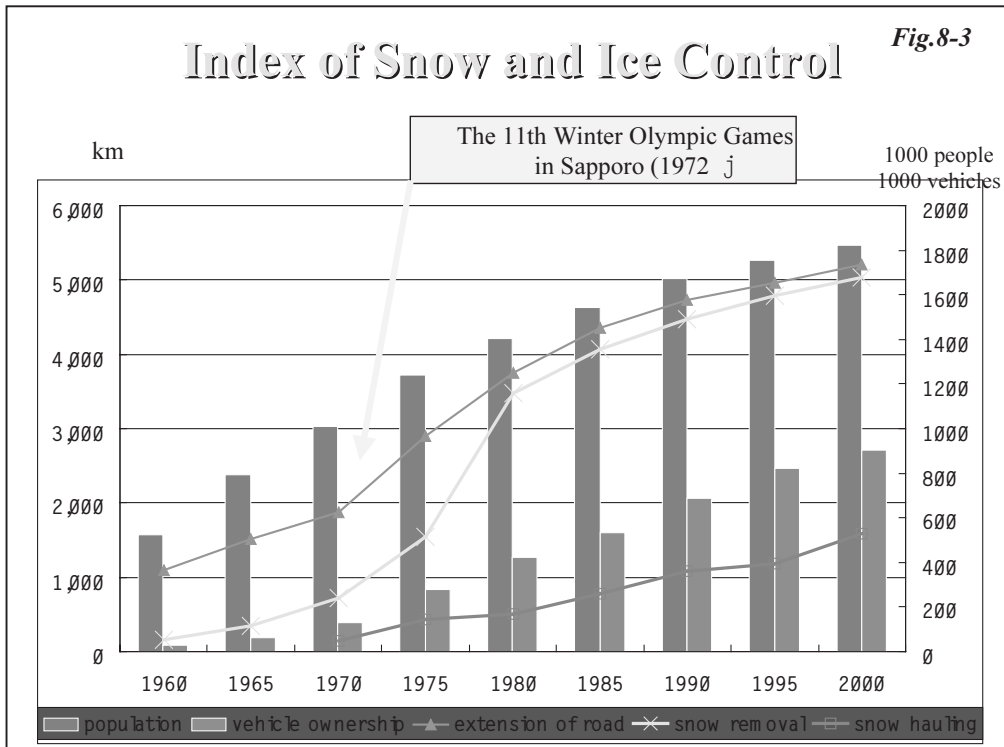
This chart shows the average cumulative snowfall and the mean temperature over the past 30 years and it is quite rare for a city with a population of 1.8 million to have a cumulative snowfall of 5 meters.(Fig.8-2)



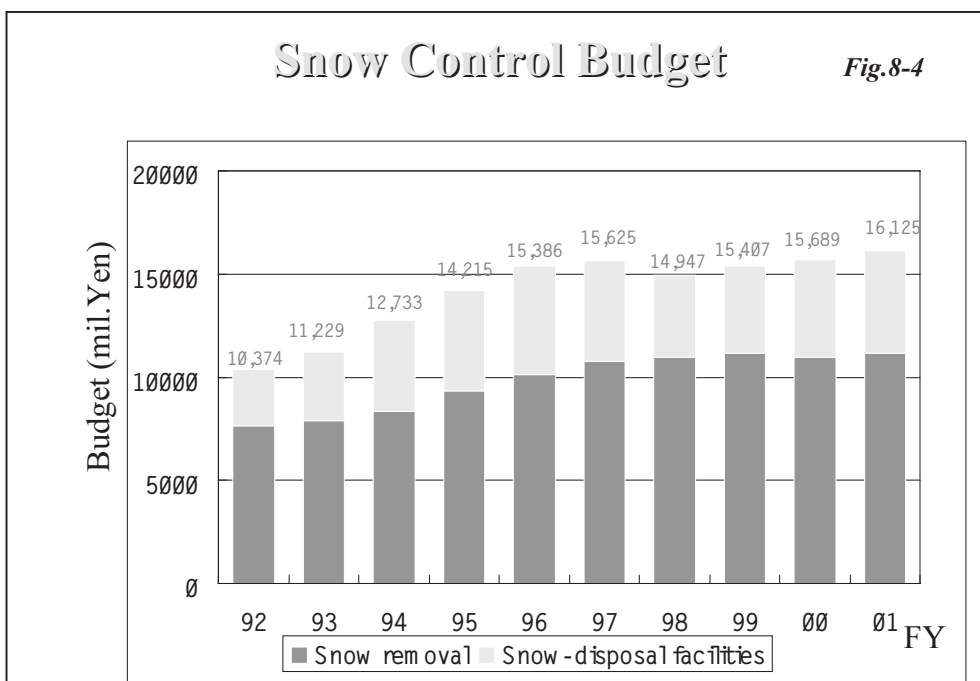
And based on this climactic condition in wintertime it is difficult to secure smooth road traffic.

According to the citizens' opinion survey the highest priority interest of the citizens concern snow and ice control measures. In order to respond to this strong demand by the citizens, the city of Sapporo has positioned the improvement of snow and ice control measures as one of the top priority issues. And we have allocated the annual budget of about \16 billion and the measures consist of enabling efficient operations and also to implement snow removal and hauling which are appropriate to the functions of different types of roads, such as trunk roads, as well as community roads, in residential areas. We have specified role sharing among the citizens and companies and we are promoting measures through a partnership. And we have also developed as a social capital various snow and ice control facilities such as snow melting tanks and snow flowing gutters.

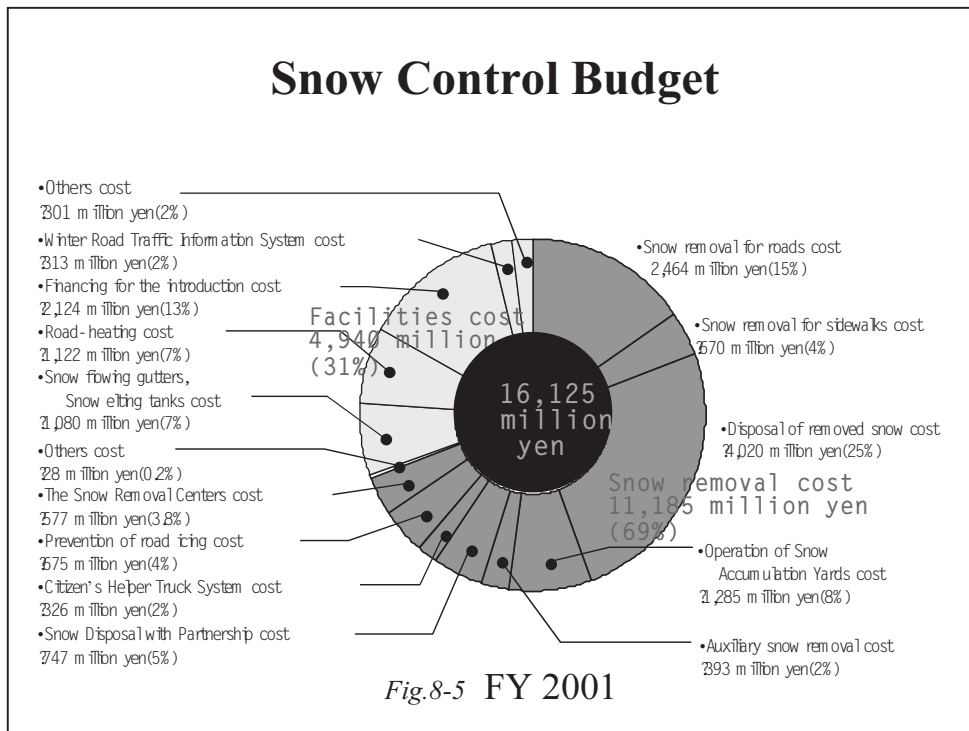
So as a result as you can see in this chart, as far as the snow removal rate is concerned we have seen a great increase starting in 1972 when the Winter Olympics were held and the rate was 30% in 1970 which has increase to 93% in 1980.(Fig.8-3)



Currently the snow removal rate is about 97% of 5,200 kilometers of city administered roads. As far as the snow control budget over the past decade is concerned it has increased from ¥10.4 billion in 1992 to ¥16.1 billion in fiscal 2001, that is 1.5 times compared with the growth rate of the budget over this period for the whole of the city of Sapporo.(Fig.8-4) The increase has been 1.27 times. So I think you can understand from this our emphasis on snow and ice control measures. And snow removal operations are carried out so that snow removal is completed when citizens wake up in the morning. And also the development of the underground system, which is not affected by heavy snow, has also enabled a convenient life in the winter.



But the citizens are demanding for further improvement of snow and ice control measures. However because there are demands for more efficient administrative and financial operations it will be difficult just to increase the snow control budget at the expense of other budgets.(Fig.8-5) So we have to clearly distinguish what is necessary and what is unnecessary.



In fiscal 2000 we have launched the fourth long-term comprehensive plan for the city which has the basic ideal to transform Sapporo into a core city in the north and also a liveable city to respond to the new age. We have compiled a ten-year guideline of the Sapporo master plan for snow and ice control. And in order to promote efficient and effective snow and ice control we have set four priority tasks.

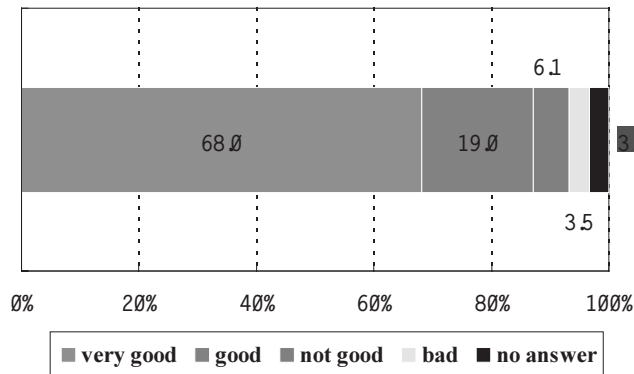
One is to respond to demographic aging, the transition to an aged society where the elderly account for 7% of the population to 14%, it took 50 to 100 years in the case of western countries but in case of Japan that transition will take place over 24 years, and in the case of Sapporo 16 years. According to a survey in the year 2000 the city of Sapporo's population of elderly over 65 years of age is expected to amount to a 1/4 of the population in the year 2020.(Fig.8-6) Which means that more and more citizens will find it difficult to remove snow around their houses so we have started a new snow removal service for the elderly since last year, which we call Welfare-oriented Snow Removal where people will help to remove snow piles left at the entrances of houses after the official snow removal operation and we are doing this on a trial basis.

Welfare –Oriented Snow Removal

Fig.8-6



Evaluation by households that tried the system

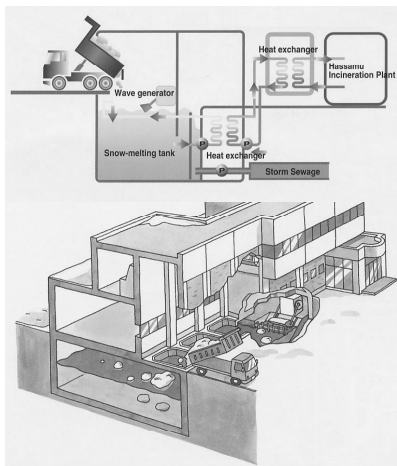


The second important challenge is to respond to environmental issues, industrial and other urban activities continue to place a load on the environment.(Fig.8-7) Therefore in order to build Sapporo, which can be based on the sustainable development we have obtained the ISO 14001 certification in December of last year, which is an international standard on environmental management.

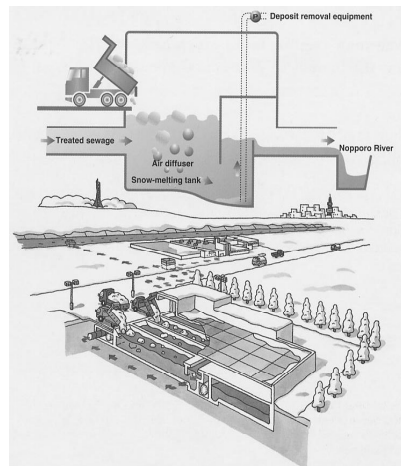
Snow-melting Tanks Utilizing Waste Energy

Fig.8-7

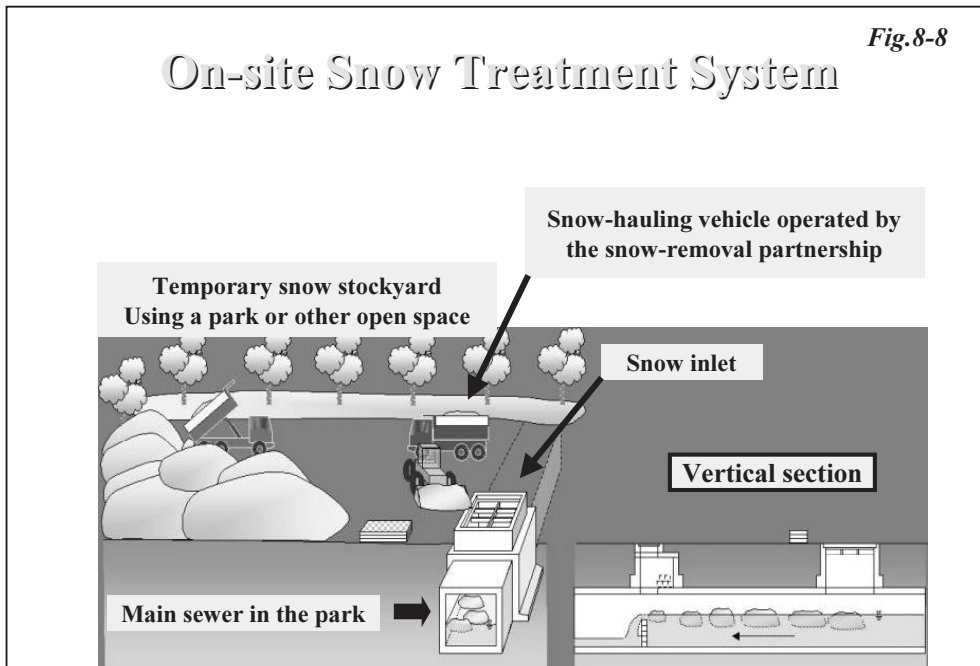
Snow-melting tank using residual heat from an incineration plant



Snow-melting tank using heat of treated sewage



As far as the snow and ice control measures are concerned we have compiled a guideline for environmentally-friendly snow control and we are making use of unused energy sources such as energy from sewage systems and waste heat from refuse incineration plants in order to further reduce the environmental load. Also in order to dispose of the snow on the road the main method is to haul the snow to snow dumping sites but because of the environmental considerations these dumping sites have to be located in suburban areas.(Fig.8-8) Which means that sometimes the trucks have to haul and transport the snow over a distance of 10 kilometers so based on environmental considerations we are aiming to dispose of a communities snow within that community. This diagram shows an example of combining sewer mains and a park.



The third issue is the icy road surface control.(Fig.8-9) About 15 years ago the sky of Sapporo was covered by asphalt dust caused by studded tires and we lost the blue sky. Transparency was very low and the living environment deteriorated and there were major concerns about health hazards. And this led to a major social problem as well as civic opposition movements and as a result of that a ban was placed on the use of studded tires and we were able to see the blue sky again. On the other hand, after the ban on studded tires we were faced with frequent occurrence of extremely slippery road surfaces and as a new challenge we need to cope with that situation.

Establish Criteria for Winter Road Surface Control

Fig.8-9

City Area Hazy with Road dust



The Distant Mountain Range is Visible without Road Dust



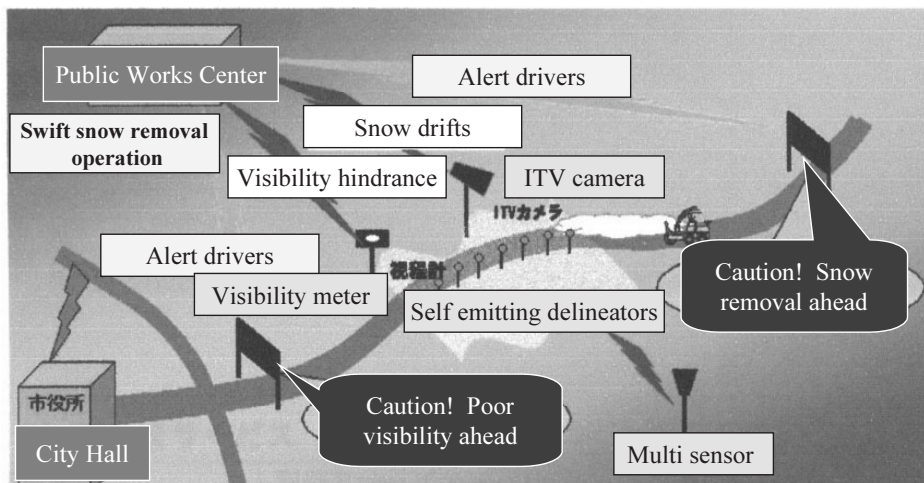
Extremely Slippery Road Surface



The fourth point is the trend of advanced information, by making use of rapidly progressing I.T. technology we are also considering the advanced use of I.T. for road management. (Fig.8-10) For example, we are making use of this for very fine tuned snow removal systems by introducing a weather forecasting system and also in suburban areas we are trying to reduce visibility hindrance by making use of visibility meters and I.T.V. cameras.

Efficiency Improvement of Traffic Information Provision by Use of ITS

Fig.8-10



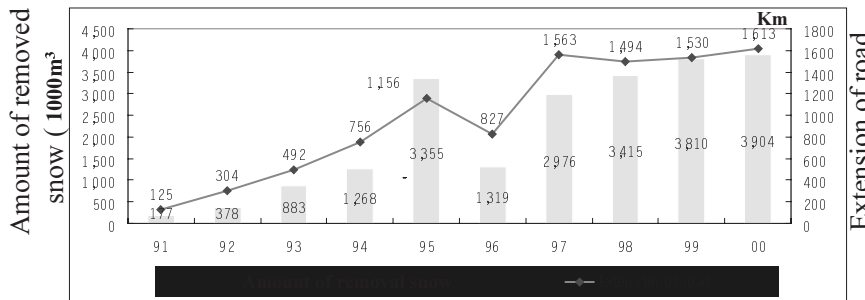
So we are going to promote future snow and ice control based on the four above-mentioned issues.(Fig.8-11) And for that a partnership with the citizens will be necessary and looking at the demands by the citizens we see that the emphasis has shifted from the request for snow removal and hauling, mainly in trunk areas to snow removal from roads in residential areas and in order to cope with such a demand we are conducting snow hauling of residential roads and community roads. And we have a system to financially support the community organizations to promote snow removal of residential roads. And since the full-scale implementation in 1992 the total length of roads covered has increased by 1.5 times every year and it has reached 1,613 kilometers by 2000, which is about 50% coverage.(Fig.8-12) And this shows that the citizens are accepting such snow removal by partnership and we also have a system of support for self-help efforts by the citizens. We provide interest-free loans for installation costs to help citizens install snow melting tanks and road heating facilities in their residential premises in addition to that for the citizens who want to install heating systems on pavements there is a system for partial subsidies, as well as further partnerships by helping installation of, for example, snow melting tanks.



Snow Removal Partnership

Fig.8-12

Amount of snow, Extension of road on which snow is removed by the partnership method



In order to efficiently and effectively promote snow and ice control measures, which is a high priority issue for the citizens we would like to further strengthen collaboration among citizens, companies and the government and we would like to continue our efforts to make Sapporo a convenient and pleasant city to live in, in the winter, as well. Thank you very much. That concludes my presentation.

Dr. MITANI:

Thank you very much, Mr. KATSURA. The first part of the session has finished now. Thank you again for your wonderful presentations. So now let's take a break, after the break we'll resume the discussion and exchange of views on the four topics. Thank you very much indeed. We will have 20-minute break.

3. Comments and Discussion

Dr. MITANI:

Now I'd like to resume the session for discussions and exchange of views. The four topics are shown on the slide. Item#1 and item#2 have a very close relationship so I'd like to combine the two topics together. First of all I'd like to call for comments from the panelists. Mr. FENG, do you have any comments on the first or second topics?

3.1 Topic 1: Mobility in winter and winter service level

Topic 2: Safety and environment

Mr. FENG:

For the mobility in winter and winter service level, I think our neighbor; the Director General of the Road Bureau of Japan should give us some good ideas. So I think from his topics, I would like to comment on three important things. First for mobility and winter service level is the establishment of a development plan for winter maintenance. The second to set up an information feedback system of snow removal to include the public and third the development and application of new technology and new materials for winter maintenance. Thank you.

Dr. MITANI:

Thank you very much, Mr. FENG. Are there any other comments for item#1? Mr. TOLOZA, do you have you any comments on mobility?

Mr. TOLOZA:

No it's OK.

Dr. MITANI:

Any other panelists with comments? Then I'll read the comments from the audience. Now I'll take the privilege to read in Japanese.

For topic#1 there is a question from a participant. This is directed to the gentleman from the United Kingdom, Mr. Mike WILSON. You discussed whether to treat or not to treat and this was very intriguing and interesting. Of course England is an area, which is not really affected by snow or ice. So how much of a budget or investment is made for measures to control ice and snow? What's the emphasis on snow and ice control? And how are you reflecting in your budget the importance of the road transport network? I would appreciate your thoughts and experiences on those matters.

And also related to this there are certain roads which are free or which charge tolls, now do you have any idea how the treatment should be considered? There are certain roads, which charge tolls and there are other roads, which are free.

Mr. WILSON:

I'm waiting for the translator to finish. I think that perhaps I gave the wrong message if I suggested we do not have any ice and snow. We do have ice and so the decision that needs to be taken is an important one and one that needs to be made almost everyday during the winter months. In terms of the level of investment we spend around about, I think it's about 5% of our annual maintenance budget, on winter maintenance, on the actual winter maintenance functions. So it's not an enormous expenditure by any ways. But it is still a considerable amount of money and therefore the decision to treat or not to treat is an important one. I missed that latter part of your question with respect to toll roads.

Ms. CLARKE:

Was there a difference between toll and non-toll roads? I think that was the second part.

Mr. WILSON:

There is no difference between toll and non-toll roads. The decision is still made; it is not within the Highways Agency that the decision is made. It is made within either the MAC contractor or our managing agent and on toll roads, of which we have no toll roads we only have toll crossings but were there is private investment in our design, build, operate and finance roads were part of the network is actually leased, perhaps is an appropriate phrase, to a private organization, they are responsible for making that decision.

However the Highways Agency retains its responsibilities, the Secretary of State has responsibilities for ensuring safe transport and we cannot pass that risk to the private sector. That risk remains within the Highways Agency and its how we manage that risk that's important. And we believe the appropriate level for making those decisions, to treat or not to treat, lie with our managing agent, who is on the ground within the area for which he is responsible.

Dr. MITANI:

Thank you, Mr. WILSON. Maybe the audience wanted to ask if the users pay for toll rates, maybe they would request a higher level of service. This may be the concept of the question. But even between toll roads and non-toll roads the service levels for users are equal?

Mr. WILSON:

Yes. The basis of toll roads and non-toll roads is the same, the same standards apply on toll roads and non-toll roads and therefore we would expect there to be a similar level of service on both types of roads.

Dr. MITANI:

Thank you. Are there any comments on this matter? If there are no comments, I'll call Mr. WILSON on the safety and the environment topic.

Mr. WILSON:

As I said in my presentation, safety is a primary responsibility of my organization and, I'm sure, everybody's organization here today. Safety has two aspects: the safety of the user; and those working on the roads. But there is the consequence of accidents that I believe is important to include as well. Accidents cause further accidents, knock-on accidents and also accidents cause congestion and congestion is, I'm sure, a factor for everybody here. And to reduce accidents therefore has many benefits not the least of which is to preserve life.

Dr. MITANI:

Thank you. Dr. LÁNYI, please.

Dr. LÁNYI:

I have a comment on road safety. First of all the national accident statistic has an important role, from the decision makers and a political point of view. My Finnish colleague mentioned that they have the same accidents in the summer and wintertime. But if a country has less traffic, the modal splits for public transport, less movement. And a country could have fewer accidents in the wintertime. At the same time we know that all the movement on the roads and sidewalks are more risky in winter, so we have to analyze relative accident parameters on the roads one by one and we also have to analyze the effects of the maintenance activities. I think it's a special problem in our countries, the beginning of the winter season. In all statistics, the first day, first week, first month is always a problem in the winter season. Also a special aspect is the motorway, fast road accidents, in one accident there could be many people involved and injured. And we have to mention also ordinary peoples' problems on the sidewalks in the cities and even maintenance. Thank you.

Dr. MITANI:

Thank you, Dr. LÁNYI. Are there any comments among the panelists on the first and second topics? No comments? OK, now I will proceed with item 3, sharing responsibility. I have a lot of questions concerning this item. But first of all I'd like to seek comments on item 3 from the panelists. Mr. KARJALUOTO?

3.2 Topic 3: Sharing responsibilities among public and private sectors

Mr. KARJALUOTO:

Thank you. This is a very complicated area and the questions are huge. Because as well as I know the new worldwide trend is for new client/provider organizations with a new, wider, long lasting maintenance concept. And this will change the rules, risks and responsibilities very much. And information technology will bring a new partner to the customer, real time interaction with client and provider. The real risk, financial risk between the partners depends on the culture, very much depends on the culture and the legislation of different countries. I'd like to talk more about sharing responsibilities between customer, client and service provider than on sharing the risks. And the final responsibility is, for sure, the clients but like traffic fluency, service level for roads and traffic safety we can't move responsibilities to the provider. In practice to move the risk and responsibility to the provider means better opportunities to earn money. And that is a very important part of the interaction. And the clients role, responsibility, especially in Finland we believe its more wide, like industrial transportation logistics, social sustainability it means fairness, balance of multi-modal travel and environmental impacts and regional equity. And the service provider, the producer they can take a wider responsibility for innovation, new concepts, development of technology and also the quality of roads, road safety and also the environmental impact. And the customer interaction, that means precise service activities, just in time service and also interactive feedback and information to the customer. And this new way of managing roads must be based on outcome based contracting agreements. And that is a very challenging approach, it means close partnering between the client service provider and the customer. It is also a learning process, a real learning process it takes time. It's a question of private and public partnership but we will, we are sure that it means a better level of quality and lower costs in the long run. We in Finland at the Road Administration and in the whole infrastructure plans has very clearly committed to this kind of process and according to our new vision we will make this change during the next five years. That is a very clear idea and I think in Finland we are ready to start this partnering, this learning. Thank you.

Dr. MITANI:

Thank you. Now, I'd like to invite Mayor KATSURA to talk about the partnership you have mentioned in your presentation. Three days ago we had a technical presentation by the PIARC EC members and this topic was fully discussed and people were interested in how in Sapporo you promote partnership between the private and public sectors.

Mayor KATSURA:

Thank you very much. On that issue I would like to start by referring to the sharing of responsibility between the private and public sectors. In this case it means between the citizens and the city government, as far as the citizens are concerned, because there are roads, whether they be summer roads or winter roads they expect the same functions. And they also expect that roads should be maintained and managed in the same way in the summer as well as in the winter. And on our side we have a responsibility to maintain and manage city administered roads but in a city like Sapporo with heavy snowfall, how we maintain the roads in this snowy area is probably different from the way the roads are managed and maintained in less snowy parts of Japan in terms of technology and finance I think the approaches would be different.

And based on the current legal structure I feel that perhaps there are certain things that the national government should also consider. That is related to responsibility of road management, in case of snowy regions. And I feel that there should be a clearer national standard for road management in the snowy areas. Without such standards and clear laws I'm sure that the citizens' demands will become more and more stringent and we will find it difficult to satisfy their demands.

I mentioned that the annual budget of Sapporo for maintaining roads is \16 billion and that amounts to almost 2% of the general budget and this \16 billion is just for the winter road management. And for us that means a lot of commitment and resolve will be required. So there is a gap between the citizens' demands and what we can provide, I think we must consider what we can do in terms of support on the part of the government and also identify what the citizens can do in terms of their self-help efforts.

As far as the city government is concerned we try to provide necessary information as much as possible, for example weather related information and road traffic information and also any traffic congestion or other road traffic impediments. I think we have more or less established such a system for providing necessary information.

On the part of the citizens they were asked not to throw snow from their premises out to the streets and they're also requested to keep their cars in garages. But actually we find many citizens personal cars left on the streets, which really impedes snow removal operations by snowplows. And also we ask in the wintertime that citizens make use of public transportation rather than their private cars. In particular because we have very good network of underground trains and we have made such requests to the citizens but the citizens have not complied with our requests to a satisfactory extent. So as far as we are concerned I think that we need to have a partnership with the citizens as well as with the operators who provide snow removal services and us, the government.

We have had discussions among the three parties, so within a certain area we have identified roads, which the city of Sapporo has to administer and maintain as opposed to the roads, for example narrow and short roads, which are not under the responsibility of the city government. But of course these small and narrow roads are very important for the daily lives of the citizens so the government will provide a certain amount of help but we will also ask the citizens concerned to perhaps bear half of the costs necessary. And the snow will be removed from those small and narrow residential roads and hauled to the dumping sites. And I think this is progressing smoothly but there are certain citizens who don't understand why they have to pay for such service but on the other hand there are other citizens who are willing to pay for more frequent snow removal service. There are still issues that need to be solved but citizens, the city government and the service providers are involved in this consultation process and I think this kind of process should be further expanded. And this is what we call snow removal partnership. Thank you.

Dr. MITANI:

Thank you very much, Mr. Mayor. So before asking for views from the panelists I'll take the liberty to introduce the questions from the audience on item 3, in English.

Mr. FURUKI from Japan has a question for Mr. KARJALUOTO or Mr. WILSON. "My understanding is that both countries are adopting winter road maintenance by a contract basis. In this connection, who pays and how will it be allocated when extraordinary costs are needed in case of exceptionally heavy snowfalls? It might be too risky for

maintenance contractors to keep so much equipment just for exceptional cases.” That’s one of the questions.

Another question is from Mr. JENSEN of Denmark, which is also for Mike. It’s about Contracts based on functional requirements. “If the contractor fails and an accident occurs and people die, how will the contractor be punished?”

Well, I’m just introducing questions; others are in Japanese so I’ll just summarize the questions.

This is from Mr. TASAKI of the Ministry of Land, Infrastructure and Transport of Japan. “You defined the requirements for performance but the private sector by definition is for profit. Therefore it will be very difficult to be environmentally friendly and at the same time be in full compliance with the specifications. These are two objectives which may not be achieved.” This is rather a very abstract question, but if you have any thoughts, I’d like your views please.

And also in Finland and the United Kingdom you advanced in purchasing from the market. How do you determine the affect of such practices in terms of cost, the impact and performance? From the point of view of a road administrator,” and I’m finding difficulty in reading this, “How do you evaluate the performance of the private sector contractors?”

And Mr. TAKAGI also has a question. “Chile, Finland and the United Kingdom are trying to prolong the duration of the contracts. But if it’s a long-term contract how do you reach an agreement for an extended period of time?”

I think all these questions raised from the audience are somewhat similar so in order to save time, one or two comments from the panelists would be appreciated. Who will be in charge? OK, please.

Mr. KARJALUOTO:

As I said in my presentation, we are in the learning process of how to share responsibilities in a new way. This is not easy, but there are already examples of cases, such as in New Zealand, Australia, the United Kingdom and also some experience in Finland. We trust this will be a good business for contractors and at the same time we can maintain the same level of quality for road maintenance. It’s a question of how to share risk during exceptional climate situations in Finland, but of course, most of the risk belongs to the service provider- the contractor. In Finland we have developed a climate/winter index, so that we will pay back or give a bonus according rate structure. So we have taken a step forward to implement a risk sharing system.

With regard to the question of what will happen in the case of accidents. The final risk eventually belongs to the client, of course. However, we investigate the circumstances of the accident and if there is objective data for poor quality level of service, it is possible to withhold money for unsatisfactory performance. And, if necessary, it is also possible to terminate the whole agreement if the service provider continues to perform unsatisfactorily.

Dr. MITANI:

Thank you. Mike?

Mr. WILSON:

I could probably talk for the rest of the day on those very good questions and insightful comments from the audience. And with respect to exceptional snow clearance we have a national fleet and we're all partners delivering a service to our users and exceptional snow clearance is not included in the lump sum that contractors put forward. I'd like to say, on this issue of risk, that it all comes down to actually understanding the risks in their totality and how people will manage those risks. A good example, perhaps, is when we were working towards identifying a lump sum approach to our winter maintenance. We were concerned that the private sector with their eye on their bank balance would not treat when there was this marginal decision, because they would be saving salt and labor and vehicle costs etc. But actually in discussion with the industry we actually found that the costs of the treatments are so insignificant concerned with the business risks associated with accidents and a failure to deliver a service that they were more likely to treat than not to treat. So, what I'm saying here is that it is important to identify the risk but also how people will manage that risk. And only when you have done that can you decide where those risks should lie.

Dr. MITANI:

Thank you. As we are very much short of time I take the liberty to conclude these items. So for the final item of new technology may I invite, first of all, Mr. PUODŽIUKAS and Mr. WIKELIUS after. Please.

3.3 Topic 4: New technologies and others

Dr. PUODŽIUKAS:

Thank you, Mr. Chairman. Of course we have possibilities to visit exhibitions, which provide many new pieces of new equipment and technologies. But if we are talking about new technologies usually we have in mind to minimize the maintenance expenditures and to improve the maintenance level. What are we doing to achieve these goals?

First of all, of course the implementation of knowledge based management systems, which usually are based on weather information systems and intelligent transportation systems.

Secondly I think it's very important to analyze the cost benefit analysis to see where measures can be implemented for snow removal and the de-icing of road surfaces. Of course in cost benefit analysis we must achieve goals such as minimizing expenditures of services, traffic safety, corresponding to traffic flows and technologies used for snow removal, de-icing and of course to save the traffic expenditures and as well save the measures. Of course different technologies must be provided if we have roads that have 200 vehicles a day of 100,000 vehicles a day. It very much depends on the traffic volume. Those are my suggestions, thank you.

Dr. MITANI:

Mr. WIKELIUS?

Mr. WIKELIUS:

Thank you. As I hear my colleagues talk about new technology I think about technology in three different areas and they are very similar to what we just heard.

First of all the changes that are taking place in the equipment and materials, that allow us to winter maintenance tasks more effectively, more efficiently and more environmentally friendly. Providing better tools to those people, our workers out there, to do their winter maintenance tasks. I think there's a challenge, in fact, in front of us that technology is changing so fast that we have a training challenge with our workers. Technology is changing faster than their learning curve to accept these changes.

The second area is in the area of measurement. We now have the ability to know not only how much we are doing but where we are doing it. How many resources we're using and what the outcome is. An important part of being able to communicate with our customer on meeting their expectations. There's a famous quote in the quality that says "You can't manage what you can't measure" and now we have the ability with lots of new technologies to better measure what we are doing so that we can manage better.

And the third area is one we've heard several times in the information, the ITS applications. Decision makers whether they are policy management, workers or the drivers will make better decisions if they have better information. Technology now allows us to not only gather better information but to disseminate better information to the decision maker, information that's just in time. And the bottom line of all the technology changes that are taking place is that we are no longer limited to being reactive in winter maintenance but are allowing us to be proactive.

Dr. MITANI:

Thank you, Mr. WIKELIUS. I have two comments from the audience but I will just give you a summary of the questions.

The first question is from Mr. Suzuki, on chemical treatment and the relationship between materials and pavement, but I think this is a very technical question, so I'd like recommend him to ask Mr. KARJALUOTO in person later, please don't hesitate to consult with him on Finland's technology.

And Mr. PORWAL from India, I will read his comment. For participants from developing countries, this congress has given us a chance to learn about new technologies and to know what is happening in the rest of the world in the winter road congress.

Well, I'm sorry but unless there are any special comments among you, now I'd like to invite Ms. CLARKE to conclude today's very much useful discussion. Thank you.

4. Summary and Conclusion

4.1 Summary and Conclusion by Ms. Ginny CLARKE

Ms. CLARKE:

Konnichiwa. Thank you very much Dr. MITANI for this very kind invitation to summarize my colleagues' and your comments in this, which I think we would all agree, is a unique session.(Fig.9-1) It is rare that we are given the opportunity to look across the world at a number of these issues, so thanks to my colleagues for giving us such a wide range of information and views. We have heard about many of the differences in the sessions and in some slides that I've prepared before hand, like all good speakers, I'll just show a couple of the variations that cover some of the different countries we've heard about.

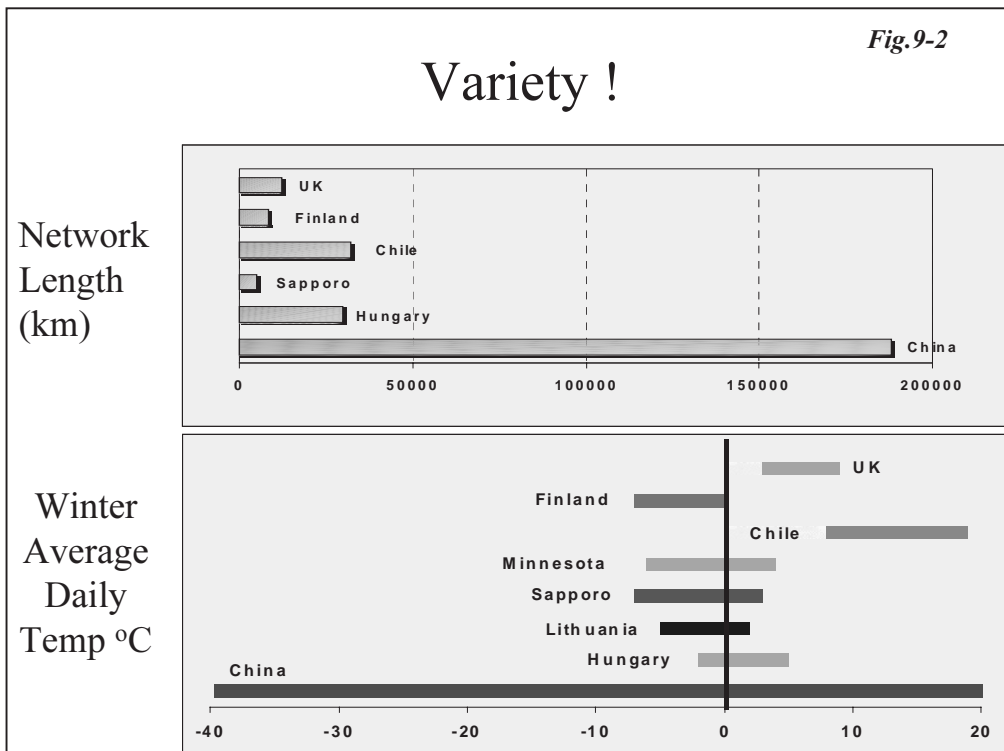
Winter Road Service in the 21st Century

Fig.9-1

Rapporteur Session

Ginny Clarke
Chief Highway Engineer
Highways Agency, United Kingdom

So, at the top of the slide, we're looking at the different network lengths that our colleagues have to look after.(Fig.9-2) I notice that China is way out in front in terms of the length of road that they have to administer. I think if we put the U.S.A. on there they'd be fairly close there as well. And you look down at some of the other countries, where clearly the problems of maintenance and winter maintenance in particular, are less of a national concern, although very important. I've also included a table on temperature. It is interesting to note, and I did check this with our Chilean colleague, that in Chile their average temperature is actually quite high, but they of course have their significant winter maintenance issues as well. So these charts actually only help to give us a quick picture.



Perhaps what I should also have shown were the common themes. Certainly the length of winter, in many of these countries extends over 4 to 5 months. There are certainly significant costs in dealing with winter maintenance. There are also the major procurement issues, we've heard about contract issues and reliability and risk, which I'll come to a little later. The technical issues that we all face are common and I'm going to talk a little about those aspects later as well. Last but not least, and probably the most significant, are the people. There are people who are providing the service, and we have heard concerns about the training of those people in a changing climate, but also about the people we serve. And I'm sure that the person, whether living in China, or in Sapporo or in the U.K., are just as interested in being able to move as easily in the wintertime as they are in the summer. So those are some of the common issues that have come out as well.

I'm going to talk about the four headings listed on the slide, just to remind you what they are. (Fig.9-3) The third point, I've called it sharing the risk. That's the same as sharing the responsibility; it's a short hand that we've tended to adopt in England using the word risk instead of responsibility. But in reality we are talking about responsibility. What I've done is I've tried to draw some common themes. Although these slides were prepared in advance of coming here today, based on the papers that were written, I think that they still hold good having heard the discussion.

Four themes

- Mobility in winter and winter service levels
- Safety and the environment
- Sharing the risk
- New technology

Firstly, identifying and responding to customer needs.(Fig.9-4) Clearly that's a common theme for all of us. We fail as organizations if we don't actually recognize what the customer wants. But in reality we'd also like to manage our customer expectations, I'm sure that the Mayor of Sapporo would find it very difficult if he had to create a road network that was as clear on a winter day as it is on a summer day. Now that might be the customers expectations but quite clearly that's unrealistic. So we manage our customer expectations and as you heard across all of the presentations and read in the papers, you'll see there is a strong element of that. But we also want our customers to play their part. Any winter maintenance operation will only be successful if we have drivers that learn to drive in conditions that are not the same as the summer; we have people who recognize that, within their local area, they play a part in keeping the roads free and that the customer needs to be looking at the information we're providing so they can help us when we've got poor conditions and they use alternative routes, such as in the extreme conditions in Chile, where the passes often may become impossible. We need customers to read and take note of the information we provide.

Mobility in winter and winter service levels

- Identifying and responding to customer needs
- Managing customer expectations
- Helping customers play their part

Safety and the environment.(Fig.9-5) Interestingly when I wrote these three points, we thought the environmental effects of treatment would be one of the key issues that came out of the presentations. Interestingly enough, the emphasis has shifted a little and safety has probably come forward as a stronger theme than environment. However I don't think anybody on this platform would disagree that environmental impacts are very much a present problem and a concern for the future. In the 21st Century, if we are not aware of the impacts of our winter maintenance activities, then we will fail in serving our customers and certainly fail in recognizing one of the key challenges for such a significant impact. We've adopted a phrase in England, which I am sure is used in other countries, the right treatment in the right place at the right time. If we were to adopt that as a process, we would have to develop management systems that had a true regard for safety and had a concern about the environmental impact. Therefore we might decide not to treat. It may also be necessary to take account of the fact that at the right time you might have to give that decision to the local representative on the ground rather than using technology to make that decision. So in terms of safety and environment, whilst I think we've heard more about safety today I think we'd all agree that environment is a very important consideration.

Safety and the environment

Fig.9-5

- Impact on the safety of users
- Environmental effects of treatment
- Right treatment, right place at the right time

Sharing the responsibility, I think I definitely got it wrong, when we picked out these five points on the slide.(Fig.9-6) I think one of the key issues that everybody is concerned about is the management of risk and the identification of risk. I noticed that in the questions and from the audience in the panel session, that responsibility is a complex issue. We have some countries where legislation plays a key part in identifying those areas of responsibility. Where legislation is in place clearly we have very exact guidelines about where responsibility can be placed. However, in many situations legislation is not that rigid, it is the form of contract. As organizations, we predominantly use contractors to undertake the operational side of winter maintenance. In these situations responsibility has to be clearly identified. For many countries I've noticed, as a result of today's session, there is a changing balance of responsibility as we increasingly use the private sector to deliver the services that we want. Taking the theme of looking into the 21st Century, there are some significant challenges for my colleagues in the way they are taking forward their organizational arrangements for winter maintenance. And I'm sure that they will share with me the concern that in doing these changes we get that balance of responsibility right. However, I wouldn't want to lose sight of the four points I've put below;

Sharing the risk...

- Identification and management of risks
- Encouraging investment
- Better management
- Encouraging Innovation
- Technical governance issues

Encouraging investment, better management, encouraging innovation and what in England we call technical governance, those aspects about who controls the technical quality and takes the technical responsibility when actually you move the responsibility for most technical decisions from ourselves as clients to the contractors. These are very significant issues, I think, for the future, for all of us as clients.

And the last topic is new technology.(Fig.9-7) Certainly in the bullet points here, I've mentioned new materials, but I wouldn't like to forget new machines. New technology over a broad area has revolutionized the way in which we respond to winter conditions. If you go out of this hall and attend some of the technical sessions and presentations that are being made elsewhere you will hear a whole array of different ideas of how technology is going to help us. If you took the U.S.A.'s view of the future, you would see a very technologically advanced system, where you begin to think where's the place for the human in this? I'm sure you would agree humans have a very important part in using technology. I don't see in the 21st Century totally technology driven winter maintenance units but I think the days are gone when we're going to find a work force that's readily available to work all hours of the day and night and in all conditions. Technology might give us the answer to a better response that reduces the reliance on people.

New technology

- New materials
- Information: gathering and dissemination
- Use of information to manage road networks
- Improved delivery of the service

The other key point I think is very important is about information. Virtually all of us in our presentations have mentioned the importance of information whether its weather based information, information about the road's condition or information about traffic and how we feed that information to our customers to make their decision. I see the development of information through technology and ITS, as being certainly one of the most significant developments of the latter part of the last century and I think it will continue to drive how we take forward the focus of technology in terms of winter maintenance. The use of information to manage road networks is a key concern for all of us. In countries where the network is often very remote from city locations, one can see that information on the ability of the road network to respond to weather conditions is absolutely crucial in terms of how we manage the process. Ultimately new technology is what's going to help us deliver a better service and certainly this has been brought out very clearly by all our presenters today.

I'm going to end up with this particular slide.(Fig.9-8) You might say that this a very English view of what happens when it snows, chaos behind the snowplow. Well I'm afraid that is often what happens in England because it snows so infrequently. However in summing up my conclusion is that this is not the picture of the 21st Century. The picture of the 21st Century, if my colleagues have anything to do with it, is a smooth running technical operation, well timed, well targeted with responsibilities clearly identified. A road network that is clear for use for 365 days of the year. With that as a hope and, perhaps a wish that we'd all like to fulfill, I close my remarks with many thanks to my colleagues and you the audience.

Fig.9-8

Summing up



4.2 Closing by Dr. MITANI

Dr. MITANI:

Thank you. Now I'd like to close the session. We feel amply rewarded if everyone regarded this session as a truly interesting and worthwhile experience that provided opportunities for sharing different perspectives and the latest practices from around the world. I believe that this session afforded many practical ideas for upgrading the quality of winter road service in your country.

In closing I wish to take this opportunity to sincerely thank all the panel members for their kind contributions and also thank all those who took part in this session. Finally I'd like to thank Ms. Ginny CLARKE for her excellent summary and all the support and counsel given to the session. Thank you very much, everyone.

Annexe

XI^e Congrès international de la Viabilité hivernale Sapporo, Japon 2002

***Séance spéciale « La Viabilité hivernale au 21^e siècle »
Mercredi 30 janvier 2002, 9h00 – 12h00***

Buts de la Séance spéciale

Ce XI^e Congrès de la Viabilité hivernale, le premier Congrès de l'AIPCR à se tenir au XXI^e siècle, est organisé conjointement par l'Association mondiale de la Route (AIPCR) et le Gouvernement du Japon.

En cette occasion importante, cette Séance spéciale a été prévue au programme sous la forme d'un panel de discussion. Elle a pour but de fournir et échanger les dernières informations et connaissances sur les perspectives d'avenir de la viabilité hivernale. Une synthèse sera faite sur les orientations à envisager pour ce nouveau siècle.

Cette séance alternera exposés et débats auxquels prendront part plusieurs personnalités, dont des maires, des administrateurs de réseaux routiers ainsi que des experts du monde entier en administration et en hautes technologies. La participation de l'auditoire est la bienvenue.

Date, heure et lieu

Date et heure : mercredi 30 janvier 2002, 9h00-12h00

Lieu : « Special Stage », Dôme de Sapporo

Thème principal et Thèmes de la Séance

La Séance a pour Thème principal « la Viabilité hivernale au 21^e Siècle ». Sous cet intitulé, les exposés couvriront des sujets liés à la vie et aux transports dans les régions enneigées, en particulier la situation actuelle des réseaux routiers et l'entretien des routes en hiver. Les membres du panel évoqueront les mesures appliquées, ainsi que les tendances d'avenir en matière de viabilité hivernale, en abordant les sujets suivants :

1. mobilité en hiver et niveau de service des routes en hiver
2. sécurité et environnement
3. partage des responsabilités entre les secteurs public et privé
4. Nouvelles technologies et autres.

Vous pouvez retrouver le texte complet des exposés de cette séance à l'adresse suivante :

<http://www.piarc-sapporo2002.road.or.jp/>

Appendix

XIth International Winter Road Congress Sapporo, Japan 2002

Special Session on “Winter Road Service in the 21st Century” 9:00 a.m. – noon, Wednesday 30 January 2002

Aim of the Special Session

The XIth International Winter Road Congress, which is to mark the first PIARC World Road Congress to be held in the 21st Century, will be jointly organised by the World Road Association (PIARC) and the Government of Japan.

On this significant occasion, a Special Session is scheduled in the manner of a panel discussion. It aims at providing the latest information and exchanging the knowledge concerning the winter road service in the future. It also intends to summarise the directions envisaged for this new century.

The Session will involve presentations and discussions made by various panellists including mayors, road administrators and experts in the fields of administration and technologies around the world. Comments from the audience will also be welcome.

Time, Date and Venue

Date and Time: 9:00 a.m. – noon, Wednesday 30 January 2002

Venue: Special Stage, Sapporo Dome

Main Theme and Topics for the Session

The main theme of the Session is “Winter Road Service in the 21st Century.” Under this theme, the presentations will cover topics related to the life and road transport in snowy regions, particularly about present situations of the road networks and winter road maintenance. Also the panellists will refer to the actual measures and future trends of the winter road maintenance which includes following topics:

1. Mobility in winter and service level of winter roads
2. Safety and environment
3. Sharing responsibilities among public and private sectors
4. New technology and others

The full texts for the session are available on Website:

<http://www.piarc-sapporo2002.road.or.jp/>

XI^e Congrès international de la Viabilité hivernale
Séance spéciale sur "Le service hivernal au 21^e siècle"
Mercredi 30 janvier 2002, Sapporo, Japon

Programme

Horaire	Thèmes et intervenants
9:00 am	<p><u>Ouverture et présentation des orateurs</u> Président : Dr Hiroshi Mitani Ancien Président de l'AIPCR Conseiller principal, <i>Metropolitan Expressway Public Corporation</i>, Japon</p>
9:10 am	<p><u>Présentations par les orateurs</u></p> <p>M. Elwyn G. TINKLENBERG (Etats-Unis) Commissaire aux Transports, Ministère des Transports du Minnesota "Faire progresser l'entretien hivernal au Minnesota"</p> <p>M. Roland TOLOZA NORAMBUENA (Chili) Directeur régional des Routes, Ministère des Travaux Publics "La mobilité en hiver et les infrastructures routières, facteur économique au Chili"</p> <p>M. Eero KARJALUOTO (Finlande) Directeur Général, Administration finlandaise des Routes "Le service hivernal au 21^{ème} siècle"</p> <p>Dr Virgaudas PUODŽIUKAS (Lituanie) Directeur Général, Administration lituanienne des Routes "Le service hivernal dans les pays baltes"</p> <p>Dr Peter LÁNYI (Hongrie) Chef de la Division Routes et Ouvrages d'art, Direction des routes Ministère des Transports et de l'Eau "L'exploitation du réseau routier dans les pays d'Europe centrale et orientale, dont la Hongrie - Problèmes hivernaux et solutions"</p> <p>M. Mike WILSON (Royaume-Uni) Responsable du Groupe de Politique opérationnelle, <i>Highways Agency</i> " Le service hivernal du 21^{ème} siècle au Royaume-Uni "</p> <p>M. FENG Zhenglin (Chine) Directeur Général, Direction des Routes, Ministère des Communications "Etat de l'art et tendances de l'entretien routier en Chine"</p> <p>M. Nobuo KATSURA (Japon) Maire de Sapporo "Déneigement et lutte contre le verglas à Sapporo - Pour s'adapter et bien vivre la période hivernale"</p>
10:30	Pause
11:00	<u>Questions, commentaires et discussion</u>
11:40	<p><u>Résumé et conclusions</u> Rapporteur : Mme Ginny CLARKE Coordinatrice du thème stratégique 3 de l'AIPCR Ingénieur en chef, <i>Highways Agency</i>, Royaume-Uni</p> <p><u>Clôture de la séance</u> Président : Dr Hiroshi Mitani</p>

XIth International Winter Road Congress
Special Session on “Winter Road
9:00 a.m. – noon, Wednesday 30 January 2002, Sapporo (Japan)

Program

Time	Topic and Presenter
9:00 am	<p>Opening remarks and introduction of the panelists Chair: Dr. Hiroshi MITANI Past President of PIARC <i>Senior Advisor, Metropolitan Expressway Public Corporation, Japan</i></p>
9:10 am	<p>Presentation by Panelists Mr. Elwyn G. TINKLENBERG (U.S.A.) Commissioner of Transportation, Minnesota Department of Transportation <i>Moving Minnesota through winter maintenance activities”</i> Mr. Roland TOLOZA NORAMBUENA (Chile) Regional Director of Roads, XI Region, Ministry of Public Works <i>“Mobility in winter, road infrastructure as an economic factor in Chile”</i> Mr. Eero KARJALUOTO (Finland) Director General, Finnish Road Administration <i>“Winter road service in the 21st Century”</i> Dr. Virgaudas PUODŽIUKAS (Lithuania) Director General of the Lithuanian Road Administration <i>“Winter road service in the Baltic countries”</i> Dr. Péter LÁNYI (Hungary) Head of Road and Bridges Division, Department for Roads Ministry of Transport and Water Management <i>“The situation and operation of the road network in the eastern and central operation region, including Hungary, under winter weather conditions-problems and solutions”</i> Mr. Mike WILSON (U.K.) Team Leader of Operational Policy, Highways Agency <i>“21st Century winter service in the United Kingdom”</i> Mr. FENG Zhenglin (China) Director General, Highway Department, Ministry of Communications <i>“State-of-the-art and trend of road maintenance in China”</i> Mr. Nobuo KATSURA (Japan) Mayor of Sapporo <i>“Snow- and ice-control measures in Sapporo – toward convenient and pleasant winter life –”</i></p>
10:30 am	Coffee break
11:00 am	Questions, comments and discussion
11:40 am	<p>Summary and conclusion Rapporteur: Ms. Ginny CLARKE PIARC Strategic Theme 3 Coordinator Chief Highway Engineer, Highways Agency, U.K.</p>
Noon	<p>Closing remarks Chair: Dr. Hiroshi MITANI</p>