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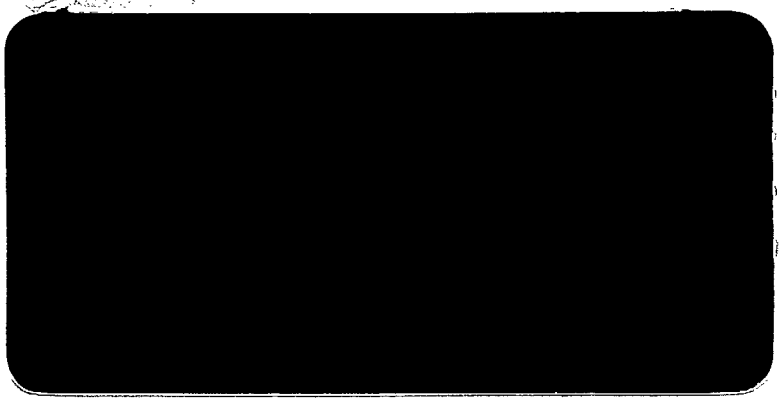

Canada

NATIONAL INVENTORY OF IVHS PROGRAMS AND RELATED ACTIVITIES IN CANADA

TP 11886 E

BY

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17. Abstract

The report contains results of research effort to develop an inventory of Canadian IVHS programs, projects and related activities that have been recently completed, are currently underway, or are being planned for the future. This first formal Canadian IVHS database covers a broad range of advanced technologies being applied in road transportation by the federal, provincial and municipal government agencies; private sector suppliers; research institutes and universities; and by associations of selected user groups.

The mail-out of questionnaires to 278 organizations resulted in 152 responses. The inventory now includes 122 projects, of which 26 have been completed, 78 are active, and 18 are being planned. Ontario reported on 53% of the active projects, Quebec on 22% and B.C. on 12%. All essential elements in these returns have been entered into an electronic database, and are presented in printed form as Appendix B to the report.

The report includes some very basic summaries on the answers provided to each questionnaire section. It also includes several recommendations for the follow-up, which outline the need for maintaining the inventory. The installation of the inventory on a national bulletin board is also recommended.

It is suggested that the provision of a high quality, up-to-date inventory of IVHS activities will be particularly important in Canada. Updated on a regular basis, it will help adjust current work as well as identify new research priorities and can help secure cost-effective program management across the country. It will assist all private and public stakeholders to identify possibilities for cooperative ventures in these advanced technology areas.

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17. Résumé

Le rapport présente les résultats d'une recherche qui dresse l'inventaire des programmes, projets et activités SIVR que l'on a récemment complétés au Canada, qui y sont en cours ou que l'on y planifient. Cette première base de données canadienne officielle sur les SIVR décrit un large éventail de technologies de pointe qu'appliquent aux transports routiers les organismes fédéraux, provinciaux et municipaux, les fournisseurs services du secteur privé, les instituts de recherche et universités, ainsi que les associations de certains groupes d'utilisateurs.

L'envoi postal des questionnaires à 278 organisations s'est soldé par 152 réponses. L'inventaire comprend actuellement 122 projets, dont 26 sont complétés, 78 sont en cours et 18 sont en planification. Parmi les projets en cours 53 % proviennent de l'Ontario, 22 % du Québec et 12 % de la Colombie-Britannique. Tous les éléments essentiels des réponses fournies ont été introduites dans une base de données électronique et sont présentés à l'appendice B du rapport.

Le rapport comprend des résumés très succincts des réponses fournies dans chaque section du questionnaire. Il comprend aussi plusieurs recommandations de suivi qui indiquent la nécessité de tenir l'inventaire à jour. On y recommande aussi d'installer ce dernier sur un babillard électronique national.

L'auteur estime que la fourniture d'un inventaire à jour de grande qualité des activités SIVR sera particulièrement importante au Canada. Mis régulièrement à jour, l'inventaire aidera à adapter les travaux en cours et à déterminer de nouveaux axes prioritaires de recherche et pourra faciliter une gestion rentable des programmes dans tout le pays. Il aidera tous les intervenants des secteurs public et privé à déterminer les possibilités de coentreprises dans ces domaines techniques de pointe.

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DISCLAIMER

The contents of this report reflect the views of the authors and not necessarily the official views or opinions of the Research and Development Directorate of Transport Canada, or the Technology Alliances Directorate of Industry Canada.

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EXECUTIVE SUMMARY

The report presents the results of a research effort to develop an inventory of Canadian IVHS programs, projects and related activities that have been recently completed, are currently underway, or are being planned for the future. This first formal Canadian IVHS database covers a broad range of advanced technologies being applied in the road transportation field by the federal, provincial and municipal government agencies; private sector suppliers of equipment and services; research institutes and universities; and by associations of selected user groups.

The questionnaire was mailed out to 278 organizations of which 152 responded. The report includes an inventory of 122 ***projects*** as well as highlights for each questionnaire element, e.g.:

* Of the 122 projects, 26 have been completed, 78 are active (representing 52 organizations), and 18 are being planned; Ontario reported on 53% of the ***active projects***, Quebec on 22% and British Columbia on 12%.

* Operational efficiency/productivity is the most common ***objective*** (recorded for 70% of projects) with majority of the projects having multiple objectives (2 to 3 on average).

* The emphasis seems to be on communications and identification areas, although other ***functions/features*** are also prominent.

* The most frequently quoted ***enabling technology*** group turned out to be mobile communications (reported for 56% of projects); in-vehicle display, vehicle positioning and on-board data storage technologies are each addresses by roughly 40% of the projects.

* The primary ***user services*** groupings used in the questionnaire, and the number of times respondents assigned their projects to one or more of these categories, were:

  1. ATIS Advanced Traveller Information Systems (44)
  2. ATMS Advanced Traffic Management Systems (45)
  3. AFMS Advanced Freight Management System /CVO Commercial Vehicle Operations (29)
  4. APTS Advanced Public Transportation Systems (40)
  5. AVCS Advanced Vehicle Control Systems (9)

  There are differences between provinces: for example, compared to Ontario, Quebec places much less emphasis on ATMS, but British Columbia's emphasis is almost exclusively on ATMS. There is a fair bit of overlap-by-design - that is, many projects address more than one primary user service grouping.

* Roughly 5 to 20% of the projects, depending on the user service category and the application area, include consideration for the ***other app-***

lication areas as defined in the questionnaire, i.e. rural and small town, elderly and disabled, ergonomics and human factors.

In order for the national inventory to be useful for stakeholders, it will have to be fully updated once-a-year - with quarterly updates on critical R&D, demonstration and implementation projects. However, this should also be accomplished with minimum additional survey burden on the participating organizations.

It is important that the content and lay-out of the questionnaire are coordinated with other established surveys, particularly the TAC/IRRD annual survey of 'research in progress' published annually as "*Surface Transportation R&D in Canada*". It should be fine-tuned to respond to changes in the technology and application areas, and simplified where possible, to further reduce the survey burden and assist in interpretation of the results. The content should respond to the specific information/technology transfer requirements of the Canadian IVHS community (and of those contemplating joining it). The list of organizations should be continually updated to make sure that new entrants to the IVHS field are included. This also applies to a variety of user groups, beyond the conventional traffic and fleet management communities. Quickly expanding the national IVHS community is one of the ways by which Canadians can still join this advanced technology revolution and become competitive in international markets.

In the absence of a national commitment to an IVHS program that would parallel the long term commitments made in the United States, Europe and Japan, the provision of a high quality, up-to-date inventory of IVHS activities will be particularly important in Canada. It will be an essential component in the agencies' work to advance IVHS developments. To accomplish the inventory upkeep and the information transfer requirements in a cost-effective manner, it will be helpful to install the database on a national bulletin board - with automatic, on-line updates by project managers. This should also include, as an option, a 'manual' subscription service which automatically transmits, by facsimile or mail, update sheets on projects of subscriber's interest. Updated on a regular basis, it will help adjust current work as well as identify new research priorities. Readily accessible to all interested parties, a national bulletin board can help secure cost-effective program management across the country. It will assist all private and public stakeholders to identify possibilities for ventures in these advanced technology areas.

SOMMAIRE

Le rapport présente les résultats d'une recherche qui dresse l'inventaire des programmes, projets et activités SIVR planifiés, en cours ou récemment complétés au Canada. Cette première base de données canadienne officielle sur les SIVR décrit un large éventail de technologies de pointe qu'appliquent aux transports routiers les organismes fédéraux, provinciaux et municipaux, les fournisseurs de matériel et de services du secteur privé, les instituts de recherche et universités, ainsi que les associations de certains groupes d'utilisateurs.

L'inventaire comprend les 122 **projets** sur lesquels les 278 organisations ciblées par l'enquête ont fourni des renseignements, et présente les faits qui ressortent de chaque partie du questionnaire. Par exemple :

* Parmi les 122 projets recensés, 26 sont complétés, 78 sont en cours (52 organisations y sont engagées) et 18 sont en planification. Parmi les **projets en cours**, 53 % proviennent de l'Ontario, 22 % du Québec et 12 % de la Colombie-Britannique.

* La productivité et l'efficacité des opérations sont l'**objectif** le plus fréquent (déclaré dans le cas de 70 % des projets), et la majorité des projets visent plusieurs objectifs (de 2 à 3 en moyenne).

* L'accent semble être mis sur les communications et l'identification, mais d'autres **fonctionnalités et caractéristiques** occupent aussi une place importante.

* Les **applications technologiques utilisées** le plus souvent citées se sont avérées être celles du domaine des communications et de la détection (56 % des projets); les groupes d'applications dans les domaines de l'affichage à bord des véhicules, de la localisation des véhicules et de la mémorisation à bord des véhicules font chacun l'objet d'environ 40 % des projets.

* Voici les grands groupes de **services** identifiés dans le questionnaire et le nombre de projets que les répondants ont rattaché à chacun de ces groupes :

  1. ATIS Système avancé d'information routière (44)
  2. ATMS Système avancé de gestion de circulation (45)
  3. AFMS Système avancé de gestion des marchandives et des frets /CVO Utilisation des véhicules commerciaux (29)
  4. APTS Système avancé de transport routier collectif de personnes (40)
  5. AVCS Système avancé d'aide à la conduite (9)

  Il y a des différences marquées entre les provinces. Par exemple, le Québec accorde beaucoup moins d'importance aux ATMS que l'Ontario, et la Colombie-Britannique met l'accent presque exclusivement sur ces derniers. Il y a pas mal de chevauchement dû à la conception des projets; en d'autres termes, nombre de projets couvrent plus d'un groupe de services.

* Selon le groupe de services et le type d'application, on envisage, dans environ 5 à 20 % des projets, les **autres applications** définies dans le questionnaire, c.-à-d. les applications liées au secteur route, aux personnes âgées et handicapées et aux facteurs humains et ergonomiques.

Afin que l'inventaire canadien soit utile aux intervenants, il faudra le mettre entièrement à jour une fois par an et mettre à jour tous les trois mois les données sur les travaux de R-D ainsi que les projets de mise en oeuvre et les projets pilotes cruciaux. Il est toutefois possible de le faire en réduisant au minimum le poids des enquêtes complémentaires imposées aux organisations participantes.

Il importe de coordonner le contenu et la présentation du questionnaire avec ceux d'autres enquêtes établies, et notamment l'enquête annuelle de l'ATC sur les «recherches en cours», dont les résultats sont publiés tous les ans sous le titre *"R&D en transports de surface au Canada"*. Il faudrait adapter le questionnaire à l'évolution de la technologie et des applications et le simplifier, si possible, pour réduire davantage le poids des enquêtes et aider à l'interprétation des résultats. Le contenu devrait répondre aux besoins particuliers du monde canadien des SIVR (et de ceux qui envisagent de s'y joindre) en matière de transfert d'information et de technologie. Il faudrait tenir constamment à jour la liste des organismes pour qu'elle comprenne les nouveaux venus dans le domaine des SIVR. Cela s'applique aussi à un éventail de groupes d'utilisateurs étrangers au monde classique de la gestion des parcs de véhicules et de la circulation. La constitution d'un répertoire du monde canadien des SIVR est l'un des moyens par lesquels les Canadiens pourront encore participer à cette révolution introduite par les technologies de pointe et devenir concurrentiels sur les marchés internationaux.

Faute d'un engagement national dans un programme de SIVR qui serait équivalent aux engagements à long terme des États-Unis, de l'Europe et du Japon, la fourniture d'un inventaire à jour de grande qualité des activités SIVR sera particulièrement importante au Canada. Cet inventaire constituera un élément essentiel dans le travail que les organismes accomplissent pour faire progresser la mise au point de SIVR. Pour tenir à jour l'inventaire et satisfaire les besoins en transfert d'information, il sera utile d'installer la base de données sur un babillard électronique pour en permettre une mise à jour en direct par les chargés de projet. Il faudrait aussi y ajouter l'option d'un service d'abonnement «manuel» qui transmette automatiquement, par télécopieur ou courrier, des mises à jour sur les projets qui intéressent l'abonné. La mise à jour régulière de l'inventaire aidera à adapter les travaux en cours et à déterminer les axes prioritaires de recherche. Facilement accessible à tous les intéressés, le babillard électronique national pourra aider à une gestion rentable des programmes dans tout le pays. Il aidera tous les intervenants des secteurs public et privé à déterminer les possibilités d'entreprises dans ces domaines techniques de pointe.

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NATIONAL INVENTORY OF IVHS PROGRAMS, PROJECTS AND RELATED ACTIVITIES IN CANADA

1. INTRODUCTION

1.1 BACKGROUND

As a follow-up to the June 1992 publication of the report "*Intelligent Vehicle Highway Systems (IVHS) - A Synopsis*", prepared by Parviainen & Associates, the Executive Committee of the IVHS Roundtable (currently ITS Canada) endorsed the development of a national inventory of IVHS activities. This endorsement coincided with the efforts of two federal departments to identify opportunities for effective participation in IVHS research, development and demonstrations and to provide a service to the members of the IVHS Roundtable and others throughout Canada. Accordingly, the Research and Development Directorate of Transport Canada and the Technology Alliances Directorate of Industry Canada, in cooperation with the IVHS Roundtable, agreed to sponsor this research activity.

1.2 OBJECTIVE

The objective in this research activity was to:

* develop an inventory of Canadian IVHS programs, projects and related activities that have been recently completed, are currently underway, or are being planned for the future.

1.3 SCOPE

This first formal database covering a broad range of IVHS activities was to include federal, provincial and municipal government agencies; private sector suppliers of IVHS related equipment and services; research institutes and universities; and associations of selected user groups.

For the purposes of this research, the following definition for IVHS[1] was used: "*Intelligent Vehicle Highway Systems (IVHS) is the application of advanced information processing, communication, sensing, and control technologies to improve the performance of highway transportation systems for passengers and freight. The objectives of IVHS are to promote more efficient use of the existing road systems, increase safety and mobility and decrease the environmental impact of road transportation through reduced fuel consumption.*"

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1) IVHS has been replaced, in the current North American terminology, by **ITS** - or **I**ntelligent **T**ransportation **S**ystems. In Europe, the term **A**dvanced **T**ransport **T**elematics is being used (as a replacement for the earlier **R**oad **T**ransport **I**nformatics).

1.4 EXPECTATION

The expectation is that the inventory will be a critical component in the agencies' work to advance IVHS developments in Canada. Updated on a regular basis, it will also help adjust current work as well as identify new research priorities. It will be distributed to all interested parties so that they may benefit from each other's experiences and avoid duplication of effort. It will assist all stakeholders to identify possibilities for cooperative ventures in these advanced technology areas - much the trend in other countries where major programs are already under way.

1.5 APPROACH

A brief review of the available methodologies confirmed that a research instrument - consisting of covering letters with instructions for respondents, a mail-back questionnaire and a return envelope - would be used. It would be mailed to the respondents, with reminder notices being sent after the indicated return date by mail and facsimile - and with some follow-up by telephone. Two parallel efforts would be required to cover separately Quebec and the rest of Canada. In Quebec, both French and English language research instruments would be included where the preferred language of the respondent was not known.

2. RESEARCH DESCRIPTION

2.1 THE RESPONDENTS

The organization types included in this research effort included government agencies, private companies, universities and associations likely to be involved or at least interested in the emerging advanced technology applications in the road transportation field. An effort was made to identify the department within each organization which, most likely, would have the lead role on IVHS matters - and, therefore, would be most appropriate for coordinating a joint response from that organization.

To prepare a short list of respondents, that could be handled within the project resources, several computerized databases of contacts were used:

- IVHS Roundtable members (full and associate members, and those that had expressed interest in the past)
- IVHS Seminar participants (Vancouver, Edmonton, Winnipeg, Toronto, Ottawa, Quebec City; 1993)
- Canadian participants of the Vehicle Navigation and Information Systems Conference (Ottawa, October 1993)
- IVHS Seminar participants (Ottawa, June 1991)

- contact names in other IVHS files of the Contractor
- individual names and lists provided by the Steering Group of this project (see 'Acknowledgments').

The information, where possible, was corrected using the Ontario Municipal Directory and the Canadian Almanac and Directory, both from 1994. Some telephone checks were also made to secure correct names and addresses.

The final distribution of respondent organizations in the initial mail-out by respondent category is presented in *Exhibit 1*. These numbers do *not represent* any kind of statistical sampling of the organizations (either overall, or within the individual categories). They simply reflect a reasonable choice of organizations where some IVHS related activities are known or perhaps most likely to take place, combined with a small informal sampling of additional organizations within those broad categories to ensure Canada-wide coverage.

In the end, some 40% of the selected respondents were private companies, some 30% government agencies. Consultants were *not included*, on the premise that their work would be, for the most part, done for one of the agencies (who would then respond for those projects), or that confidential work underway for private clients might not be recorded in any case. Some did receive, however, the survey package through their client agencies.

Because of the relatively small sample, many potential user groups were *not included* - such as trucking companies, shippers and receivers, tourism and leisure industry representatives, disabled systems providers, etc. Although many of their associations were on the mailing list, this survey must be considered simply the first cut in developing a comprehensive annual inventory of IVHS activities across Canada.

2.2 RESEARCH INSTRUMENT

The Contractor reviewed several questionnaires used in similar inventory projects (eg: by Transportation Association of Canada, Institute of Transportation Engineers, and others), and developed a draft research instrument. This was further refined in cooperation with the Transport Canada Project Officer, Arjan Chandan.

As a pretest, the instrument was submitted to a representative of one provincial and one municipal agency. Several modifications to the questionnaire were made based on comments provided. The final research instrument, included in *Appendix A* of this report, contains the English and French language versions of the following:

- Letters
  - Transport Canada & Industry Canada
  - Parviainen & Associates / Roche-Deluc Ltée
- Questionnaire

EXHIBIT 1

RESPONDENT CATEGORIES AND NUMBER OF ORGANIZATIONS IN THE INITIAL MAIL-OUT

CAT	RESPONDENT GROUP	No.
1.	FEDERAL AGENCIES	20
2.	PROVINCIAL AGENCIES	7
3.	MUNICIPAL AGENCIES	56
4.	PRIVATE SECTOR (SUPPLIERS)	112
5.	UNIVERSITIES	32
6.	ASSOCIATIONS	24
7.	CONSULTANTS (ADD-ONS ONLY)	7
	TOTAL MAILING	278

The Questionnaire covers the following areas:

A. Title of Program/Project/Activity
B. Responsible Organization
C. Other Participating Organizations
D. Description of the Program/Project/Activity
E. Project Objectives
F. Project Type
G. Functions/Features
H. Enabling Technologies
I. Total Estimated Project Cost
J. Current Status
K. IVHS User Services by Application Area
L. Project Reports/Publications
M. Comments
N. Request for Further Information

For ease of reference, the results are presented in the above, Questionnaire sequence.

3. SUMMARY OF FINDINGS

3.1 RESPONSE RATES

Overall Response - Of the 278 organizations who were mailed a questionnaire, 152 - or 55% - responded with 197 completed questionnaires. In all, these represent 122 projects [2] either completed, active or being planned. The overall response statistics are presented in *Exhibit 2.*

Response Rates by Organization Type - The response rates of the government agencies were high (70-71%) and consistent at all levels: federal, provincial and municipal. However, less than half of both private sector suppliers of IVHS services and equipment (at 41%) and of the universities (at 47%) responded. Associations and consultants fell roughly in the middle. The response rates by respondent category are presented in *Exhibit 3.*

Response Rates by Province - The response rates for most provinces were fairly consistent, ranging from 43% to 60%. The exceptions, although with very small samples, were Newfoundland/Labrador and Yukon Territory (at 100%) and Northwest Territories (at 0%). The response rates by province are presented in *Exhibit 4.*

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2) Although the questionnaire called for 'programs', 'projects' or 'related activities', for the most part the responses related to what is typically described within agencies *projects* - hence the use of this description in the subsequent text of the report.

EXHIBIT 2

OVERALL RESPONSE STATISTICS

CATEGORY		No.	Share
▪ QUESTIONNAIRES MAILED OUT		278	
▪ RESPONSES	RECEIVED (NO. OF ORGANIZATIONS)	152	55%
	ACCEPTED (NO DUPLICATES)	145	
▪ PROGRAMS / PROJECTS / ACTIVITIES (EITHER COMPLETED, ACTIVE OR PLANNED)		122	

EXHIBIT 3

RESPONSE RATES BY RESPONDENT CATEGORIES

CAT	RESPONDENT GROUP	Sent	Retd	%
1.	FEDERAL AGENCIES	20	14	*70*
2.	PROVINCIAL AGENCIES	27	19	*70*
3.	MUNICIPAL AGENCIES	56	40	*71*
4.	PRIVATE SECTOR (SUPPLIERS)	112	46	*41*
5.	UNIVERSITIES	32	15	*47*
6.	ASSOCIATIONS	24	14	*58*
7.	CONSULTANTS (ADD-ONS ONLY)	*7*	*4*	*57*
	OVERALL RESPONSE	278	152	*55*

EXHIBIT 4

RESPONSE RATES BY PROVINCE

	PROVINCE	Sent	Retd	%
1.	BRITISH COLUMBIA	22	12	*55*
2.	ALBERTA	19	10	*53*
3.	SASKATCHEWAN	9	5	*56*
4.	MANITOBA	6	3	*50*
5.	ONTARIO	140	75	*54*
6.	QUEBEC	62	35	*56*
7.	NEW BRUNSWICK	7	3	*43*
8.	NOVA SCOTIA	5	3	*60*
9.	PRINCE EDWARD ISLAND	2	1	*50*
10.	NEWFOUNDLAND & LABRADOR	3	3	*100*
11.	YUKON TERRITORY	1	1	*100*
12.	NORTHWEST TERRITORIES	1	0	*0*
-	OTHER (MOVED TO U.S.)	1	1	*100*
	ALL PROVINCES	278	152	*55*

3.2 FREQUENCY DISTRIBUTION OF RESPONSES

Project Objectives - By far the most common objective is *operational efficiency/productivity* - recorded for 70% of the projects (85 out of 122). *Mobility improvement* is also a common aim, counting for 42% of the Canadian IVHS work. Three objectives are being considered in roughly quarter of the projects (not obviously always the same ones): *business/product opportunity, road safety,* and *energy conservation/air quality.*

For a majority of the 122 projects, multiple objectives are reported - on average 2.57. However, this is perhaps less than expected considering the fairly complex applications being addressed. The full range of related safety, efficiency, mobility, and other effects are not yet the focus in all IVHS implementation. The details on project objectives are presented in *Exhibit 5.*

Project Types - Although the IVHS field itself is new, *research and development* and *full scale application* types are reported for an equal number of projects (roughly 40%). The reason for this, it is speculated on the basis of the project descriptions, is that the questionnaire itself did not allow identification of the share of advanced versus conventional technologies within the projects. Neither was there any instruction not to include projects which might have only a very small IVHS component or where past (conventional) technology has simply been rephrased as IVHS. Hence, the inclusion of many 'implementation projects' applying primarily conventional technology. Be as it may, it is evident that the IVHS concept has captured the imagination of many transportation/traffic engineers and planners - and a transition to applying truly advanced technologies within 'conventional' projects can be expected.

Other prominent project types are *demonstration/field trial* (31%), *system architecture/integration* (27%). Curiously enough, almost the same number of projects are reported to be of multiple type (2.43 types ticked off on average for 122 projects) as was the case for project objectives. The details on project types are presented in *Exhibit 6.*

Functions/Features - Overall, the emphasis seems to be on communications and identification areas. The most times that specific functions/features are reported for the projects are for *AVI and AVL* (37 each for automatic vehicle identification and location), *dispatch↔vehicle communications* (32), and *traffic flow monitoring* (30). Related to fleet and traffic management, the two application areas considered early winners in the IVHS game, this was indeed expected.

Although the numbers are small (3-4), it is important to also note the emergence of some 'new' areas - namely *yellow pages* applications within GIS, *driver alertness monitoring, proximity radars,* and *intelligent cruise control.* On average, 3.94 functions/features are reported for the 122 projects. This number may rise in the future, when more comprehensive systems are being

EXHIBIT 5

PROJECT OBJECTIVES

OBJECTIVE	No.
■ ROAD SAFETY	31
■ OPERATIONAL EFFICIENCY / PRODUCTIVITY	85
■ MOBILITY IMPROVEMENT	51
■ ENERGY CONSERVATION / AIR QUALITY	30
■ ENFORCEMENT OF REGULATIONS	13
■ ELDERLY AND DISABLED NEEDS	12
■ REVENUE GENERATION	23
■ INDUSTRIAL / REGIONAL DEVELOPMENT	19
■ BUSINESS / PRODUCT OPPORTUNITY	33
■ 1ST OTHER (REPRESENTING A VARIETY OF OBJECTIVES)	17
■ 2ND OTHER (REPRESENTING A VARIETY OF OBJECTIVES)	3
AVERAGE FOR 122 PROJECTS = 2.57 TICKED OFF	314

EXHIBIT 6

PROJECT TYPES

TYPE	No.
■ EDUCATION / TRAINING	8
■ FEASIBILITY STUDY	26
■ MARKET STUDY	4
■ RESEARCH AND DEVELOPMENT	49
■ DATABASE DEVELOPMENT	23
■ MODEL DEVELOPMENT	14
■ STANDARDS DEVELOPMENT	24
■ SYSTEM ARCHITECTURE / INTEGRATION	33
■ LABORATORY / FIELD TEST PROTOTYPE	24
■ DEMONSTRATION / FIELD TRIAL	38
■ FULL SCALE APPLICATION	48
■ OTHER (REPRESENTING A VARIETY OF TYPES)	5
AVERAGE FOR 122 PROJECTS = 2.43 TICKED OFF	296

introduced. The frequency distribution of responses on functions/features is presented in *Exhibit 7.*

Enabling Technologies - The most frequently quoted enabling technology group turns out to be *mobile communications*, reported for 56% of the projects (68 out of 122). The emphasis at this time is, rather expectedly, on *land mobile radio* (27% with 33) and *mobile cellular* (20% with 25). The other enabling technologies are being considered in roughly equal number of projects (47, 44 and 50), each representing about 40 percent. In-vehicle *keyboards*, *GPS* positioning, and *RAM* storage are the most prominent.

No projects are reported to be investigating or using *heads-up displays*, or *magnetic tapes* for on-board data storage, as yet. The frequency distribution of responses on enabling technologies is presented in *Exhibit 8.*

Current Status - Of the 122 projects for which Questionnaires were returned, 26 have been completed, 67 are active, and 18 are being planned. Eleven projects have been recorded with multiple status, indicating phases of essentially the same project. The 78 currently active projects (ie. 67+6+3+2), represent 52 organizations. Of the 190 total responses received, 68 reported no activity. The details on current status are presented in *Exhibit 9.*

Active Projects - Amongst the organization types, the provinces and private companies report the highest level of active projects (28 and 22 respectively). The federal agencies and universities each report 10 active projects, the municipal agencies 6.

Ontario reports 53% of all active projects (at 41), by far the highest level. But Quebec and British Columbia also are quite involved reporting on 17 and 9 projects respectively. Nova Scotia, Prince Edward Island, Newfoundland/Labrador and Northwest Territories have no active projects (among the Questionnaires received). There may well be IVHS projects or related activities underway in each of those provinces, the original respondent listing may simply not have captured those organizations or they may not have had a chance to respond to the Questionnaire. The details on projects with active current status, by organization type and province, are presented in *Exhibit 10.*

EXHIBIT 7

FUNCTIONS/FEATURES
- FREQUENCY DISTRIBUTION OF ANSWERS -

COMMUNICATIONS

☑ Communications - vehicle<->vehicle	15
☑ Communications - road-side<->vehicle	25
☑ Communications - dispatch<->vehicle	32
☑ Communications - area-wide broadcast	20
☑ Personal Communication System (PCS)	9
☑ Personal Digital Assistant (PDA)	6

IDENTIFICATION

☑ Automatic Identification - vehicle	37
☑ Automatic Identification - driver	18
☑ Automatic Identification - cargo/parcels	13
☑ Automatic Vehicle - classification	20
☑ Automatic Vehicle - location	37

NAVIGATION / ROUTE GUIDANCE

☑ Navigation - directional arrows	6
☑ Navigation - full in-veh map display	10
☑ Route Guidance - autonomous (in-vehicle)	14
☑ Route Guidance - centrally driven	12
☑ Route Guidance - interactive with ATMS	10

MAP DATABASE

☑ Map Database - road system only	20
☑ Map Database - road side attributes	11
☑ Map Database - yellow pages (general)	3
☑ Map Overlays (external) - weather, etc	3

INFORMATION TRANSFER

☑ Info Transfer - to changeable signs	15
☑ Info Transfer - to broadcast media	14
☑ Info Transfer - to home/office computers	24

MONITORING

☑ Monitoring - traffic flow	30
☑ Monitoring - vehicle systems	16
☑ Monitoring - driver alertness	4

OTHER

☑ Proximity Radar	3
☑ Intelligent Cruise (gap radar)	4
☑ Lane Assist/Control (lateral)	6
☑ Weigh-in-Motion	13
☑ Electronic collection of user charges	16
☑ Other (representing several functions)	15

EXHIBIT 8

ENABLING TECHNOLOGIES
- FREQUENCY DISTRIBUTION OF ANSWERS -

1. MOBILE COMMUNICATION	68
☑ Inductive Loops	13
☑ UHF (Low Power Radio Beacons)	14
☑ Microwave	14
☑ Infra-red	5
☑ AM/FM Broadcast (HAR/AHAR)	5
☑ Broadcast SCA on FM (ARI, RDS)	5
☑ Land Mobile Radio (VHF, UHF)	33
☑ Mobile Cellular	25
☑ Satellite	16
☑ Other_____	8
☐ Other_____	-

2. VEHICLE POSITIONING	44
☑ Magnetic Compass	2
☑ Gyro	8
☑ Differential Odometer	8
☑ Map Matching	11
☑ Proximity Beacons	11
☑ Loran-C	4
☑ GPS	18
☑ Differential GPS	19
☑ Other: _____	11
☐ Other: _____	-
☐ Other: _____	-

3. IN-VEHICLE DISPLAY	47
☑ Electro-Luminescent	8
☑ CRT	9
☑ LED	14
☑ LCD	15
☐ HUD	-
☑ Chime	7
☑ Voice (synthesized/digitized)	14
☑ Printer	5
☑ Keyboard	19
☑ Voice Recognition	3
☑ _____	7

4. ON-BOARD DATA STORAGE	50
☑ Smart Transponder	12
☑ Type III AVI Tag	7
☑ Smartcard	12
☑ RAM	18
☐ Magnetic Tape	-
☑ Magnetic Disk	4
☑ PCMCIA card	7
☑ DAT (digital audio tape)	1
☑ CD-ROM	6
☑ EEPROM	12
☑ Other: _____	9

EXHIBIT 9

CURRENT STATUS
OF PROGRAMS/PROJECTS/ACTIVITIES

STATUS	No.
■ COMPLETED (ONLY)	26
■ ACTIVE (ONLY)	67
■ PLANNED (ONLY)	18
■ COMPLETED & ACTIVE	6
■ ACTIVE & PLANNED	3
■ COMPLETED & ACTIVE & PLANNED	2
SUB-TOTAL (REPRESENTING 79 ORGANIZATIONS)	*122*
■ NO ACTIVITY	68
TOTAL	190

NOTE: THE 78 ACTIVE PROJECTS (67+6+3+2) REPRESENT 52 ORGANIZATIONS

EXHIBIT 10

PROJECTS BY ORGANIZATION TYPE AND PROVINCE

- ACTIVE STATUS -

PROVINCE	ORGANIZATION TYPE							
	FED	PRO	MUN	PRV	UNV	ASC	CON	TOT
BRITISH COLUMBIA	-	5	1	-	3	-	-	9
ALBERTA	-	2	-	2	-	-	-	4
SASKATCHEWAN	-	1	-	1	-	-	-	2
MANITOBA	-	1	-	2	-	-	-	3
ONTARIO	9	13	4	9	4	2	-	41
QUEBEC	1	4	1	8	3	-	-	17
NEW BRUNSWICK	-	1	-	-	-	-	-	1
NOVA SCOTIA	-	-	-	-	-	-	-	0
PRINCE EDWARD ISLAND	-	-	-	-	-	-	-	0
NEWFOUNDLAND & LABRADOR	-	-	-	-	-	-	-	0
YUKON TERRITORY	-	1	-	-	-	-	-	1
NORTHWEST TERRITORIES	-	-	-	-	-	-	-	0
TOTAL	10	28	6	22	10	2	0	78

3.3 USER SERVICES

Projects by User Service and Province - Section K of the Questionnaire used basically the same primary user services groupings as IVHS America had just prior to this research, namely: [3]

1. ATIS Advanced Traveller Information Systems
2. ATMS Advanced Traffic Management Systems
3. AFMS /CVO Advanced Freight Management Systems Commercial Vehicle Operations
4. APTS Advanced Public Transportation Systems
5. AVCS Advanced Vehicle Control Systems.

In all, one or more of the above user service groups have been indicated within the 122 completed/active/planned projects to arrive at a total of 167 'check marks' (1.37 on average). Except for AVCS (with only 9 projects), the other user service groups appear often: ATMS (45), ATIS (44), APTS (40) and AFMS (29). Since these numbers include R&D projects, both the multiple categories and the ATMS/ATIS and APTS foci are perhaps expected.

For Ontario, with 53% of the 'check marks', the distribution between ATIS/ATMS/AFMS/APTS/AVCS is very similar to the total distribution - with some 3 percentage points transferred from AVCS to ATIS. The relative foci in both Quebec and British Columbia are different from this overall Canadian scene and opposite from each other - with a lot less emphasis on ATMS but almost exclusive emphasis on ATMS respectively. The details on all projects by user service and province are presented in *Exhibit 11.*

More carefully developed user service groupings (with rigorous hierarchy and terminology) - that would not mix, for example, public transit and emergency vehicles - would certainly yield a better sense on what precisely are the primary interest areas in current IVHS work in Canada.

Application Areas - The responses for the application areas (project vs. other) indicate a great deal of overlap-by-design - that is, many projects address more than one primary user service grouping. Roughly 5 to 20% of the projects, depending on the user service category and the application area, include consideration for the other application areas: *rural and small town, elderly and disabled, ergonomics and human factors.* The details on all projects by user service and application area are presented in *Exhibit 12.*

Based on anecdotal information (informal discussions with some of the respondents), and on the manner the coding has been provided in some instances, the 'other applications' sometimes are simply an afterthought - with

3) These user service groupings, and corresponding sub-groupings, have since been modified by ITS America (Intelligent Transportation Society of America) and others.

EXHIBIT 11

PROJECTS BY USER SERVICE AND PROVINCE
- COMPLETED / ACTIVE / PLANNED -

PROVINCE	USER SERVICE					
	ATIS	ATMS	AFMS	APTS	AVCS	TOTAL
BRITISH COLUMBIA	1	6	-	-	-	7
ALBERTA	1	3	2	1	1	8
SASKATCHEWAN	1	1	2	2	-	6
MANITOBA	2	1	1	1	-	5
ONTARIO	26	24	15	22	2	89
QUEBEC	12	8	9	13	6	48
NEW BRUNSWICK	-	-	-	-	-	0
NOVA SCOTIA	1	1	-	1	-	3
PRINCE EDWARD ISLAND	-	-	-	-	-	0
NEWFOUNDLAND & LABRADOR	-	-	-	-	-	0
YUKON TERRITORY	-	1	-	-	-	1
NORTHWEST TERRITORIES	-	-	-	-	-	0
TOTAL	44	45	29	40	9	167

EXHIBIT 12

PROJECTS BY USER SERVICE AND APPLICATION AREA
- COMPLETED / ACTIVE / PLANNED -

APPLICATION AREA	USER SERVICE					
	ATIS	ATMS	AFMS	APTS	AVCS	*'TOTAL'*
GENERAL	43	44	27	40	9	*83*
RURAL & SMALL TOWN	6	4	5	6	2	*12*
ELDERLY & DISABLED	8	3		5	2	*11*
ERGONOMICS & H.F.	5	2		3	2	*7*
'TOTAL'	*44*	*45*	*29*	*40*	*9*	*(87)*

no explicit project objectives, far less suggested MOEs (measures of effectiveness) within the evaluation process.

3.4 INFORMATION NEEDS

Roughly quarter of all respondents requested information materials on either IVHS technologies only, or on both the technologies and the IVHS Roundtable. Presumably because of past involvement in the IVHS scene, half of those involved in the 122 projects felt they needed no further information at this time. Amongst the 68 respondents with no IVHS projects, roughly 65% requested information - only 35% required none.

The essential information from the Questionnaires returned by those organizations who indicated either completed, current or planned activities - and provided some measure of description of the same - has been entered into an electronic database (Microsoft ACCESS format). A compressed 'print-out' of this database, including a brief description of each project, is provided in *Appendix B*. To facilitate information exchange and technology transfer, this listing contains the project manager's name, address, telephone and facsimile numbers.

4. RECOMMENDATIONS FOR FUTURE RESEARCH

4.1 REQUIRED UPDATE CYCLES

Because of the current and expected future pace of IVHS developments, any centralized database can quickly become 'dated'. In the Canadian context, the minimum requirement would be for a complete update to be made available once-a-year - with quarterly updates on critical research, development, demonstration and implementation projects.

However, this ought to be accomplished with minimum additional survey 'burden' on the organizations participating. Most of these are already responding to several mandated and voluntary surveys throughout the year. It is essential that the content of the questionnaire (sequence, terminology, lay-out, etc...) is coordinated with other established surveys, particularly the TAC/IRRD annual survey of 'research in progress' - published annually as "Surface Transportation R&D in Canada".

It is also important that the Questionnaire used in any new cycles of the survey is fine-tuned to respond to changes in the technology and application areas, and simplified - where possible - to further reduce the survey burden and assist in interpretation of the results. The Questionnaire content should respond to the specific information/technology transfer requirements of the IVHS community (and of those who are contemplating joining it).

EXHIBIT 13

INFORMATION REQUESTS

INFORMATION REQUESTED FOR	AS RECORDED AMONG QUEST SETS RETURNED		AS RECORDED AMONG ACTUAL PROJECTS	
	No.	%	No.	%
■ IVHS ONLY	45	23.7	27	22.1
■ IVHS CANADA ONLY	6	3.2	1	0.8
■ BOTH	54	28.4	33	27.1
■ NOTHING	85	44.7	61	50.0
ALL RESPONSES	190	100.0	122	100.0

The list of organizations should be continually updated to make sure that new entrants to the IVHS field are included. This also applies to a variety of user groups, beyond the conventional traffic and fleet management communities. This is particularly important as it is one of the ways by which Canadians can still join this advanced technology revolution and become competitive within the national and international markets.

In parallel to providing a database on Canadian programs, projects and related activities, it would be highly desirable to offer quick-reference summaries - in a simplified matrix format - of projects in other countries. For the time being, this requires special monitoring and consolidation (primarily from current computerized databases such as REACH), of the U.S., European, Japanese and Australian projects.

4.2 NATIONAL BULLETIN BOARD

To accomplish the activities proposed in Section 4.1 in a cost-effective manner - and, indeed, to provide easier access for all - it is necessary to install the database on a national bulletin board.

The bulletin board should be accessible 24 hours a day, have simple and effective screen layouts, be easy to search, and be truly current - particularly on contact names and telephone/facsimile numbers. To ensure the currency, it should be assigned to an individual as an ongoing, long term maintenance contract. It will also be necessary to assign update authority (access to make changes in specific assigned project screens or screen elements) to the designated project managers of at least the major project entries.

For the operation of the bulletin board, it should not be assumed that all interested organizations and individuals across Canada will communicate with it through electronic means. A 'manual' subscription service should be provided which automatically transmits, by facsimile or mail, update sheets on projects of the subscriber's interest.

In the absence of a national commitment to an IVHS program that would complement and parallel the long term commitments made in the United States, Europe and Japan, the provision of a high quality, up-to-date inventory of IVHS activities will be particularly important in Canada. The inventory will be an essential component in the agencies' work to advance IVHS developments. Updated on a regular basis, it will help adjust current work as well as identify new research priorities.

Readily accessible to all interested parties, a national bulletin board can help secure cost-effective program management across the country. It will assist all private and public stakeholders to identify possibilities for cooperative ventures in these advanced technology areas.

APPENDICES

A. RESEARCH INSTRUMENT

A.1 ENGLISH LANGUAGE VERSION

LETTERS
- Transport Canada & Industry Canada
- Parviainen & Associates

QUESTIONNAIRE

A.2 UN VERSION EN FRANÇAIS

LES LETTRES
- Transports Canada & Industrie Canada
- Roche-Deluc Ltée

LE QUESTIONNAIRE

B. RESEARCH RESULTS

A COMPRESSED PRINT-OUT OF INVENTORY SHEETS FOR RESPONDENTS WITH PLANNED/ACTIVE/COMPLETED IVHS PROGRAMS/PROJECTS/ ACTIVITIES

C. LIST OF ORGANIZATIONS INCLUDED IN THE RESEARCH

APPENDIX A

RESEARCH INSTRUMENT

A.1 ENGLISH LANGUAGE VERSION

- LETTERS
  - Transport Canada & Industry Canada
  - Parviainen & Associates
- QUESTIONNAIRE

A.2 UN VERSION EN FRANÇAIS

- LES LETTRES
  - Transports Canada & Industrie Canada
  - Roche-Deluc Ltée
- LE QUESTIONNAIRE

Transport Canada | Transports Canada
Policy and Coordination | Politiques et coordination
Research and Development Directorate | Direction générale de recherche et développement

Your file *Votre référence*

Our file *Notre référence*
ACD

Ottawa, Ontario
March 29, 1994

Dear Mr. :

Subject: National Inventory of IVHS Programs Activities in Canada

As a follow-up to the publication of the report "Intelligent Vehicle Highway systems (IVHS) - A Synopsis", prepared by Parviainen & Associates, the Executive Committee of the IVHS Roundtable/Transportation Association of Canada endorsed the development of a national inventory of IVHS programs and related activities. The study is being sponsored by the Research and Development Directorate of Transport Canada and the Technology Alliances Directorate of Industry Canada in cooperation with the IVHS Roundtable/Canada.

We are seeking your cooperation in responding to the attached questionnaire on behalf of your organization and its various groups involved in IVHS activity. The information collected will be compiled in form of a report in both English and French and will be distributed to all interested parties. We expect that the results will help all stakeholders learn from other's experience and identify possibilities for cooperation in this area of advanced technology applications.

Please do not hesitate to contact either of the undersigned should you have any questions about the objectives of this study. On behalf of both our departments, and the IVHS Roundtable/Canada, we thank you in advance for your cooperation in responding to the enclosed questionnaire.

Yours sincerely,

Arjan Chandan
Senior Advisor
Research and Development
Policy and Coordination
Transport Canada
Place de Ville - Twr C - Area 26B
Ottawa, Ontario K1A 0N5
Tel: 613-991-6035
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Lorraine Raynes
Economic Analyst
Technology Alliances Directorate
Information Technologies Industry Br.
Industry Canada
235 Queen St., 952A - East
Ottawa, Ontario K1A 0H5
Tel: 613-941-0611
Fax: 613-952-8419

Parviainen & Associates

8 April 1994

Susan B Crawford
Director
Strategic Transportation Research Branch
Ministry of Transportation Ontario
1201 Wilson Ave - Central Bldg - Rm 333
Downsview, Ontario
M3M 1J8

Dear Susan Crawford:

Under contract with Transport Canada, Parviainen & Associates - in co-operation with Roche-Deluc, of Montreal - is conducting a study to develop a *national inventory of IVHS programs, projects and related activities.*

We are seeking your cooperation in responding to the attached questionnaire on behalf of Ministry of Transportation Ontario and its various divisions involved in IVHS. The questionnaire is designed to obtain information for one project only; please make photocopies to cover all IVHS programs, projects and related activities of your organization. A pre-addressed envelope is attached for you to return the completed forms.

If there are no formal IVHS activities underway, please fill in Section B to identify your organization and a person who may be contacted on IVHS matters in the future. If you wish to receive information on IVHS in general, or on the IVHS Roundtable/Canada, please indicate this in Section N. We would appreciate receiving your response by April 29th.

Please contact me if you have any questions concerning the attached questionnaire. The information collected will be compiled by Transport Canada in the form of a report in both English and French, and a copy will be made available to you.

Thank you for your cooperation.

Yours sincerely,

Jouko A Parviainen, PEng
Principal

1125 Linbrook Road, Oakville, Ontario, Canada L6J 2L3 Tel: (905) 849-5806 Fax: (905) 844-9945

National Inventory of IVHS Programs and Activities in Canada

OBJECTIVE AND SCOPE OF THE STUDY

The objective of this study is to develop an inventory of all Canadian IVHS programs and projects currently underway as well as ones recently completed or being planned for future applications at all levels of government (federal, provincial and municipal), as well as operating and manufacturing sectors of transportation, transportation related associations, research institutes and universities. The study is sponsored by the Research and Development Directorate of Transport Canada and the Technology Alliances Directorate of Industry Canada in cooperation with the IVHS Roundtable/Canada. The information collected will be compiled in a report in both English and French and distributed to all interested parties to make them aware of the IVHS activities underway or planned for in Canada, thus benefiting from other's experience and avoiding duplication of effort. The inventory, which will be updated on a regular basis, will help to identify research priorities as well as provide opportunities for cooperative ventures in areas of advanced technology applications.

DEFINITION OF IVHS

"Intelligent Vehicle Highway Systems (IVHS) is the application of advanced information processing, communication, sensing, and control technologies to improve the performance of highway transportation systems for passengers and freight. The objectives of IVHS are to promote more efficient use of the existing road systems, increase safety and mobility and decrease the environmental impact of road transportation through reduced fuel consumption."

INSTRUCTIONS FOR RESPONDENTS

This questionnaire is being mailed to one individual identified as the contact person in each organization included in the study. The contact person is requested to coordinate responses from all other groups involved in IVHS activity within his/her organization. As the questionnaire is designed to obtain information for one project only, please make photocopies of the questionnaire for completion by others in your organization and for additional projects .

It is also requested that the contact person collect all completed questionnaires in his/her organization and return them to the consultants in the pre-addressed envelope provided.

Where possible, the questionnaire has been designed to minimize effort on your part by allowing you to simply check (✓) appropriate categories or specify others.

The success of the study depends on your input and we appreciate your cooperation in this matter. Thank you.

PLEASE RESPOND BY: FRIDAY, APRIL 29, 1994

National Inventory of IVHS Programs and Activities in Canada

A. Title of Program/Project/Activity	Survey I.D.#

B. Responsible Organization

Name:_____

Street:_____

City:_____ Province: _____ Postal code: _____

Project Manager:_____ Tel:_____ Fax:_____

C. Other Participating Organizations including Federal, Provincial, Municipal, Industry-operating sector, Industry-manufacturing sector, Research Institutes, Universities, User Communities, Consultants/Contractors, and any other organizations
(please name organization and if possible provide the name and phone number of the contact person).

Organization	Contact	Phone	Fax

D. Description of the Program/Project/Activity *(attach additional pages if necessary)*

E. Project Objectives *(please check whichever apply)*

- ➢ road safety ____
- ➢ operational efficiency/productivity ____
- ➢ mobility improvement ____
- ➢ energy conservation/air quality ____
- ➢ enforcement of regulation ____
- ➢ elderly and disabled needs ____
- ➢ revenue generation ____
- ➢ industrial/regional development ____
- ➢ business/product opportunity ____

Other: _____

Other: _____

F. Project Type *(please check whichever apply)*

- ➢ education/training ____
- ➢ feasibility study ____
- ➢ market study ____
- ➢ research and development ____
- ➢ database development ____
- ➢ models development ____
- ➢ standards development ____
- ➢ system architecture/integration ____
- ➢ laboratory/field test prototype ____
- ➢ demonstration/field trial ____
- ➢ full-scale application ____

Other: _____

G. Functions/Features *(please check whichever apply)*

- ➢ Communications - vehicle ⇔ vehicle ____
- ➢ Communications - road side ⇔ vehicle ____
- ➢ Communications - dispatch ⇔ vehicle ____
- ➢ Communications - area-wide broadcast ____
- ➢ Personal Communication System (PCS) ____
- ➢ Personal Digital Assistant (PDA) ____
- ➢ Automatic Identification - vehicle ____
- ➢ Automatic Identification - driver ____
- ➢ Automatic Identification - cargo/parcels ____
- ➢ Automatic Vehicle - classification ____
- ➢ Automatic Vehicle - location ____
- ➢ Navigation - directional arrows ____
- ➢ Navigation - full in-vehicle map display ____
- ➢ Route Guidance - autonomous (in-veh.) ____
- ➢ Route Guidance - centrally driven ____
- ➢ Route Guidance - interactive w/ ATMS ____
- ➢ Map Database - road system only ____
- ➢ Map Database - road side attributes ____
- ➢ Map Database - yellow pages (general) ____
- ➢ Map Overlays (external) - weather, etc. ____
- ➢ Info Transfer - to changeable signs ____
- ➢ Info Transfer - to broadcast media ____
- ➢ Info Transfer - to home/offc computers ____
- ➢ Monitoring - traffic flow ____
- ➢ Monitoring - vehicle systems ____
- ➢ Monitoring - driver alertness ____
- ➢ Proximity Radar ____
- ➢ Intelligent Cruise (gap radar) ____
- ➢ Lane Assist/Control (lateral) ____
- ➢ Weigh-in-Motion ____
- ➢ Electronic Collection of user charges ____

Other: _____ ____

H. Enabling Technologies *(please check whichever apply)*

1. Mobile Communication

- ➢ Inductive Loops ____
- ➢ UHF (Low Power Radio Beacons) ____
- ➢ Microwave ____
- ➢ Infra-red ____
- ➢ AM/FM Broadcast (HAR/AHAR) ____
- ➢ Broadcast SCA on FM (ARI, RDS) ____
- ➢ Land Mobile Radio (VHF, UHF) ____
- ➢ Mobile Cellular ____
- ➢ Satellite ____
- ➢ Other _____
- ➢ Other _____

2. Vehicle Positioning

- ➢ Magnetic Compass ____
- ➢ Gyro ____
- ➢ Differential Odometer ____
- ➢ Map Matching ____
- ➢ Proximity Beacons ____
- ➢ Loran-C ____
- ➢ GPS ____
- ➢ Differential GPS ____
- ➢ Other _____
- ➢ Other _____
- ➢ Other _____

3. In-Vehicle Display

- ➢ Electro-Luminescent ____
- ➢ CRT ____
- ➢ LED ____
- ➢ LCD ____
- ➢ HUD ____
- ➢ Chime ____
- ➢ Voice (synthesized/digitized) ____
- ➢ Printer ____
- ➢ Keyboard ____
- ➢ Voice Recognition ____
- ➢ Other _____

4. On-Board Data Storage

- ➢ Smart Transponder ____
- ➢ Type III AVI Tag ____
- ➢ Smartcard ____
- ➢ RAM ____
- ➢ Magnetic Tape ____
- ➢ Magnetic Disk ____
- ➢ PCMCIA Card ____
- ➢ DAT (digital audio tape) ____
- ➢ CD-ROM ____
- ➢ EEPROM ____
- ➢ Other _____

I. Total Estimated Project Cost $

J. Current Status	
Planned ____ Active ____ Completed ____	Start Date: _____ Completion Date: _____
Has an evaluation of the project been done? Yes ❑ No ❑ or is one planned? ❑ Is the evaluation information available? Yes ❑ No ❑ or will be available? ❑	

K. IVHS User Services by Application Area *(Please place check mark in appropriate column/s adjacent to user service applicable to this project)*	Project Application (Proj. App.)	Other Application Areas		
		Rural and Small Town (RSTA)	Elderly and Disabled (E&D)	Ergonomics and Human Factors (E&HF)
I. Advanced Traveller Information Systems (ATIS)				
• Pre-Trip Travel Information (transit, driver, and ride-sharing)				
• En Route Driver Information (real time)				
– Driver Information				
– In-Vehicle Signing				
• En Route Transit Information (real time)				
• Traveler Services Information (yellow pages, weather, etc.)				
• Route Guidance (includes general service; does not include emergency vehicle-specific)				
• Ride Matching and Reservation (car/vanpool, etc.)				
II. Advanced Traffic Management Systems (ATMS)				
• Incident Detection and Management (excludes emergency vehicle management service)				
• Travel Demand Management (regulatory, mode change, parking control, emissions detection, etc.)				
• Traffic Network Monitoring and Control (includes transit priority and HOV priority)				
• Electronic Payment Services (parking, transit fares, toll collection, congestion and highway pricing, etc.)				
• Parking Management				
• Traffic Management				

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)	Proj. App.	RSTA	E&D	E&HF
• Commercial Vehicle Administrative Processes				
- Electronic Purchase of Credentials				
- Automated Mileage and Fuel Reporting and Auditing				
• On-Board Safety Monitoring and Tracking (includes driver, vehicle and cargo)				
• Commercial Fleet Management				
- Inter-modal Transportation Planning				
- Inter-modal Terminal Operation				
- Route Planning and Scheduling				
• Regulatory Compliance and Law Enforcement				
- Automated Roadside Inspection				
- Commercial Vehicle Preclearance				
* Roadside access to carrier				
* Vehicle and driver records				
* International border preclearance				
- Law Enforcement				
* Retrieval of lost or stolen vehicles				
IV. Advanced Public Transportation Systems (APTS)				
• Public Transportation Management				
- Operations of Vehicles and Facilities				
- Planning and Scheduling Services				
- Personnel Management				
• Personalized Public Transit (para-transit, route deviations, etc.)				
• Emergency Notification and Personal Security				
- Driver and Personal Security				
- Automated Collision Notification				
- Hazardous Materials Incident Notification				
• Public Travel Security				
• Emergency Vehicle Management				
- Fleet Management				
- Route Guidance				
- Signal Priority				

V. Advanced Vehicle Control Systems (AVCS)	Proj. App.	RSTA	E&D	E&HF
• Longitudinal Collision Avoidance				
- Rear-End Crash Warning and Control				
- Autonomous Intelligent Cruise Control				
- Cooperative Intelligent Cruise Control				
- Head-On Crash Warning and Control				
- Passing Warning (on two-lane roads)				
- Backing Crash Warning				
• Lateral Collision Avoidance				
- Lane Change/Blind Spot Crash Warning and Control				
- Lane Keeping Warning and Control				
• Intersection Collision Avoidance				
• Vision Enhancement for Crash Avoidance (inclement weather and at night)				
• Safety Readiness				
- Impaired Driver Warning and Control Override				
- Vehicle Condition Warning				
- In-Vehicle Infrastructure Condition Warning (infrastructure- based warning in En Route Travel Information service)				
• Pre-Crash Restraint Deployment				
• Automated Highway System				

L. Project Reports/Publications

Title	Author	Available? (Y/N)
1.		
2.		
3.		

M. Comments *(please include future program plans or attach a page with any new concepts)*

N. Request for Further Information IVHS ☐ IVHS Roundtable/Canada ☐

For additional information or clarification, please contact:
Jouko A. Parviainen 1125 Linbrook Road Oakville, Ontario L6J 2L3
Parviainen & Associates Tel: 905-849-5806/Fax: 905-844-9945

Transport Canada
Policy and Coordination
Research
and Development
Directorate

Transports Canada
Politiques et coordination
Direction générale
de recherche et
développement

Your file *Votre référence*

Our file *Notre référence*
ACD

Ottawa (Ontario)
Le 29 mars, 1994

Monsieur,
Madame,

Objet: Répertoire national des programmes et activités sur les SIVR au Canada

Afin de donner suite au rapport de Parviainen & Associates intitulé <Systèmes intelligents véhicules-routes (SIVR) - Un Synopsis>, le Comité de direction de la Table ronde sur les SIVR (Association des transports du Canada) a approuvé que soit dressé un répertoire national des programmes et activités sur les SIVR. L'étude est menée par Recherche et Développement (Transports Canada) et Alliances technologiques (Industrie Canada), en collaboration avec la Table ronde sur les SIVR (Canada).

Nous désirons que vous répondiez au questionnaire ci-joint au nom de votre organisme et des divers groupes qui s'occupent des SIVR. L'information recueillie sera répertoriée dans un rapport dans les deux langues officielles qui sera distribué à tous les intéressés. L'étude permettra à tous de partager leurs expériences et fera ressortir les possibilités de coopération dans ce domaine de haute technologie.

Si vous avez es questions quant aux objectifs de l'étude, n'hésitez pas à communiquer avec l'un ou l'autre des soussignés. Au nom des deux ministères participants et de la Table ronde sur les SIVR (Canada), nous vous remercions à l'avance de votre coopération.

Veuillez agréer, (Monsieur) (Madame), nos salutations distinguées.

Arjan Chandan
Conseiller principal
Recherche et Développement
Politiques et Coordination
Transports Canada
Place de Ville, Tour C
Secteur 26B
Ottawa (Ontario) K1A 0N5

Tel: 613-991-6035
Fax: 613-991-6045

Lorraine Raynes
Analyste en économie
Alliances technologiques
Direction générale des technologies
de l'information
Industrie Canada
235, rue Queen, Pièce 952A - Est
Ottawa (Ontario) K1A 0H5

Tel: 613-941-0611
Fax: 613-952-8419

Montréal, le 8 avril 1994

Monsieur Frank Vena
Chief - Transp Systems Div/Ind Programs Br
Environmental Protection Directorate
Environment Canada
351, St-Joseph Blvd, 13 th Floor
Hull (Québec)
K1A 0H3

OBJET: **Étude nationale des programmes SIVR et des activités connexes au Canada**

Monsieur,

En vertu d'un contrat avec Transports Canada, **ROCHE•DELUC** prépare, en collaboration avec Parvianen & Associates, un inventaire des programmes et projets SIVR (systèmes intelligents véhicule-route) existants au Canada.

A titre de personne ressource de **Environment Canada** et de ses différents services ou divisions effectuant des travaux sur les SIVR, nous sollicitons votre collaboration pour répondre au questionnaire ci-joint . Le questionnaire est conçu de manière à présenter les détails concernant un seul projet à la fois. Nous vous demandons donc de le recopier en nombre suffisant pour décrire tous les programmes et projets de **Environment Canada.** Une enveloppe pré-adressée et affranchie est également jointe pour nous retourner les questionnaires complétés. Si vous disposez de documents corporatifs décrivant vos produits ou services du domaine des SIVR, veuillez joindre deux copies de ceux-ci. Cette information sera conservée en référence par la Table ronde SIVR/Canada. Nous vous saurions gré de ne répondre au questionnaire que pour les travaux internes que **Environment Canada** exécute et de faire suivre une copie du questionnaire à vos clients si nous ne les avons pas déjà rejoints par la poste.

Si vous n'effectuez aucune activité reliée aux SIVR, nous vous demandons tout de même de remplir la section B du questionnaire, pour bien identifier votre organisation dans notre inventaire et nous confirmer l'identité de la personne pouvant être rejointe à ce sujet à l'avenir. Vous pouvez également compléter la section **N** si vous désirez recevoir ultérieurement de la documentation sur les SIVR ou la Table ronde SIVR/Canada.

.../2

N'hésitez pas à communiquer avec le soussigné pour toute information complémentaire concernant le questionnaire. Les informations recueillies seront compilées par Transports Canada dans un rapport disponible en français et en anglais. Des copies seront mises à votre disposition.

Nous vous remercions de votre collaboration et vous prions d'accepter, Monsieur, nos sincères salutations.

Raynald Ledoux, ing., M.Sc.A.
Directeur Général

RL/sl

p.j.

INVENTAIRE CANADIEN DES PROGRAMMES ET ACTIVITÉS SIVR

Objectif et envergure de l'étude

L'objectif principal de la présente étude est de préparer un inventaire de tous les programmes et projets canadiens, qu'ils soient actuellement en cours, récemment complétés ou planifiés par les gouvernements (fédéral, provincial et municipal) ainsi que par les fournisseurs et manufacturiers, les associations, instituts de recherche et universités associés au secteur du transport. Cette étude est pilotée par la Direction de la recherche et du développement de Transports Canada et la Direction des alliances technologiques de Industries Canada, en collaboration avec la Table Ronde SIVR/Canada. Les données compilées seront publiées dans un document français et anglais distribué aux personnes et organismes concernés afin de les sensibiliser à l'activité canadienne dans ce domaine et ainsi favoriser les échanges d'expertise et éviter le dédoublement des efforts. Cet inventaire sera mis à jour régulièrement et contribuera à identifier les axes prioritaires de recherche de même que les occasions d'association dans le développement d'applications technologiques avancées.

Définition de SIVR

«Systèmes intelligents véhicule-route» (SIVR) désigne les applications technologiques avancées de traitement de l'information, de communication, de captation et de contrôle qui améliore la performance des systèmes de transport des passagers et des marchandises. Les objectifs de ces systèmes sont de promouvoir un usage plus efficace des réseaux routiers existants, accroître la sécurité et la mobilité du transport routier tout en réduisant les impacts environnementaux associés à la consommation de carburant.

Instructions aux répondants

Le présent questionnaire est posté à la personne-ressource identifiée pour chaque organisme à contacter lors de l'inventaire. La personne-ressource est priée de coordonner les réponses de tous les autres groupes de son organisme impliqués dans des travaux sur les SIVR.

Puisque le questionnaire est conçu pour d'obtenir les informations pertinentes à un seul projet, la personne-ressource est priée de faire le nombre de copies nécessaires pour répertorier chaque projet SIVR de son organisme. La conception du questionnaire minimise l'effort du répondant en ayant recours à l'emploi de simple crochet (✓) vis-à-vis des catégories indiquées ou l'inscription d'une catégorie particulière.

La personne-ressource est également priée de coordonner le retour de tous les questionnaires complétés en utilisant l'enveloppe préadressée jointe.

Le succès de cet inventaire dépend des réponses obtenues et nous vous remercions de votre collaboration. Merci !

S.V.P. NOUS TRANSMETTRE VOS RÉPONSES AVANT VENDREDI, LE 29 AVRIL 1994

INVENTAIRE CANADIEN DES PROGRAMMES ET ACTIVITÉS SIVR

A. Titre du projet/programme/activité

B. Organisation responsable

Nom: _____

Adresse: _____

Ville: _____ Province: _____ Code postal: _____

Chargé de projet: _____ Tél.: _____ Fax: _____

C. Autres organisations participantes (S.V.P. indiquer le nom de l'organisation et si possible fournir le nom et le nunéro de téléphone de la personne contact

Organisation	Contact	Téléphone/Fax

D. Description du projet/programme/activité (inclure pages additionnelles si nécessaire)

E. Objectifs du projet

-Sécurité routière ____
-Productivité et efficacité des opérations ____
-Amélioration de la mobilité ____
-Conservation énergétique/qualité de l'air ____
-Mise en application de la réglementation ____
-Besoins des personnes agées et des handicapées ____
-Production de recettes ____
-Développement industriel et régional ____
-Occasions d'affaires ____
Autre: _____
Autre: _____

F. Type de projet

-Éducation/formation ____
-Étude de faisabilité ____
-Étude de marché ____
-Recherche et développement ____
-Développement base de données ____
-Modélisation ____
-Normalisation ____
-Architecture et intégration de système ____
-Laboratoire/Prototype de test ____
-Projet de démonstration ____
-Système opérationnel ____
Autre: _____

G. Fontionalités/caractéristiques (S.V.P. indiquer les catégories appropriées)

-Communications/véhicule-véhicule ____
-Communications/balise-véhicule ____
-Communications répartiteur-véhicule ____
-Communications/zone ____
-Système de communication personnel ____
-Assistance digitale (PDA) ____
-Identification automatique/véhicule ____
-Identification automatique/chauffeur ____
-Identification automatique/charge-colis ____
-Classification automatique des véhicules ____
-Localisation automatique des véhicules ____
-Navigation/flèches directionnelles ____
-Navigation/cartographie à bord ____
-Guidage routier à bord ____
-Guidage routier centralisé ____
-Guidage routier intéractif
-avec système de gestion de la circulation ____

-Base de données cartographiques:
Réseau routier seulement ____
Attributs des rives routières ____
Pages jaunes (général) ____
Couches graphiques (météo, etc.) ____
-Échange d'information/panneaux à messages variables ____
-Échange d'information/ordinateur personnel ____
-Suivi des débits de circulation ____
-Diagnostic mécanique du véhicule ____
-Suveillance de la vigilance du conducteur ____
-Contrôle de conduite automatisée ____
-Radar à proximité ____
-Guidage latéral du véhicule ____
-Système de pesée en mouvement ____
-Tarification électronique ____

-Autre: _____

H. Applications technologiques utilisées (S.V.P. Cocher les catégories appropriées)

1. Communication et détection

-Boucles à inductance ____
-Station radio de basse puissance (UHF) ____
-Micro-onde ____
-Infrarouge ____
-Diffusion AM/FM ____
-Diffusion SCA sur FM ____
-Radiomobile ____
-Cellulaire ____
-Satellite ____
-Autre:_____
-Autre:_____

2. Localisation du véhicule

-Compas magnétique ____
-Gyroscope ____
-Odomètre différentiel ____
-Repérage cartographique ____
-Balise à proximité ____
-Loran-C ____
-Système de positionnement géographique ____
-Système de positionnement différentiel ____
-Autre:_____
-Autre:_____
-Autre:_____

3. Affichage à bord du véhicule

-Électroluminescent ____
-Moniteur ____
-DEL ____
-DCL ____
-DHU ____
-Carillon sonore ____
-Voix digitale ____
-Imprimante ____
-Clavier ____
-Reconnaissance de la voix ____
-Autre:_____

4. Mémorisation à bord du véhicule

-Émetteur à proximité ____
-Étiquette AVI/ Type III ____
-Carte à puce ____
-Mémoire RAM ____
-Bande magnétique ____
-Disque magnétique ____
-Carte PCMCIA ____
-Bande digitale ____
-CD-ROM ____
-EEPROM ____
-Autre:_____

I. Coût estimé du projet $ _____

J. Statut courant	
Planification _____ Réalisation _____ Complété _____	Estimation actuelle de la date du début: _____ Estimation actuelle de la date d'achèvement: _____ J/M/A
Une évaluation du projet a-t-elle été faite? OUI __ NON __ PLANIFIÉE _____ Les résultats de l'évaluation sont-ils disponibles? OUI __ NON __ PRÉVUS _____	

K. SIVR - Service par type d'application		Autres applications		
(S.V.P. indiquer dans la colonne appropriée le service offert au projet au moyen d'un crochet)	Applicable (A)	Secteur route (SR)	Personnes agées et handicapés (PA&H)	Facteurs humains et ergonomique (F&HE)
1. Système avancé d'information routière (ATIS)				
• Information routière avant le départ (itinéraire, conducteur,co-voiturage)				
• Données en cours de route				
-information au conducteur				
-information routière à bord				
• Données sur l'itinéraire en cours de route				
• Services routiers (pages jaunes, etc.)				
• Guidage (inclut les services généraux, mais non les services de véhicules d'urgence)				
• Co-voiturage et réservations (autos/fourgonnettes, etc.)				
2. Système avancé de gestion de circulation (ATMS)				
• Détection et gestion des incidents (n'inclut pas le service de gestion des véhicules d'urgence)				
• Gestion de la demande de déplacement (régulation, changement de modes, stationnement, détection des gaz d'échappement, etc.)				
• Surveillance et contrôle du réseau de circulation (inclut les priorités d'itinéraires et de véhicules occupés par plusieurs personnes)				
• Gestion du stationnement				
• Gestion du trafic				

3. Utilisation des véhicules commerciaux (COV)	(A)	(SR)	(PA&H)	(F&HE)
• Processus administratif pour les véhicules commerciaux				
-Achat électronique d'autorisations de passage				
-Rapports automatisés de kilométrage et de consommation de carburant, et vérification				
• Surveillance de la sécurité à bord (conducteur, véhicule, marchandises)				
• Gestion des parcs roulants commerciaux				
-Planification du transport intermodal				
-Exploitation des terminus intermodaux				
-Planification et régulation routière				
• Contrôle d'application des lois et règlements				
-Inspection routière automatisée				
-Prédédouanement des véhicules commerciaux				
• Accès routier au transporteur				
• Dossiers sur le véhicule et le conducteur				
• Prédédouanement aux frontières internationales				
-Application des lois				
• Repérage des véhicules perdus ou volés				
4. Système avancé de transport routier collectif de personnes (APTS)				
• Gestion des transports publics				
-Utilisation des véhicules et des installations				
-Services de planification et de régulation				
-Gestion du personnel				
• Itinéraires personnalisés (personnes handicapés, déviation des itinéraires établis, etc.)				
• Avertissement de cas d'urgence et sécurité personnelle				
-Sécurité du conducteur				
-Avertissement automatisé de collisions				
-Avertissement d'incidents mettant en cause des marchandises dangereuses				
• Sécurité publique				
• Gestion des véhicules d'urgence				
-Gestion des parcs roulants				
-Guidage				
-Priorité de signalisation				

5. Système avancé d'aide à la conduite (AVCS)	(A)	(SR)	(PA&H)	(F&HE)
• Évitement des collisions longitudinales				
-Avertissement et contrôle des collisions arrière				
-Régulateur de vitesse intelligent autonome				
-Régulateur de vitesse intelligent coopératif				
-Avertissement et contrôle des collisions avant				
-Avertissement de dépassement (routes à deux voies)				
-Avertissement de collision de voitures en marche arrière				
• Évitement des collisions latérales				
-Avertissement et contrôle des changements de voie et des collisions attribuables au point mort				
-Avertissement et contrôle du maintien de voie				
• Évitement des collisions aux intersections				
• Amélioration de la visibilité pour éviter les collisions (par mauvais temps et le soir)				
• Impératifs de sécurité				
-Avertissement et contrôle du conducteur en état d'ébriété				
-Avertissement de l'état du véhicule				
-Avertissement de l'état de l'infrastructure intérieure du véhicule (avertissement basé sur l'infrastructure donné dans le service d'information en cours de route)				
• Déploiement de l'ensemble de retenue avant une collision				
• Réseau auto routier automatisé				

L. Publications

Titre	Auteur	Disponible (O/N)
1.		
2.		
3.		

M. Commentaires (S.V.P. Inclure projets et programmes futurs ou page additionnelle avec chacun des nouveaux concepts)

N. Demande d'informations supplémentaires SIVR OUI ____ NON ____

Pour plus d'information ou clarification, veuillez contacter:
Raynald Ledoux, ingénieur 5160, boul. Décarie, bureau 770, Montréal (Québec) H3X 2H9
ROCHE•DELUC LTÉE Tél.: 514-481-4459/Fax: 514-481-7293

APPENDIX B

RESEARCH RESULTS

A COMPRESSED PRINT-OUT OF INVENTORY SHEETS

FOR RESPONDENTS WITH

COMPLETED/ACTIVE/PLANNED IVHS PROGRAMS/PROJECTS/ACTIVITIES

A. Title of Program/Project/Activity

Project ID: 2
Project Title: **Generic Reversible Lane Control System**

B. Responsible Organization

Organization ID: B 3
Organization Name: Ministry of Transportation & Highways BC

Mr Peter Boudreau
4b-940 Blanshard St.
Victoria BC V8W 3E6
Tel: 604-387-7690
Fax: 604-356-7798

D. Description of the Program/Project/Activity

The Ministry's three existing reversible lane systems all use different proprietary types of hardware/software configurations to implement the counter operations resulting in a wide assortment of spare equipment, the requirement for maintenance personnel to be experts on three different types of operating systems and the inability by the Ministry to support or enhance the systems without being tied to the original supplier. To eliminate these drawbacks, the Ministry is currently developing a generic reversible lane system using off the shelf hardware and in-house software development. The first generation system will be implement at the Lion's Gate Bridge.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Business/Product Opportunity

F. Project Type

- Laboratory/Field test prototype
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Monitoring - Traffic Flow

J. Current Status

- Project Active
- Completion Date: Sept-94

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (excludes emergency vehicle management service)
- Traffic Management

A. Title of Program/Project/Activity

Project ID: 7
Project Title: **Adaptive Timing Plan Calculation Program**

B. Responsible Organization

Organization ID: B 3
Organization Name: BC Ministry of Transportation & Highways

Mr Ed Miska
4B-940 Blanshard Street
Victoria BC V8W 3E6
Tel: 604-387-5061
Fax: 604-356-7798

D. Description of the Program/Project/Activity

This software development project is an in-house developed expert system for the optimization of signal timing for progression. The program automates the progression signal timing process for multiple time of day periods. The software iteratively calls the commercial programs, the Arterial Analysis Program (AAP), Passer II and Transyt-7f, correlates and ranks the results and then recommends the optimal traffic signal timings for a coordinated corridor. The custom developed software also includes modules for traffic volume data formatting and graphing, fuzzy modelling for traffic pattern recognition, expert systems for traffic signal phasing and timing design for isolated intersections as well as modules which automatically and iteratively run the commercial programs correlate results and make recommendations. On a typical corridor the program can reduce the person-hours required to prepare coordination timings from several weeks to several hours. The next stage of the project will include interfacing the program with on-street master and local controllers to permit implementation of on-line optimal control mechanisms and automatic updating of timing plans based on historical and current volume information.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement

F. Project Type

- Research and Development
- Full-Scale Application

G. Functions/Features

- InfoTransfer - Home/Offc Computers

J. Current Status

- Project Active
- Start Date: Jan-93
- Completion Date: Dec-94

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Traffic Management

A. Title of Program/Project/Activity

Project ID: 8
Project Title: **Electronic Vehicle Measurement System**

B. Responsible Organization

Organization ID: B 3
Organization Name: Ministry of Transportation & Highways

Mr Wei-Wu Zhou
4B-940 Blanshard Street
Victoria BC V8W 3E6
Tel: 604-387-5061
Fax: 604-356-7798

C. Other Participating Organizations

- University of Victoria/Faculty of Engineering
  Dr. W. Lu / Dr. Z. Dong
  Tel: 604-721-8692 / 604-721-8693
  Fax: 604-721-6052 / 604-721-8676

D. Description of the Program/Project/Activity

As part of the transportation system in B.C., the Ferries Corporation has a requirement to measure the weight and size of commercial and recreational vehicles loading on their ships. A project was initiated with the University of Victoria to find suitable sensors to measure the size (width/height/length) of vehicles up to speeds of 90 km/h and to develop these sensors into an electronic vehicle measuring systems. The work is currently underway and a prototype system is expected in early 1994.

E. Project Objectives

- Operational Efficiency/Productivity
- Enforcement of Regulation

F. Project Type

- Research and Development
- Laboratory/Field Test Prototype

G. Functions/Features

- Automatic Vehicle - Classification
- InfoTransfer - Home/Offc Computers
- Monitoring - Traffic Flow

J. Current Status

- Project Active
- Start Date: Jan-93
- Completion Date: Dec-94
- Evaluation Planned

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)

A. Title of Program/Project/Activity

Project ID: 9
Project Title: **Intelligent Dynamic Contraflow Lane Control System**

B. Responsible Organization

Organization ID: B 3
Organization Name: BC Ministry of Transportation & Highways

Mr Ed Miska
4B-940 Blanshard Street
Victoria BC V8W 3E6
Tel: 604-387-5061
Fax: 604-356-7798

D. Description of the Program/Project/Activity

The Ministry operated three reversible lane systems in British Columbia. Each system is operated on a time of day basis or on operator input resulting in less than efficient operation during part of the day. This program seeks to optimize the counterflow implementation times based on the real-time demand and queue lengths on the approaches to the structures. The system incorporated a Real-Time Traffic Demand Detection and Pattern Estimator, Fuzzy Logic Pattern Recognizor and On-line Optimal Controller for counterflow lane operations. The work is being developed in-house and a prototype is expected later this year.

E. Project Objectives

- Operational Efficiency/Productivity

F. Project Type

- Research and Development
- Laboratory/Field Test Prototype

G. Functions/Features

- Monitoring - Traffic Flow

J. Current Status

- Project Active
- Start Date: Mar-92
- Completion Date: 31-Dec-94
- Evaluation Planned

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Traffic Management

L. Project Reports/Publications

- Title: An Intelligent Traffic Responsive Contraflow Lane Control System, published in VNIS 93
  Author: W.W.Zhou, P. Livolsi, E. Miska, H. Zhang, J. Wu,
  Publication Available

A. Title of Program/Project/Activity

Project ID: 10
Project Title: **Remote Weather Stations**

B. Responsible Organization

Organization ID: B 3
Organization Name: Ministry of Transportation & Highways

Mr Patrick C. Livolsi
4B-940 Blanshard Street
Victoria BC V8W 3E6
Tel: 604-387-7692
Fax: 604-356-7798

D. Description of the Program/Project/Activity

A project is underway to implement a remote weather station system which will provide real-time weather information from several stations located along the 120 km Coquihalla Highway and Okanagan Connector Freeway corridors. These roadways experience some of the most severe winter conditions in B.C.. The purpose of the system is to enable more efficient use of our Changeable Message signs for advising motorists of current weather conditions and to allow the maintenance contractor access to more timely and accurate information which can be used to maintain only the area of the road requiring treatment resulting in savings in material, labour and environmental costs. It is expected that a prototype system consisting of about 5 stations will be implemented in the summer of 1994 for operational tests in that winter.

E. Project Objectives

- Road Safety

F. Project Type

- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Weather identification

J. Current Status

- Project Active
- Completion Date: Nov-94

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information

II. Advanced Traffic Management Systems (ATMS)
- Traffic Management

A. Title of Program/Project/Activity

Project ID: 11
Project Title: **Canadian Heavy Vehicle Electronic Licence Plate (C-Help) Project**

B. Responsible Organization

Organization ID: B 3
Organization Name: Ministry of Transportation & Highways

Samuel Lam & Wei-Wu Zhou
2631 Douglas Street
Victoria BC V8T 5A3
Tel: 604-387-4527
Fax: 604-356-8986

C. Other Participating Organizations

- Transport Canada, T.D.C. Montreal
  Lewis Sabounghi
  Tel: 514-283-0029
  Fax: 514-283-7158

D. Description of the Program/Project/Activity

Please, refer to Mr. Sabounghi at Transport Canada 514-283-0029

E. Project Objectives

- Operational Efficiency/Productivity
- Energy Conservation/Air Quality

F. Project Type

- Feasibility Study
- Demonstration/Field Trial

G. Functions/Features

- Automatic Identification - Vehicle
- Automatic Vehicle - Classification
- Weigh-In-Motion

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)

3. In-Vehicle Display
   - LED

4. On-Board Data Storage
   - Smart Transponder
   - TypeIII AVI Tag

J. Current Status

- Project Completed
- Completion Date: 31-Mar-94
- Evaluation Planned

A. Title of Program/Project/Activity

Project ID: 5
Project Title:

B. Responsible Organization

Organization ID: B 7
Organization Name: Greater Vancouver Regional District

Mr Paul C. Lee, P. Eng.
4330 Kingsway
Burnaby BC V5H 4G8
Tel: 604-432-6377
Fax: 604-436-6970

J. Current Status

- Project Active

M. Comments

Our organization is heavily into TDM. We're also participating in the BC Provincial Ministry of Transportation & Highways' Traffic Management Plan (TMP) Study: in the South Coast Region office: a forerunner to IVHS in the tower Mainland.

A. Title of Program/Project/Activity

Project ID: 6
Project Title: **Sigma - 8th Traffic Controller**

B. Responsible Organization

Organization ID: B 10
Organization Name: James Thomson & Ass. Inc.

Mr James Thomson
7-2062 Henry Ave
Sidney BC V8L 3S1
Tel: 604-655-4349
Fax: 604-655-4383

C. Other Participating Organizations

- Ministry of Transportation & Highways
  Dr. Wei-Wu Zhou
  Tel: 604-387-5061
  Fax: 604-356-7798

- Province of British Columbia

D. Description of the Program/Project/Activity

Prototyping, development and manufacturing of advanced architecture traffic controller enclosure and equipment base. Design allows infinite expendability to incorporate IVHS systems when implemented without replacing basic field installations.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement

F. Project Type

- Standards Development
- System Architect/Integration
- Full-Scale Application

J. Current Status

- Project Completed
- Evaluation Done
- Evaluation Information Available Later

A. Title of Program/Project/Activity

Project ID: 142
Project Title:

B. Responsible Organization

Organization ID: B 16
Organization Name: Institute of Ocean Studies

Mr E.W. Hinds
9860 West SaanichRd / Box 6000
Sydney BC V8L 4B2
Tel: 604-363-6313
Fax: 604-363-6323

D. Description of the Project/Program/Activity

Portable low power DGPS reference stations using high speed 2 watts UHF Data Modems, for hydrographic surveys (marines). These stations are to provide coverage in areas where we do not have DGPS coverage from marine beacon broadcasts.

G. Functions/Features

- Navigation - Full In-Vehicle Map Display
- Route Guidance - Autonomous (in-veh.)

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)
2. Vehicle Positioning
   - Differential GPS
3. In-Vehicle Display
   - Electro-Luminescent
   - CRT
   - LCD
4. On-Board Data Storage
   - PCMCIA Card

J. Current Status

- Project Active
- Start Date: On going

M. Comments

DGPS work in Canadian hydrographic service is to provide real time > 2 m positioning accuracy in hydrographic sounding planforms (5-10 m boats).

A. Title of Program/Project/Activity

Project ID: 13
Project Title: **Smart Signal System and Smart Hill**

B. Responsible Organization

Organization ID: B 17
Organization Name: UBC/Civil Engineering Dept

Mr Frank Navin
2324 Main Mall
Vancouver BC N6T 1Z4
Tel: 604-822-3158
Fax: 604-822-6901

D. Description of the Program/Project/Activity

1. We are about to join with Dr. Wei-Vu Zhou of BC Moth to look at traffic control for the lower mainland of BC. The outcome of this aboved be a «Almost Signal System» for a large area.

2. We are involved with BC MOTH Highway Safety Branch on a truck run-away-lane study. Hopefully that will eventually be a «smart» hill that will tell the drivers how to handel the hill prior to getting to it.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity

F. Project Type

- Education/Training

J. Current Status

- Project Active

M. Comments

The Road Safety Group is looking for ways to get the Civil Engineering aspects of safety into IVHS for rural-mountain highways.

A. Title of Program/Project/Activity

Project ID: 14
Project Title: **Dynamic Traffic Control**

B. Responsible Organization

Organization ID: B 18
Organization Name: Intelligent Traffic Control Group

Zuomin Dong
Department of Mechanical Engineering
University of Victoria
Victoria BC V8W 3P6
Tel: 604-721-8693
Fax: 604-7221-6051

C. Other Participating Organizations

- BC Min of Transportation & Highways, Eng. Highways
  Dr. Wei-Wu Zhon
  Tel: 604-387-7685
  Fax: 604-356-7798

D. Description of the Program/Project/Activity

Traffic pattern recognition and dynamic control for signal controllers using fuzzy modeling techniques and self-learning, fuzzy-neural intelligent systems.

E. Project Objectives

- Operational Efficiency/Productivity

F. Project Type

- Education/Training
- Feasibility Study
- Research and Development
- Models Development

G. Functions/Features

- Automatic Identification - Vehicle
- Automatic Vehicle - Classification
- Monitoring - traffic Flow
- Lane Assist/Control (lateral)
- Dynamic Control of Traffic Flow

J. Current Status

- Project Active

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Electronic Payment Services (parking, transit fares, toll collection, congestion and highway pricing, etc.)

A. Title of Program/Project/Activity

Project ID: 18
Project Title: **Automated Electronic Data Transfer System for Truck Hauls**

B. Responsible Organization

Organization ID: A 25
Organization Name: Alberta Transportation & Utilities

Allan Lo and John Lowe
4999-98 Avenue, 1st Floor (Twin Atria Bldg)
Edmonton AB T6B 2X3
Tel: 403-422-2750
Fax: 403-427-0783

C. Other Participating Organizations

- Alberta Transportation & Utilities - Contracts Eng
  Ron Voogel
  Tel: 403-427-2083

- Precision Scale Co.
  Gerry Streater
  Tel: 403-463-0026

D. Description of the Program/Project/Activity

To develop an automated system that can electronically identify a gravel truck and its load remotely, and thus, replaces the current manual ticket system. The AVI (Automatic Vehicle Identification) system is to be installed for truck hauls during a construction job. Each truck will be outfitted with a transponder or «electronic tag» that can store unique information pertaining to that truck in the tag's memory. At the weigh scale, the truck is weighed and the tare weight is to be recorded and transmitted from the scale electronics to an AVI interrogator, which in turn, will update the truck's tag with the loading information. When the truck reaches its destination, the checker will read off the truck's particulars and its loads remotely by using a portable reader from a distance. He will also be able to input the kilometre distance of the haul into the reader's datalog.

The new system is perceived to be much superior to the ticket handling method in safety - no more unnecessary pedestrian/vehicular traffic in a busy construction zone and in efficiency - faster turnaround in collecting and storing the haul data and performing analyses. It will also save department money in not having to station an operator at the weigh scale house.

At the end of the project, specifications for a «generic» design will be produced for other system manufacturers.

E. Project Objectives

- Operational Efficiency/Productivity
- Worker safety

F. Project Type

- Laboratory/Field Test Prototype
- Demonstration/Field Trial

G. Functions/Features

- Automatic Identification - Vehicle
- Automatic Identification - Cargo/Parcels

H. Enabling Technologies

4. On-Board Data Storage
   - TypeIII AVI Tag
   - RAM

I. Total Estimate Project Cost

Project Cost: $ 25 000

J. Current Status

- Project Active
- Start Date: Mar-93
- Evaluation Done
- Evaluation Information Available

K. IVHS User Services by Application Area

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- On-Board Safety Monitoring and Tracking (includes driver, vehicle and cargo) (General, Rural/Small Town)

L. Project Reports/Publications

- Title: Automated Electronic Data Transfer System for Truck Hauls
  Author: Allan Lo
  Publication Available

M. Comments

Further testing with the system on gravel crushing stockpiling job and more paving job test.

A. Title of Program/Project/Activity

Project ID: 19
Project Title: **Integrated GPS/Videolog Van**

B. Responsible Organization

Organization ID: A 25
Organization Name: Alberta Transportation & Utilities

Mr Allan Lo
4999 - 98 Avenue, 1st Floor
Edmonton AB T6B 2X3
Tel: 403-422-2750
Fax: 403-427-0783

D. Description of the Program/Project/Activity

When Alberta Transportation & Utilities (AT&U) original videolog system was slated for a total upgrade, Global Positioning System (GPS), a powerful location reference system, was perceived to be an emerging technology that could play an integral part in the new videolog system. A department-wide strategy paper identified the different areas of the department that could benefit from using GPS, out of which the GPS Videolog system (GVLS) was considered a high priority project. In 1992, work began to make this integrated GPS videolog vehicle a reality. At this writing, the van has now been built and is slated for testing and fine-tuning of its system components.

The overall objective was to design and build a completely new multi-purpose videolog vehicle that could take a video inventory of the highway images for transportation engineering purposes, and that additionally, included new technologies such as GPS to support other applications. By tracking the position coordinated of the van through GPS, the travelled highway could be digitized with high accuracy into a Geographical Information system (GIS) database. For most mapping needs, traffic engineering usage, and executive information system requirements, a target accuracy level of +5 m (metre) for the absolute coordinated would suffice. an optional inventory acquisition module could be added later to provide maintenance and operations staff with an automated asset management tool. Also in the future, an inertial system could be integrated into the GVLS
at which point, the software and hardware would have to be upgraded. The new combination would permit the capture of roadway geometric data such as grades, crossslopes, and alignment, all tied into one computerized map system. Detailed design analyses of the roadway could then be made using just the videologs and the map database, minus the expensive on-site surveys. Depending on the calibre of the inertial system, the GPS/Inertial system could achieve up to sub-metre accuracy. Ultimately, the largest benefit to the department would be the ability to plot ½as-is╗ engineering drawings from the GVLS data directly.

E. Project Objectives

- Operational Efficiency/Productivity

F. Project Type

- Laboratory/Field Test Prototype
- Full-Scale Application

G. Functions/Features

- Map DataBase - Road System Only

H. Enabling Technologies

2. Vehicle Positioning
   - Differential GPS
   - Wheel sensors / post-processed

3. In-Vehicle Display
   - CRT
   - Bernoulli hard drive

I. Total Estimate Project Cost

Project Cost: $ 200 000

J. Current Status

- Project Active
- Start Date: Avr-92
- Evaluation Planned
- Evaluation Information Available Later

A. Title of Program/Project/Activity

Project ID: 20
Project Title: **Motorist Advisory Variable Message Sign**

B. Responsible Organization

Organization ID: A 26
Organization Name: City of Calgary/Engineering Department

Peter Enslen, P. Eng./R.J. Homes
P.O. Box 2100, Station M
Calgary AB T2P 2M5
Tel: 268-4079
Fax: 268-1058

D. Description of the Program/Project/Activity

Variable message signs on the Deerfoot Trail freeway located in the vicinity of the Calf Robe Bridge.

These signs provide motorists with traffic and road condition information on an as required basis.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Energy Conservation/Air Quality
- Enforcement of Regulation

F. Project Type

- Full-Scale Application

I. Total Estimate Project Cost

Project Cost: $ 300 000

J. Current Status

- Project Completed
- Completion Date: 12-Avr-86

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)
  - Driver Information

II. Advanced Traffic Management Systems (ATMS)
- Traffic Management

M. Comments

The control system presently in place is capable of operating 25 signs. Information from an electronic ice detection system is used to select various messages.

A. Title of Program/Project/Activity

Project ID: 21
Project Title: **Traffic Signals Computer Control System**

B. Responsible Organization

Organization ID: A 26
Organization Name: City of Calgary, Transportation Department

Mr J. David Keenan, P. Eng.
P.O. Box 2100, Station M
Calgary AB T2P 2M5
Tel: 268-1543
Fax: 268-1633

D. Description of the Program/Project/Activity

The City of Calgary installed its first computerized traffic signal control system in 1980. Since that time, we have expanded the original system to include two traffic computers controlling 310 out of a total of 592 signals in the city. The present system selects signal timings on the basis of historical traffic volume information for specific times of the day. In addition, there are two signalized corridors where signal timings are selected from a number of pre-determined signal plans based on actual traffic volumes at the time.

Since the installation of the first traffic computer in 1980, there have been many advances in the traffic control and management industry. By today's standards, the central system is considered out-of-date. Recognizing this fact, the City of Calgary has embarked on a program to replace the old system with one that is state-of-the-art. This new system will not only take advantage of the previous 15 years of technological advancements, but also form a key building block to grow and expand into the realm of IVHS.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality

F. Project Type

- Feasibility Study
- Full-Scale Application

I. Total Estimate Project Cost

Project Cost: $ 2 100 000

J. Current Status

- Project Planned
- Start Date: Jun-94
- Completion Date: Mar-97
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Traffic Management

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Signal Priority

A. Title of Program/Project/Activity

Project ID: 26
Project Title: **High Precision GPS Receiver**

B. Responsible Organization

Organization ID: A 35
Organization Name: Novatel Communications Ltd

Tony Murfin & Brad Timinski
6732, 8th Street NE
Calgary AB T2E 8M4
Tel: 403-295-4241
Fax: 403-295-4901

D. Description of the Program/Project/Activity

Novatel GPS Business Group is actively seeking IVHS/Tracking Applications. We currently have no applications, but are developing exclusive features watch Enhanee Vehicle Tracking Capabilities:

- Narrow Correlation: Improved Accuracy & Multipath Immunity
- Multipath Ellimination Technology: reduces multipath even more significantly
- L1/L2 for even further accuracy improvements by removal of atmospheric errors.

E. Project Objectives

- Mobility Improvement
- Enforcement of Regulation
- Revenue Generation
- Industrial/Regional Development
- Business/Product Opportunity

F. Project Type

- Research and Development
- Models Development
- Standards Development
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Automatic Identification - Vehicle
- Automatic Identification - Cargo/Parcels
- Automatic Vehicle - Classification
- Automatic Vehicle - Location
- Navigation - Full In-Vehicle Map Display
- Route Guidance - Autonomous (in-veh.)
- Route Guidance - Centrally Driven
- Monitoring Driver Alertness

H. Enabling Technologies

1. Mobile Communication
   - Microwave
   - Satellite

2. Vehicle Positioning
   - GPS
   - Differential GPS

4. On-Board Data Storage
   - EEPROM

J. Current Status

- Project Active
- Start Date: 1992 Launch
- Completion Date: In Process

L. Project Reports/Publications

- Title: We have many published papers
  Author: Novatel

M. Comments

Novatel is seeking appropriate IVHS programs, partners.

A. Title of Program/Project/Activity

Project ID: 27
Project Title: **Development of Autonomous Mining Vehicles**

B. Responsible Organization

Organization ID: A 38
Organization Name: Syncrude Canada

Mr Julian Coward
10120, 17th Street
Edmonton AB T6P 1V8
Tel: 403-790-7820
Fax: 403-790-7818

C. Other Participating Organizations

- Alberta Research Council
  K. Chrystal
  Tel: 403-297-2600
  Fax: 403-297-2339

- National Research Council
  S. Elgazzar
  Tel: 613-993-6628
  Fax: 613-952-0215

- Defence Research Establishment, suffield
  C. Lafevee
  Tel: 403-544-4733

D. Description of the Program/Project/Activity

Description available (contact the project manager)

E. Project Objectives

- Operational Efficiency/Productivity
- Industrial/Regional Development

F. Project Type

- Research and Development
- System Architect/Integration
- Demonstration/Field Trial

G. Functions/Features

- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Vehicle - Location
- Route Guidance - Autonomous (in-veh.)
- Map DataBase - Road Side Attributes
- InfoTransfer - Home/Offc Computers
- Proximity Radar

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)

2. Vehicle Positioning
   - Map Matching
   - Differential GPS

4. On-Board Data Storage
   - RAM

J. Current Status

- Project Active
- Start Date: Jan-94
- Completion Date: 95
- Evaluation Done

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- On-Board Safety Monitoring and Tracking (includes driver, vehicle and cargo)

V. Advanced Vehicle Control Systems (AVCS)
- Longitudinal Collision Avoidance
- Vision Enhancement for Crash Avoidance (inclement weather and at night)

A. Title of Program/Project/Activity

Project ID: 29
Project Title: **Global Positioning System (GPS) Pilot Project**

B. Responsible Organization

Organization ID: S 42
Organization Name: Planning & Coordination Branch/Sask. Highways & Tr

Horst Arndt & Greg Gilks
1855, Victoria Avenue
Regina SK S4P 3V5
Tel: 306-787-4785
Fax: 306-787-4836

D. Description of the Program/Project/Activity

The study will review the current state of GPS in Saskatchewan, with a focus on trucking applications. It will review possible uses for the department, such as monitoring maintenance vehicles to provide efficient response to various locations where needs might arise on the highway system.

If the department applications are promising, a pilot project will be initiated.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity

F. Project Type

- Feasibility Study

G. Functions/Features

- Communication - Dispatch/Vehicle
- Automatic Vehicle - Location
- Map DataBase - Road System Only

H. Enabling Technologies

2. Vehicle Positioning
   - GPS

J. Current Status

- Project Planned

A. Title of Program/Project/Activity

Project ID: 30
Project Title: **Saskatchewan Transportation Modal Data Base**

B. Responsible Organization

Organization ID: S 43
Organization Name: Central Survey & Mapping Agency, Sask. Property Mg

John b. Turnbull & Mike Mepham
2045 Broad Street - North, 2nd Floor
Regina SK S4P 3V7
Tel: 306-787-4900
Fax: 306-787-4617

C. Other Participating Organizations

- Dept of Highways
  Roy Chunsinuff

D. Description of the Program/Project/Activity

This project will see the design and creation of a multi-user data base containing all the transportation facilities in the province. The current focus is on the highways and rural roads but the project will be expanded to include urban roads, rail ways, and air transport facilities as well.

The data base will include lines from the transportation system to the property mapping, including addresses.

The data base will support a wine range if activities including:
- Route Selection
- Demographic Studies
- AVL Applications

E. Project Objectives

- Operational Efficiency/Productivity

F. Project Type

- Database Development
- Models Development
- Standards Development

G. Functions/Features

- Automatic Vehicle - Location
- Navigation - Directional Arrows
- Route Guidance - Autonomous (in-veh.)
- Route Guidance - Centrally Driven
- Map DataBase - Yellow Pages General

I. Total Estimate Project Cost

Project Cost: $ 200 000

J. Current Status

- Project Active
- Start Date: Nov-93
- Completion Date: Dec-94

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- Route Guidance (includes general service; no emergency vehicle-specific)

II. Advanced Traffic Management Systems (ATMS)
- Traffic Management

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Fleet Management
  - Inter-modal Transportation Planning
  - Route Planning and Scheduling

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Route Guidance

A. Title of Program/Project/Activity

Project ID: 32
Project Title: **Design and Development of an Integrated, Automated, Heavy Vehicle Electronic License Plate Identification System**

B. Responsible Organization

Organization ID: S 46
Organization Name: International Road Dynamics Inc.

Brian Taylor & Bob Woytowich & Terry Bergan
702, 43rd Street East
Saskatoon SK S7K 3T9
Tel: 653-6600
Fax: 242-5599

C. Other Participating Organizations

- Transportation Development Centre, T.C.
  Mr. Lewis Sabounghi
  Tel: 514-283-0029
  Fax: 514-283-7158

D. Description of the Program/Project/Activity

The project has been dubbed the Canadian Heavy Vehicle Electronic Licence Plate of C-Help Project due to the ability of the system to interface with the U.S. HELP Project. In general, the project consisted of the integration of Weigh In Motion, Automatic Vehicle Classification, and Automatic Vehicle Identification technology into a system that could automatically identify and weigh particular heavy commercial vehicles at weight enforcement stations, and automatically signal and pre-clear these vehicles based on a computerized credential and weight check system. Three weigh station facilities in British Columbia were equipped with the necessary hardware, and the required database and software were developed to accommodate the automation.

The system was also designed to provide participating vehicles with vehicle movement information. The respective carriers participating in the program can call up the system for information on truck movements. In this way, the respective carriers can use the information for real time fleet monitoring including scheduling and load tracking.

The primary objective of the system was to significantly reduce delays to participating heavy trucks at weight and credential checking facilities. This reduces lost time, and can significantly reduce vehicle emissions, as well as lineups and safety problems at the facilities.

E. Project Objectives

- Operational Efficiency/Productivity
- Energy Conservation/Air Quality
- Business/Product Opportunity

F. Project Type

- Research and Development
- Database Development
- Demonstration/Field Trial

G. Functions/Features

- Communication - RoadSide/Vehicle
- Automatic Identification - Vehicle
- Automatic Vehicle - Classification
- Navigation - Directional Arrows
- Monitoring - Traffic Flow
- Weigh-In-Motion

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops
   - Microwave
3. In-Vehicle Display
   - LED
   - Chime
4. On-Board Data Storage
   - TypeIII AVI Tag

J. Current Status

- Project Completed
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Vehicle Administrative Processes
  - Automated Mileage and Fuel Reporting and Auditing
- Commercial Fleet Management
  - Route Planning and Scheduling
- Regulatory Compliance and Law Enforcement
  - Commercial Vehicle Preclearance
    * Roadside access to carrier
    * Vehicle and driver records
  - Law Enforcement
    * Retrieval of lost or stolen vehicles

L. Project Reports/Publications

- Title: Design and development of an integrated automated heavy vehicle license plate identification system - Transport Canada TP11812E
  Author: Bergan, Taylor & Woytowich
  Publication Available

A. Title of Program/Project/Activity

Project ID: 33
Project Title: **Saskatchewan abilities council real-time dispatch system**

B. Responsible Organization

Organization ID: S 46
Organization Name: International Road Dynamics Inc.

Ian Moore & Terry Bergan
702, 43rd Street East
Saskatoon SK S7K 3T9
Tel: 653-6600
Fax: 242-5599

C. Other Participating Organizations

- IRAP
  Robert Levesque
  Tel: 306-933-5416
  Fax: 306-933-7896

D. Description of the Program/Project/Activity

Develop a real-time dispatch system utilizing GPS, two-way data communication to vehicles, and specialized central dispatch software. Intent is to make scheduling more efficient thus increasing level of service and subsequent increase in cost-effectiveness of the operation. This system will be aimed at small to medium (over 100 vehicle) operations.

E. Project Objectives

- Operational Efficiency/Productivity
- Elderly and Disabled Needs
- Business/Product Opportunity

F. Project Type

- Research and Development
- System Architect/Integration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communication - Dispatch/Vehicle
- Communication - Area-wide Broadcast
- Automatic Identification - Vehicle
- Automatic Vehicle - Location
- Route Guidance - Centrally Driven
- Map DataBase - Road System Only

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
2. Vehicle Positioning
   - GPS
   - Differential GPS
3. In-Vehicle Display
   - LCD
   - Keyboard
4. On-Board Data Storage
   - EEPROM

I. Total Estimate Project Cost

Project Cost: $ 250 000

J. Current Status

- Project Active
- Start Date: May-94
- Completion Date: Dec-94
- Evaluation Done

K. IVHS User Services by Application Area

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Planning and Scheduling Services
    (General, Rural/Small Town, Elderly/Disabled)
- Personalized Public Transit (para-transit, route deviations, etc.)
  (General, Rural/Small Town, Elderly/Disabled)

A. Title of Program/Project/Activity

Project ID: 35
Project Title: **Weigh in Motion (WIM) & Automatic Vehicle Classification (AVC)**

B. Responsible Organization

Organization ID: M 51
Organization Name: Manitoba Department of Highways & Transportation

O. Rogers, P. Eng. & John R. Hosang
215 Garry Street, 14th Floor
Winnipeg MB R3C 3Z1
Tel: 204-945-3781
Fax: 204-945-5539

D. Description of the Program/Project/Activity

Six WIM/AVC sites have been established under the auspices of the Strategic Highway Research Program (SHRP) at the following locations:

TransCanada Highway (West) at Oak Lake
TransCanada Highway (West) at MacGregor
TransCanada Highway (East) at Richer
Provincial Trunk Highway (PTH) No. 2 at Nesbitt
Provincial Trunk Highway (PTH) No.75 at Glenlea
Provincial Trunk Highway (PTH) No. 100 at Winnipeg

The AVC equipment consists of Golden River M-600 classifiers with WIM upgrades.

E. Project Objectives

- Traffic Monitoring

F. Project Type

- Database Development

G. Functions/Features

- Automatic Vehicle - Classification

I. Total Estimate Project Cost

Project Cost: $ 75 000

J. Current Status

- Project Active
- Evaluation Done
- Evaluation Information Available

A. Title of Program/Project/Activity

Project ID: 37
Project Title: **Portable Public Transit Data Display**

B. Responsible Organization

Organization ID: M 55
Organization Name: Transcom International

Mr Edward Burgener
55 Gibraltar Bay
Winnipeg MB R2Y 1J4
Tel: 204-889-6754
Fax: 204-453-7385

C. Other Participating Organizations

- Province of Manitoba Dept of Industry, Trade & Tourism
  R.D. Lyncy
  Tel: 204-945-8065
  Fax: 204-945-7592

D. Description of the Program/Project/Activity

Portable real-time data display unit (pocket sized) which will communicate to users of public transportation.

E. Project Objectives

- Operational Efficiency/Productivity
- Energy Conservation/Air Quality
- Elderly and Disabled Needs
- Business/Product Opportunity

F. Project Type

- Feasibility Study
- Research and Development
- Models Development

G. Functions/Features

- Communication - Area-wide Broadcast
- Personal Communication System (PCS)
- Automatic Vehicle - Location

H. Enabling Technologies

1. Mobile Communication
   - AM/FM Broadcast (HAR/AHAR)

4. On-Board Data Storage
   - Smart Transponder

J. Current Status

- Project Active
- Start Date: 1993
- Completion Date: TBA
- Evaluation Done

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Transit Information (real time)
  (General, Elderly/Disabled, Ergonomics/Human Factors)

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
  - Personnel Management
- Personalized Public Transit (para-transit, route deviations, etc.)

A. Title of Program/Project/Activity

Project ID: 38
Project Title: **Transit Transporter Development/Real Time Transit Data Broadcast**

B. Responsible Organization

Organization ID: M 55
Organization Name: Transcom International Ltd

Mr Edward Burgener
55 Gibraltar Bay
Winnipeg MB R2Y 1J4
Tel: 204983-5773/204-889-6754
Fax: 204-453-7385

C. Other Participating Organizations

- Provincial: Industry,Trade,Tourism
  Mr. Doug Pearson
  Tel: 945-4013
  Fax: 945-1193

- Technology Commercialization Program
  Mr. Bob Lynch

- N.R.C. Washington, Transportation Research Board
  Mr. Steve Andrle
  Tel: 202-334-3240
  Fax: 202-334-2003

D. Description of the Program/Project/Activity

The development and testing of real-time transit broadcast software, on an FM subcarrier transmitter. To develop and test transit information, running on a corporate local area network (LAN) and home PC. A partner on the project is the Data Broadcasting Corp. of San Mateo California.

The real time broadcast will service the fixed display devices (LANS), (PC's), and will provide data to personal portable transit data displays, called transporters (TM TRANSCOM INTERNATIONAL LTD.)

The transporter features a continuously updated real time to arrival estimate on the next bus to the transit stop of choice to the user. (Patent pending)

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Elderly and Disabled Needs
- Revenue Generation
- Business/Product Opportunity

F. Project Type

- Market Study
- Research and Development
- Laboratory/Field Test Prototype

G. Functions/Features

- Communication - Area-wide Broadcast
- Automatic Vehicle - Location
- InfoTransfer - to Broadcast Media
- InfoTransfer - Home/Offc Computers
- Electronic Collection User Charges
- Info transfer-To LCD Display Devices (miniature TV)

H. Enabling Technologies

1. Mobile Communication
   - Broadcast SCA on FM (ARI, RDS)
   - Land Mobile Radio (VHF, UHF)

2. Vehicle Positioning
   - Proximity Beacons
   - Differential GPS
   - Radio - Ranging

I. Total Estimate Project Cost

Project Cost: $ 130 000

J. Current Status

- Project Active
- Start Date: 01-Jun-94
- Completion Date: 01-Jun-95
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing) (General, Rural/Small Town, Elderly/Disabled)
- En Route Transit Information (real time)
- Traveler Services Information (yellow pages, weather, etc.)
- Route Guidance (includes general service; no emergency vehicle-specific)
- Ride Matching and Reservation (car/vanpool, etc.)

II. Advanced Traffic Management Systems (ATMS)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)

L. Project Reports/Publications

- Title: Personnal Transit Arrival Time Receiver
  Author: Edward Burgener
  Publication Available

M. Comments

Future Program Plans - Field trial with a participating transit it authority, one already equipped with ALV.

A. Title of Program/Project/Activity

Project ID: 40
Project Title: **Geopostal Project**

B. Responsible Organization

Organization ID: O 58
Organization Name: Canada Post Corporation

Raj Mediratte, director & Philippe Eric Landry
2701 Riverside Dr., suite N0950
Ottawa ON K1A 0B1
Tel: 613-734-4066
Fax: 613-734-7645

D. Description of the Program/Project/Activity

GEOPOSTAL DATABASE: CPC* has undertaken the editing of Digital Street Networks (DSN), initially acquired from Statistic Canada. The objective was to correct node distortions and verify all address ranges and postal codes. CPC has currently updated over 200 cities in Canada and is in the process of adding new components such as one-ways and turn restrictions for motorized routing application. Adding inter-urban and rural networks into a unique national coverage is also a planned activity.

GEOPOSTAL APPLICATIONS: Different applications derive from the connected database, some actually being implemented, and others at the development or prototype phase.

i. LETTER CARRIER ROUTE OPTIMISATION SYSTEM (LCROS): Implemented throughout the corporation. Arc routing optimization for letter carrier walks.

ii. MOTORIZED ROUTING: At prototype phase. mode routing for fixed and dynamic demand (day to day service). Tested for priority courier operations.

iii. MOTORIZED MAIL CARRIERS: At development stage. Mix of node and arc Routing (park & loop concept).

iv. GLOBAL POSITIONING SYSTEMS (GPS): At research stage. Undertook several studies to evaluate GPS and complementary support technologies in urban environments (gyroscope, compass...). These studies will provide CPC with guidelines for vehicle tracking and DSN updating.

CPC*: Canada Post Corporation

E. Project Objectives

- Operational Efficiency/Productivity
- Revenue Generation
- Business/Product Opportunity

F. Project Type

- Research and Development
- Database Development
- Models Development
- Standards Development
- System Architech/Intergration
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communication - Dispatch/Vehicle
- Automatic Vehicle - Location
- Map DataBase - Road System Only
- Map DataBase - Road Side Attributes

H. Enabling Technologies

1. Mobile Communication
   - Mobile Cellular
   - Satellite
2. Vehicle Positioning
   - Magnetic Compass
   - Gyro
   - Map Matching
   - Differential GPS

J. Current Status

- Project Planned
- Project Active
- Project Completed
- Start Date: 1987
- Completion Date: 1996
- Evaluation Done

K. IVHS User Services by Application Area

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- Commercial Fleet Management
  - Route Planning and Scheduling

L. Project Reports/Publications

- Title: Priority Courrier Testing
  Author: Address Management

- Title: Several other documents on Routing, GPS
  Author: Address Management

- Title: Functional Specifications Geospatial Platform
  Author: Address Management

A. Title of Program/Project/Activity

Project ID: 43
Project Title: **Electronic Chart Pilot Project**

B. Responsible Organization

Organization ID: O 64
Organization Name: Canadian Hydrographic Service

Mr M.J. Casey
615 Booth St
Ottawa ON K1A 0E9
Tel: 613-992-0017
Fax: 613-996-9053

J. Current Status

- Project Active

M. Comments

Our interest in IVHS revolves around the parallel field of marine «electronic charts» which offer some of the same functionality. IVHS will drive the market for spin-off products useful for recreational boating.

A. Title of Program/Project/Activity

Project ID: 144
Project Title: **Prototype Military Message Handling System**

B. Responsible Organization

Organization ID: O 66
Organization Name: CRAD INDHQ

Mr V.K. Taylor
305 Rideau 7th floor
Ottawa ON K1A 0K2
Tel: 995-8008
Fax: 996-5777

C. Other Participating Organizations

- NATO

D. Description of the Project/Program/Activity

Requirements:
In concert with NATO, to develop the technology and prototype the requirements for a Military Message Handling System suitable for the Strategic Message Switching System replacement (G2475) and other DND communication requirements.

Activities:
The project is structured in three phases:
a. Basic services development and implementation for MMHS (6 months).
b. Prototype X.400 MMHS network including security features (18 months).
c. Develop a prototype gateway between the developed MMHS network and standard ACP services. Add directory service enhancements and advanced features to the MMHS prototype (12 months). Throughout the project, the NATO MMHS Ad Hoc Working Group Activities will be supported.

Related Projects:
G2475 - SMSS Evolution
0418Y - Store and Forward Message Switch (SFMS)
D6476 - Communication Systems Network Interoperability (CSNI.

Progress:
A tested network using the Draghound has been established.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Industrial/Regional Development

F. Project Type

- Feasibility Study
- Research and Development
- Database Development
- Models Development
- Standards Development
- System Architect/Integration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communications - RoadSide/Vehicle
- Communications - Dispatch/Vehicle
- Communications - Area-wide Broadcast

I. Total Estimate Project Cost

Project Cost: $ 750 000

J. Current Status

- Project Planned
- Project Active
- Start Date: 1991
- Completion Date: 1994
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Travel Demand Management (regulatory, mode change, parking control, etc.)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Fleet Management
  - Route Planning and Scheduling
- Regulatory Compliance and Law Enforcement

A. Title of Program/Project/Activity

Project ID: 145
Project Title: **Aircraft Position/Communication Monitoring for MUDPAC**

B. Responsible Organization

Organization ID: O 66
Organization Name: CRAD INDHQ

Dr. AW Bridgewater DRDCS
305 Rideau, 7th floor
Ottawa ON K1A 0K2
Tel: 992-9311
Fax: 996-5777

C. Other Participating Organizations

- Air Command
- TC Air Traffic Control

D. Description of the Project/Program/Activity

Requirements:
There is a requirement to enhance the prototype Modular Unit Deployment Package (MUDPAC) with a GPS based aircraft positioning system and communication link monitoring system to provide an effective reporting interface between deployed elements of the Canadian Forces and Command Headquarters.

Activities:
1. To develop software to support the integration of a GPS based aircraft positioning system with the MUDPAC and an encrypted radio communication system. 2. To integrate, adapt and test the positioning system with the MUDPAC and the encrypted radio link to ensure effective reporting interface between deployed units and Command Headquarters.

Related Projects:
041YV - Transportable Command and Control Information System

Progress:
The first phase of work was completed last year. The second phase was refocused to put together a prototype of all external GPS and other communications interfaces into the future OPEN SYSTEMS development now being adopted by Air Command. Hardware and software procurement have been initiated.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Enforcement of Regulation

F. Project Type

- Feasibility Study
- Research and Development
- System Architect/Integration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial

G. Functions/Features

- Communication - RoadSide/Vehicle
- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Identification - Cargo/Parcels
- Automatic Vehicle - Classification
- Navigation - Directional Arrows

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
   - Satellite
2. Vehicle Positioning
   - GPS
   - Differential GPS
3. In-Vehicle Display
   - CRT
   - Voice (synthesized/digitized)
4. On-Board Data Storage
   - RAM

I. Total Estimate Project Cost

Project Cost: $ 75 000

J. Current Status

- Project Active
- Project Completed

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Route Guidance (includes general service; no emergency vehicle-specific)

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Travel Demand Management (regulatory, mode change, parking control, etc.)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Fleet Management
  - Route Planning and Scheduling

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Fleet Management
  - Route Guidance

A. Title of Program/Project/Activity

Project ID: 146
Project Title: **Communications Systems Network Interverability CSNI**

B. Responsible Organization

Organization ID: O 66
Organization Name: CRAD Defence Research Establishment Ottawa

LCol GJ Doucet
3701 Carling av
Ottawa ON K1A 0K2
Tel: 996-4496
Fax: 996-5177

C. Other Participating Organizations

- NATO Shape Technical CTR
- Industry Canada

D. Description of the Project/Program/Activity

Robust, reliable and SECURE communications services are fundamental to co-ordination and management of military operations. Canada, France, Germany, the Netherlands, SHAPE Technical Centre, the UK and the US have signed a Memorandum of Understanding to collaborate in an exciting opportunity to demonstrate NATO Command, Control and Communications interoperability. The CSNI project will expose the issued of using the concepts and standards embodied in the ISO developments of Open System Interconnection Architectures and Modern Switching Technologies to provide a variety of user services (e.g. voice, tactical data and massaging) over heterogeneous networks: radio, satellite and landline-based. National networks will interact via gateways. Potentially, this will mean more efficient sharing and use of communications resources. Other benefits include improved ECCM protection through dynamic and alternate routing over different subnetworks and the integration of the sub-networks under a common management framework.

CRAD is funding Canada's $2.08M contribution to the CSNI collaboration through DRCDS. DGCEEM/DISEM is the Project Manager and the scientific/technical co-ordination is being carried out by the Communications Research Centre via the Defence Recoverable Program. Most of the work on CSNI tasks/sub-tasks will be contracted to Canadian industry.

E. Project Objectives

- Operational Efficiency/Productivity
- Industrial/Regional Development
- Business/Product Opportunity

F. Project Type

- Standards Development
- System Architect/Integration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communications - RoadSide/Vehicle
- Communications - Dispatch/Vehicle
- Communications - Area-wide Broadcast
- Personal Communication System (PCS)
- Personal Digital Assistant (PDA)
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Identification - Cargo/Parcels
- Automatic Vehicle - Classification
- Automatic Vehicle - Location

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)
   - Microwave
   - AM/FM Broadcast (HAR/AHAR)
   - Broadcast SCA on FM (ARI, RDS)
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
   - Satellite

3. In-Vehicle Display
   - Voice (synthesized/digitized)
   - Printer
   - Keyboard

I. Total Estimate Project Cost

Project Cost: $ 1 200 000

J. Current Status

- Project Active
- Start Date: 1992
- Completion Date: 1996
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)

L. Project Reports/Publications

- Title: Several in production
  Author: Dr, G. Nourz
  Publication Available

A. Title of Program/Project/Activity

Project ID: 147
Project Title: **Airlift Intervention System**

B. Responsible Organization

Organization ID: O 66
Organization Name: CRAD INDHQ

Dr. AW Bridgewater
305 Rideau 7th floor
Ottawa ON K1A 0K2
Tel: 992-9311
Fax: 996-5777

C. Other Participating Organizations

- USAF IITAQ

D. Description of the Project/Program/Activity

Requirements:
Air Command/ATG has identified requirements for:
a. automated airlift planning, load analysis, scheduling, tasking and authorization

b. on-line query capability of resource information required by the ATG

c. data management and display on weather, airfield and resources

d. improved methods of information handling and presentation using GUI/GIS displays

e. development of decision aids for aircraft loading, scheduling, training, etc.

Activities:
1. To determine functional requirements for ATG on automated airlift planning, scheduling, tasking and authorization.
2. To develop the architecture configuration for connecting to BMIS and other AIRCOM data sources.
3. To develop on-line query capability of resource information required by ATG.
4. To incorporate existing software developed by ATGOR.
5. To automate the cargo planning, cargo tracking and aircraft load master functions.
6. To develop decision aids for aircraft planning, scheduling and training.

Related Projects:
041AK - Mobile Command Post CCIS
041AL - Deplorable Command Post Communications

Progress:
Three initial prototypes for the automation of aircraft load planning, scheduling, tasking and authorization have been developed and demonstrated to potential users at ATG Trenton. From the feedback to date, an effective methodology for capturing user requirements and promoting user interaction has been established.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality

F. Project Type

- Feasibility Study
- Research and Development
- Models Development
- System Architect/Integration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial

I. Total Estimate Project Cost

Project Cost: $ 350 000

J. Current Status

- Project Active
- Start Date: 01-Apr-93
- Completion Date: 31-Dec-94
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- Traveller Services Information (yellow pages, weather, etc.)
- Route Guidance (includes general service; no emergency vehicle-specific)
- Ride Matching and Reservation (car/vanpool, etc.)

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- Commercial Vehicle Adiministrative Processes
  - Automated Mileage and Fuel Reporting and Auditing
- Commercial Fleet Management
  - Inter-modal Transportation Planning
  - Inter-modal Terminal Operation
  - Route Planning and Scheduling

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Fleet Management

A. Title of Program/Project/Activity

Project ID: 148
Project Title: **Geomatic Exchange Standards**

B. Responsible Organization

Organization ID: O 66
Organization Name: National Defence

Melville Walker & Pierre Gauvin
305, Rideau, 7th Floor
Ottawa ON K1A 0K2
Tel: 613-996-5717
Fax: 613996-5177

C. Other Participating Organizations

- Canadian hydrographic Jvs
- NATO
- IDON Corp.

D. Description of the Project/Program/Activity

Requirements:
Working in cooperation with other NATO nations to ensure that DIGEST, a geomatics protocol developed by 14 nations in the DGIWG forum, is introduced into the appropriate North American and International Standards Organization Committees such that DIGEST will become the international standard for geomatics.

Activities:
1. Development of production test sets in all three vector forms of the DIGEST format (i.e., relational, telecommunication and interchange). This work will be derived from the existing, approved DGIWG test set in ISO 8211 format, and will likely be done in conjunction with another NATO nation.
2. Foster the development of Canadian industrial capabilities to handle geographic data in the DIGEST format.
3. Investigate issues related to compatibility of DIGEST with the emerging US federal government exchange standards SDTS. The essence of this work will evolve around the development of a harmonized architecture for handling the two different approaches to encoding geomatic data (i.e., SDTS generalized structure versus DIGEST defined elements). It will be critical that this work build upon previous D Geo Ops work related to Geomatics Document Architecture (GDA).
4. Active support for DND in the pursuit of formal world (ISO) and North American (ANSI/CGSB) standards.

5. Evaluate operational impact on D Geo Ops with respect to the use of the DIGEST format, developing a plan for production and assist DND in the implementation.

Related Projects:
DPAS 031Y7 - Digital Chart of the World
DPAS 041WT - Digital Geographic Information Exchange

Progress:
Ongoing as per activities above.

Remarks:
This project continues to support DND's commitments to NATO in the area of geomatics standards development. IDON Corporation of Ottawa has been the prime contractor on the two related projects and is the only contractor qualified to undertake this work.

E. Project Objectives

- Operational Efficiency/Productivity
- Industrial/Regional Development
- Business/Product Opportunity

F. Project Type

- Database Development
- Standards Development
- System Architect/Integration

G. Functions/Features

- Map DataBase - Road System Only
- Map DataBase - Road Side Attributes
- Map DataBase - Yellow Pages General
- Map Overlays (external) - weather, etc.
- InfoTransfer - to Changeable Signs
- InfoTransfer - to Broadcast Media
- InfoTransfer - Home/Offc Computers

J. Current Status

- Project Active
- Start Date: 01-Jul-92
- Completion Date: 31-Mar-94

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing
- En Route Transit Information (real time)
- Traveller Services Information (yellow pages, weather, etc.)
- Route Guidance (includes general service; no emergency vehicle-specific)
- Ride Matching and Reservation (car/vanpool, etc.)

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Regulatory Compliance and Law Enforcement

A. Title of Program/Project/Activity

Project ID: 44
Project Title: **Municipal GIS Applications - A Cooperative Project with the RMOC for GIS Design for Roadway Rehabilitation Planning**

B. Responsible Organization

Organization ID: O 68
Organization Name: Geographic Information Systems Division

Carole D'Aoust-Martin & Allan Mosaad
615 Booth St, Room 753
Ottawa ON K1A 0E9
Tel: 613-996-2812
Fax: 613-952-0916

C. Other Participating Organizations

- Regional Municipality of Ottawa-Carleton
  David Johnston
  Tel: 613-560-6065 ext: 1375
  Fax: 613-560-1201

D. Description of the Program/Project/Activity

This pilot project makes use of the street centerlines, elevation contours, public buildings, and other data found in the 1:50,000 databases. It is predicted that other municipalities and provincial departments will show an interest in this data for their own GIS applications, since the RIMS application is common to municipalities across Ontario, and across Canada in varying formats.

In the past, the various decision-makers in the Transportation Department would study the tabular reports produced by RIMS in conjunction with information produced by other agencies before finalizing rehabilitation plans. With the inherent flexibility of the GIS, additional tables can be designed to hold data produced by these other agencies to enable broader queries. Results from economic analyses and bus delay statistics can now be associated to individual road segments.

Where sophisticated network analysis is required, macros will play an important role in accessing the attribute tables to supplement the basic networking tools. The two following cases emphasizes this need:

i) Where construction detours are concerned, the selection of an alternate route not only depends on the spatial sequence of the road segments, but also on their number of lanes, speed limits, vehicular and structural capacities, and on their ownership.

ii) Where lists of «continuation» projects are established, the selection of segments lying between two improved sections requires locating two-lane segments between three-lane ones, or two resurfaced sections on each side of a gravel section, etc...

E. Project Objectives

- Operational Efficiency/Productivity
- Industrial/Regional Development

F. Project Type

- Feasibility Study
- Database Development

G. Functions/Features

- Map DataBase - Road System Only

J. Current Status

- Project Completed
- Start Date: 1-Jul-91
- Completion Date: 31-Jul-92
- Evaluation Done

L. Project Reports/Publications

- Title: Infrastructure Management Using GIS
  Author: Carole D'Aoust-Martin & David Johnston
  Publication Available

- Title: Designing a GIS to Manage Roads in the RMOC
  Author: Carole D'Aoust-Martin & David Johnston
  Publication Available

M. Comments

As the result of this pilot project, using GIS technology for roadway rehabilitation planning is implemented in RMOC.

A. Title of Program/Project/Activity

Project ID: 45
Project Title: **Road Transportation Database Pilot Project**

B. Responsible Organization

Organization ID: O 68
Organization Name: Geographic Information Systems Division, SMRS Sect

Ms. Charlene Morrison
615 Booth St
Ottawa ON K1A 0E9
Tel: 613-996-2810
Fax: 613-952-0916

D. Description of the Program/Project/Activity

Develop operational procedure for integrating National Topographic Data Base topographic data (1:250,000 and 1:50,000) and Surveys, Mapping and Remote Sensing data (1:7,5000,000 and 1:2,000,000) to produce digital national road transportation network. Select a pilot test area to ensure that the data is both horizontally and vertically integrated. Subsequently, in cooperation with transportation agencies, enter road attributes for transportation route applications and possibly mobile GPS information. Throughout the project, document procedures, problems and solutions to enable private sector exploitation of EMR data. In particular, advise Canada Centre for Mapping on difficulties encountered using the road network data.

More information available (contact the project manager).

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Industrial/Regional Development
- Business/Product Opportunity

F. Project Type

- Research and Development
- Database Development
- Standards Development
- Laboratory/Field Test Prototype

G. Functions/Features

- Map DataBase - Road System Only

J. Current Status

- Project Completed
- Start Date: Jan-91
- Completion Date: Dec-92
- Evaluation Done
- Evaluation Information Available Later

L. Project Reports/Publications

- Title: Road Transportation Database - A Pilot Project
  Author: Charlene Morrison
  Publication Available

M. Comments

As the result of this pilot project, Canada Centre for Geomatics is preparing the production of Canadian Road Network.

A. Title of Program/Project/Activity

Project ID: 47
Project Title: **Research Program / Route Canada Project**

B. Responsible Organization

Organization ID: O 71
Organization Name: Geography Division Statistics Canada

Larry Li & Victor Glickman
367, Jean Talon Building, 3rd Floor
Ottawa ON K1A 0T6
Tel: 613-951-6921
Fax: 613-951-0569

C. Other Participating Organizations

- Elections Canada
  Brian Cromie
  Tel: 613-991-0970
  Fax: 613-990-3662

D. Description of the Program/Project/Activity

Building of a road network coverage for the Windsor Montreal corridor (phase 1) with the eventual hope of completing a roads and reference features digital base of Canada, with road names & addresses.

The coverage will be a topologically structured, vector coverage.

E. Project Objectives

- Census and survey taking

F. Project Type

- Research and Development
- Database Development

G. Functions/Features

- Map DataBase - Road Side Attributes

J. Current Status

- Project Active
- Start Date: 1-Avr-94
- Completion Date: 30-Mar-94

M. Comments

The Route-canada File can support many of the applications in Section K + more, eg. linkage to census data for estimating ride matching potential, or using journey to work data to refine travel demand estimates, but it's principal objective is to support census taking. A copy of the study results would be appreciated.

A. Title of Program/Project/Activity

Project ID: 48
Project Title: **IVHS Navigation Systems Database**

B. Responsible Organization

Organization ID: O 72
Organization Name: Transport Canada R&D Directorate

Mr Arjan Chandan
330 Sparks St. Place de Ville, Tower C, Floor 26B
Ottawa ON K1A 0N5
Tel: 613-991-6035
Fax: 613-991-6045

C. Other Participating Organizations

- Industry Canada
  Luc Fournier
  Tel: 613-990-1910
  Fax: 613-952-0566

- University of Calgary
  Dr. Edward J. Krakinwsky
  Tel: 403-220-7878
  Fax: 403-284-1980

D. Description of the Program/Project/Activity

IVHS NAVIGATION SYSTEMS DATABASE

BACKGROUND: A computerized database has been developed under the direction of Dr. E.J. Krakiwsky for the purpose of capturing, in electronic form, information on IVHS navigation systems being developed worldwide. As of Fall 1993, 150 Automatic Vehicle Location and Navigation (AVLN) systems have been identified and are contained in the database. Some of them are simply patents awaiting development, others are prototypes with limited testing, while many have undergone a few generations of development, testing, and implementation.

The information about these systems has been collected over a five year period from scientific articles, company brochures, magazines, newsletters, and via personal attendance at conferences and demonstrations of these systems. Furthermore, the information has been studied and organized so that it can be accessed in a user friendly nammer from a PC or Macintosh computer with full colour graphics of each system. The database id designed for those individuals and firms who are interested in land vehicle navigation, namely, GPS and dead reckoning sensor manufacturers, system integrators, students and educators, researchers, IVHS planners, and government agencies and corporations who are looking at implementing IVHS navigation systems.

FUNDING: The project has been funded by a number of federal (including Transport Canada and Industry Canada), provincial governments and private companies, using a multi-client approach. Each participant paid an initial fee of $5,000 towards the development cost plus an annual fee of $2,000 for updating the database. The last update (version 3.0) was released on December 1, 1993.

E. Project Objectives

- Information system

F. Project Type

- Database Development

G. Functions/Features

- Navigation systems

H. Enabling Technologies

2. Vehicle Positioning
   - Navigation Systems Database

I. Total Estimate Project Cost

Project Cost: $ 5 000

J. Current Status

- Project Completed
- Completion Date: Jul-94
- Evaluation Planned

L. Project Reports/Publications

- Title: IVHS Navigation System Database
  Author: Dr. Edward J. Krakiwsky
  Publication Available

M. Comments

Database available in form of electronic book from Dr. E.J. Krakiwsky at University of Calgary, Department of Geomatics Engineering at a cost of 1500$. Phone 403-220-7878 Fax.: 403-284-1980

A. Title of Program/Project/Activity

Project ID: 49
Project Title: **Developing a National Inventory of IVHS Programs and related activities in Canada**

B. Responsible Organization

Organization ID: O 72
Organization Name: Transport Canada R&D Directorate

Mr Arjan Chandan
330 Sparks St, Place de Ville, Tower C, Floor 26B
Ottawa ON K1A 0N5
Tel: 613-991-6035
Fax: 613-991-6045

C. Other Participating Organizations

- Parviainen & Associates
  Jouko Parviainen
  Tel: 405-849-5806
  Fax: 405-844-9945

- Roche-Deluc
  Raynald Ledoux
  Tel: 514-481-4459
  Fax: 514-481-7293

D. Description of the Program/Project/Activity

DEVELOPING A NATIONAL INVENTORY OF IVHS PROGRAMS AND RELATED ACTIVITIES IN CANADA

BACKGROUND: The objective of the study is to develop an inventory of all IVHS programs and projects currently underway as well as ones recently completed or being planned for future applications at the federal, provincial and municipal levels of government, as well as operating and manufacturing sectors of transportation, research institutes and universities. The information collected will be compiled in a report in both English and French and distributed to all interested parties to make them aware of the IVHS activities underway or planned for in Canada, thus benefiting from other's experience and avoiding duplication of effort. The inventory, which will be updated on a regular basis, will help to identify research priorities as well as provide opportunities for cooperative ventures in areas of advanced technology applications.

E. Project Objectives

- Information

F. Project Type

- Database Development

J. Current Status

- Project Active
- Completion Date: 31-May-94
- Evaluation Planned

L. Project Reports/Publications

- Title: National Inventory of IVHS Programs and Related Activities in Canada
  Author: Parviainen & Ass. & Roche-Deluc Ltée
  Publication Available

M. Comments

Once completed, the report will be widely distributed. Contact person for the report is Arjan Chandan at Transport Canada. Tel: 613-991-6035.

A. Title of Program/Project/Activity

Project ID: 50
Project Title: **Assessment of Communication Needs and Standards for IVHS**

B. Responsible Organization

Organization ID: O 72
Organization Name: Transport Canada, R&D Directorate

Mr Arjan Chandan
330 Sparks St., Place de Ville, Tower C, Floor 26B
Ottawa ON K1A 0N5
Tel: 613-991-6035
Fax: 613-991-6045

C. Other Participating Organizations

- Communications Development and Planning Branch, Industry Canada
  Luc Fournier
  Tel: 613-990-1910
  Fax: 613-952-0566

- Consultant ADGA Group of Ottawa
  Alan Waltho
  Tel: 613-237-3022
  Fax: 613-237-3024

- Spectrum Eng. Program Branch Industry Cda
  Neil McGrath
  Tel: 613-990-4697
  Fax: 613-952-5108

- Communications Research Centre
  Barry McLarnon
  Tel: 613-998-5005
  Fax: 613-990-6488

D. Description of the Program/Project/Activity

ASSESSMENT OF COMMUNICATION NEEDS AND STANDARDS FOR IVHS

BACKGROUND: The objective of this study is to analyze communications requirements for IVHS, to evaluate proposals from European, Japanese, and American organizations involved in the IVHS communications and to make an assessment of communications network evolution. The contractor is also to organize information in form of matrices of applications and communications needs, make recommendations on IVHS communication standards and identify issues requiring action from the Working Group on Communications for IVHS.

E. Project Objectives

- Assessment of Communication Needs and Standards

F. Project Type

- Feasibility Study
- Standards Development
- Technology Assessment

G. Functions/Features

- Communication Needs and Standards

I. Total Estimate Project Cost

Project Cost: $ 30 000

J. Current Status

- Project Completed
- Completion Date: 31-Mar-94

L. Project Reports/Publications

- Title: Assessment of Communication Needs and Standards
  Author: ADGA Systems International Ltd
  Publication Available

M. Comments

Report will be available from Transport Canada, A. Chandan at 613-991-6035

A. Title of Program/Project/Activity

Project ID: 51
Project Title: **Developing Information Program for IVHS**

B. Responsible Organization

Organization ID: O 72
Organization Name: Transport Canada, R&D Directorate

Mr Arjan Chandan
330 Sparks St., Place de Ville, Tower C, Floor 26B
Ottawa ON K1A 0N5
Tel: 613-991-6035
Fax: 613-991-6045

C. Other Participating Organizations

- Transportation Ass. of Canada
  Chris Hedges
  Tel: 613-736-1350
  Fax: 613-737-1395

- Consultant UMA Engineering
  John Robinson
  Tel: 506-457-1111
  Fax: 506-459-3355

D. Description of the Program/Project/Activity

DEVELOPING INFORMATION PROGRAM FOR IVHS

BACKGROUND: The program is designed as an information package as well as for training transportation planners, traffic managers, transit planners, energy/air quality planners, and fleet managers and will related examples from international programs in these areas. The program consists of a guidebook and other training materials (handout package, presentation slides, etc.). The information program is designed in a modular format in order to select and orient the presentation or training for individuals with specific interests such as traffic management, urban transportation, commercial fleet operation, etc. Six regional one day seminars followed the development of the Information Program. These seminars were held in Quebec City, Ottawa, Toronto, Winnipeg, Edmonton, and Vancouver during October-November 1993. An average of 30 people attended these seminars. The seminar planned for Halifax had to be cancelled due to insufficient response.

E. Project Objectives

- Information Program
- Training Program

F. Project Type

- Education/Training
- Information Program

G. Functions/Features

- All aspects of IVHS

I. Total Estimate Project Cost

Project Cost: $ 30 000

J. Current Status

- Project Completed
- Completion Date: Nov-93

L. Project Reports/Publications

- Title: Information Program for IVHS
  Author: Dr. John B.L. Robinson
  Publication Available

M. Comments

The project was jointly funded by Transportation Ass. of Canada (TAC) and Transport Canada, R&D Directorate. For further information for copy of the Information Program, please contact mr. Christopher Hedges at TAC. Tel.: 613-736-1350

A. Title of Program/Project/Activity

Project ID: 52
Project Title: **Strategic Plan for the Development of IVHS in Canada**

B. Responsible Organization

Organization ID: O 72
Organization Name: Transport Canada, R&D Directorate

Mr Arjan Chandan
330 Sparks St., Place de Ville, Tower C, Floor 26B
Ottawa ON K1A 0N5
Tel: 613-991-6035
Fax: 613-991-6045

C. Other Participating Organizations

- Industry Cda-Technology Alliances Directorate
  Lorraine Raynes
  Tel: 613-941-0611
  Fax: 613-952-8419

- Delphi Ass.
  John Robinson
  Tel: 506-457-1111
  Fax: 506-459-3355

D. Description of the Program/Project/Activity

STRATEGIC PLAN FOR THE DEVELOPMENT OF IVHS IN CANADA

BACKGROUND: Intelligent Vehicle Highway Systems (IVHS) are a group of technologies that are changing the way in which we build, design, and manage and operate our road transportation systems. Through these changes they promise to bring important benefits to society, both at the transportation level, and at the level of building an industrial base necessary to develop and implement these technologies.

The Research and Development Directorate of Transport Canada, and the Technology alliances Directorate of Industry Canada combined their resources to commission this project to develop the base for a strategic plan for the development of IVHS in Canada. The goal was to help foster the discussion and information exchange that will eventually help Canadian transportation interests channel this important process of change which is taking place in our country. More specifically, the objective of the study was stated as follows: «To prepare a plan providing future direction for the development of IVHS in Canada, for consideration by IVHS Canada, and subsequent presentation to the Board of Directors of the Transportation Association of Canada for their information, advice and action.» The plan would also be of value to the federal and provincial ministries of transportation and other organizations for presentation to their senior management plans for IVHS related activities in their respective areas of interest.

E. Project Objectives

- Strategic Plan

F. Project Type

- Strategic Planning

G. Functions/Features

- All aspects of IVHS

I. Total Estimate Project Cost

Project Cost: $ 30 000

J. Current Status

- Project Completed
- Completion Date: 31-Mar-94
- Evaluation Planned

L. Project Reports/Publications

- Title: A Strategic Plan for the Development of IVHS in Canada
  Author: Dr. John B.L. Robinson & Delphi Corporation
  Publication Available

M. Comments

The study was jointly funded by R&D Directorate of T.C. and the Technology Alliances Directorate of Industry Cda. For copy of the report, please contact Mr. Arjan Chandan and Transport Canada. Tel.: 613-991-6035

A. Title of Program/Project/Activity

Project ID: 53
Project Title:

B. Responsible Organization

Organization ID: O 74
Organization Name: Ministry of the Attorney General

Mr John Lefebvre
720 Bay St., 3rd Floor
Toronto ON M5G 2K1
Tel: 416-326-4406
Fax: 416-326-4213

J. Current Status

- Project Planned

M. Comments

Ignition interlock devices for convicted impaired drivers. (Info request).

A. Title of Program/Project/Activity

Project ID: 54
Project Title: **Ontario Special Reporting Program**

B. Responsible Organization

Organization ID: O 75
Organization Name: Ministry of Culture, Tourism & Recreation

Ruth Parkes & Mary Ann Lanyon
21 Molson Park Dr.
Barrie ON L4M 6E7
Tel: 705-725-7280
Fax: 705-725-7285

D. Description of the Program/Project/Activity

ONTARIO SPECIAL REPORTING PROGRAM (includes detail on daily ski conditions, snow mobiling, provincial park vacancies, fall colour, spring blossoms, weekly events.

More information available (contact the project manager)

G. Functions/Features

- InfoTransfer - to Broadcast Media

H. Enabling Technologies

1. Mobile Communication
   - AM/FM Broadcast (HAR/AHAR)

J. Current Status

- Project Active
- Start Date: 1968
- Completion Date: On going

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
- Traveler Services Information (yellow pages, weather, etc.)

A. Title of Program/Project/Activity

Project ID: 56
Project Title: **Standard Labelled Road Network (SLRN)**

B. Responsible Organization

Organization ID: O 78
Organization Name: Ontario Ministry of Natural Resources

Mr Barry Costello
90 Sheppark Avenue East, 4th Floor
North York ON M2N 3A1
Tel: 416-314-1244
Fax: 416-314-1339

C. Other Participating Organizations

- Ontario Ministry of Health
  Barbara Bridgehouse
  Tel: 416-327-7843

- Ontario Ministry of Education & Training
  Ruth Flynn
  Tel: 416-325-2009

D. Description of the Program/Project/Activity

STANDARD LABELLED ROAD NETWORK

The building of a Data Base of Road Information (attributes) and geometry for the province of Ontario. Included are:

-X/Y coordinate locations of roads
-X/Y intersections
-Left and right hand civil or municipal address ranges for each section of road
-Road type/classification/jurisdiction
-Direction
-Landmarks

Project duration: approx. 3 yrs
Coverage target: province wide
Current coverage: Eastern Ontario complete/Niagara Peninsula in progress

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Revenue Generation
- Industrial/Regional Development
- Business/Product Opportunity

F. Project Type

- Standards Development
- Full-Scale Application

G. Functions/Features

- Navigation - Full In-Vehicle Map Display
- Route Guidance - Autonomous (in-veh.)
- Route Guidance - Centrally Driven
- Map DataBase - Road Side Attributes
- Map Overlays (external) - weather, etc.

J. Current Status

- Project Active
- Start Date: 1993
- Completion Date: 1997
- Evaluation Information Available
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Route Guidance (includes general service; no emergency vehicle-specific)

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Fleet Management
  - Route Planning and Scheduling

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
- Personalized Public Transit (para-transit, route deviations, etc.)
- Emergency Vehicle Management
  - Fleet Management
  - Route Guidance

L. Project Reports/Publications

- Title: SLRN - DATA CONVERSION SPECIFICATIONS
  Author: B. Bridgehouse
  Publication Available

- Title: SLRN - DATA MODEL
  Author: B. Bridgehouse
  Publication Available

- Title: DTDBY2 - DATA BASE DESIGN
  Author: T. Malone/Ministry of Natural Resources
  Publication Available

A. Title of Program/Project/Activity

Project ID: 58
Project Title: **Video Compression Codec and Spread Spectrum Radio Communications Link**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ministry of Transportation of Ontario

Mr Felix Tam
1201 Wilson Ave
Downsview ON M3M 1J8
Tel: 416-235-5611
Fax: 416-235-4097

C. Other Participating Organizations

- ABL CANADA
  MIKE EVANS
  Tel: 905-472-0747
  Fax: 905-472-6101

- MSC ELECTRONICS
  TERRY AMBROSE
  Tel: 905-731-9500
  Fax: 905-731-5195

D. Description of the Program/Project/Activity

Recently, a rented Bell microwave link is being used to transmit a CCTV video signal. As the monthly cost is very high, our office is looking at replacing the microwave with video compression codec and spread spectrum radio units. This project is still active and completion is anticipated to be in June 1994.

E. Project Objectives

- Reduction in on-going operational costs

F. Project Type

- Demonstration/Field Trial

G. Functions/Features

- Communications - Remote location (control centre)

I. Total Estimate Project Cost

Project Cost: $ 46 000

J. Current Status

- Project Active
- Start Date: 30-Mar-94
- Completion Date: 30-Jun-94

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)

M. Comments

If this project proves successful, another communications link will be implemented summer or fall 1994.

A. Title of Program/Project/Activity

Project ID: 59
Project Title: **Research on the correlation between bus and car travel time**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ministry of Transportation

Mr Marian Berinzon
1201 Wilson Ave
Downsview ON M3M 1J8
Tel: 416-235-5050
Fax: 416-235-4936

C. Other Participating Organizations

- University of Toronto
  Prof. Scott Bortoll
  Tel: 416-978-0562
  Fax: 416-978-0806

D. Description of the Program/Project/Activity

Data from Toronto Transit Commission. Communication and information system permit automated, continuous monitoring of bus location in real time. This project focuses on the development of algorithms to estimate automobile link travel times based on transit data. Cluster analysis, linear and nonlinear estimation models on used.

E. Project Objectives

- Supply travel time data for advanced traveller info system.

G. Functions/Features

- InfoTransfer - Home/Offc Computers
- Monitoring - Traffic Flow
- Monitoring - Vehicle Systems

H. Enabling Technologies

1. Mobile Communication
   - Microwave
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
2. Vehicle Positioning
   - Proximity Beacons
3. In-Vehicle Display
   - Electro-Luminescent

J. Current Status

- Project Active
- Start Date: Aug-93
- Completion Date: Sep-94

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
- En Route Transit Information (real time)
- Route Guidance (includes general service; no emergency vehicle-specific)
- Ride Matching and Reservation (car/vanpool, etc.)

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
  - Personnel Management
- Personalized Public Transit (para-transit, route deviations, etc.)
- Public Travel Security

L. Project Reports/Publications

- Title: DEVELOPMENT OF A TRANSPORTATION DATA

- Title: PROCESSING SYSTEM FOR METRO TORONTO
  Author: MARIAN BERINZON
  Publication Available

A. Title of Program/Project/Activity

Project ID: 60
Project Title: **Metropolitan Toronto Transportation Data Processing System**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ministry of Transportation of Ontario

Mr Marian Berinzon
1201 Wilson Ave
Downsview ON M3M 1J8
Tel: 416-235-5050
Fax: 416-235-4936

C. Other Participating Organizations

• Teleride Sage
Joseph Ho
Tel: 416-596-1940
Fax: 416-595-5653

D. Description of the Program/Project/Activity

The Ministry of Transportation of Ontario is currently developing a prototype of the Metropolitan Toronto Transportation Information Production System (MTIPS). MTIPS is a real-time data collection, processing, and dissemination system which can provide timely information on transit and traffic conditions. Data from Toronto Transit Commission's Communications and Information System permit automated, continuous monitoring of bus location and estimation of general traffic conditions in real time. The ministry's Freeway Traffic Management System on Highway 401 provides spot speed data which are converted to link travel times. The Metropolitan Toronto Transportation Department SCOOT project and other traffic detectors will be used to generate volume and saturation flow data on arterial roads. These data are processed using a formal control systems formulation for modelling and prediction of traffic flows. The estimated car and bus travel times and traffic events are stored and organized in a database for dissemination to various users using standard traffic message formats. MTIPS provides the real-time traffic information base for low-cost guidance and travel information devices.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Revenue Generation
- Industrial/Regional Development

F. Project Type

- Standards Development
- System Architech/Intergration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial

G. Functions/Features

- Communication - Area-wide Broadcast
- Personal Communication System (PCS)
- Personal Digital Assistant (PDA)
- Navigation - Directional Arrows
- Route Guidance -Interactive w/ ATMS
- Map DataBase - Road Side Attributes
- Map DataBase - Yellow Pages General
- InfoTransfer - to Broadcast Media
- InfoTransfer - Home/Offc Computers
- Monitoring - Traffic Flow

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops
   - Land Mobile Radio (VHF, UHF)
   - Digital Pager Communications

3. In-Vehicle Display
   - Electro-Luminescent
   - Voice (synthesized/digitized)

J. Current Status

- Project Active
- Start Date: Sep-93
- Completion Date: Jun-94
- Evaluation Done
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing) (General, Elderly/Disabled)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing (Elderly/Disabled)
- En Route Transit Information (real time) (General, Elderly/Disabled)
- Traveler Services Information (yellow pages, weather, etc.)
- Route Guidance (includes general service; no emergency vehicle-specific) (General, Elderly/Disabled)
- Ride Matching and Reservation (car/vanpool, etc.)

II. Advanced Traffic Management Systems (ATMS)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
  - Personnel Management
- Personalized Public Transit (para-transit, route deviations, etc.)
- Emergency Notification and Personal Security
  - Driver and Personal Security
- Public Travel Security
- Emergency Vehicle Management
  - Fleet Management

L. Project Reports/Publications

- Title: Development of a Transportation Data processing System for Metro Toronto
  Author: Marian Berinzon
  Publication Available

A. Title of Program/Project/Activity

Project ID: 61
Project Title: **Traffic and Road Information System (TRIS)**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ministry of Transportation of Ontario/Freeway Traf

Mr Phil Masters
1201 Wilson Ave
Downsview ON M3M 1J8
Tel: 416-235-3535
Fax: 416-235-4097

C. Other Participating Organizations

- IBI Group
  Scott Stewart
  Tel: 416-596-1930
  Fax: 416-590-0644

D. Description of the Program/Project/Activity

The Traffic and Road Information System (TRIS) is a centrally operated traffic reporting system. COMPASS operator entered information on Unscheduled Events (i.e. accidents, breakdowns, debris on roadway, etc) and Scheduled Events (i.e. construction, maintenance closures, etc.) are disseminated broadly via: automated fax system, closed circuit video display, and alpha numeric pagers. Automated congestion information from the Hwy 401 COMPASS system is currently being integrated. TRIS reports on traffic events on Provincial Highways throughout the greater. Toronto Area, with approx. 40 media and emergency services subscribing to the fax service.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Revenue Generation
- Business/Product Opportunity

F. Project Type

- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communication - Area-wide Broadcast
- Personal Digital Assistant (PDA)
- Route Guidance - Autonomous (in-veh.)
- Route Guidance - Centrally Driven
- Map DataBase - Road System Only
- InfoTransfer - to Broadcast Media

H. Enabling Technologies

1. Mobile Communication
   - Pager Broadcast

3. In-Vehicle Display
   - Pager (alpha-numeric)

J. Current Status

- Project Active
- Project Completed
- Completion Date: Summer 1994 - Enhancements
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing

L. Project Reports/Publications

- Title: Traffic and Road Information System - Final Report
  Author: MTO/ IBI Group
  Publication Available

M. Comments

The pager system was developed by IBI Group (Toronto) in partnership with MTO and will be introduced to the public mid - 1994.

A. Title of Program/Project/Activity

Project ID: 62
Project Title: **RTMS (Remote Traffic Microwave Sensor) Incident Detection Demonstration Project**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ministry of Transportation of Ontario

Mr Aran Kapur
1201 Wilson Ave
Downsview ON M3M 1J8
Tel: 416-235-5606
Fax: 416-235-4097

C. Other Participating Organizations

- IBI Group
  Kevin Bebenek
  Tel: 416-596-1930
  Fax: 416-595-0644

- Electronic Integrated Systems Inc.
  Dan Manor
  Tel: 416-785-9248
  Fax: 416-785-9332

D. Description of the Program/Project/Activity

Description available (contact the project manager)

E. Project Objectives

- Operational Efficiency/Productivity

F. Project Type

- Demonstration/Field Trial

G. Functions/Features

- Monitoring - Traffic Flow

H. Enabling Technologies

1. Mobile Communication
   - Mobile Cellular

4. On-Board Data Storage
   - RAM

J. Current Status

- Project Active

A. Title of Program/Project/Activity

Project ID: 63
Project Title: **Border Crossings Technology Applications**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ministry of Transportation of Ontario

Mr Joe Tsai
1201 Wilson Ave, Room 333, Central Bldg
Downsview ON M3M 1J8
Tel: 416-235-3453
Fax: 416-235-4936

C. Other Participating Organizations

- Transport Canada
  Lewis Sabounghi
  Tel: 514-283-0029
  Fax: 514-283-7158

- FHWA U.S.
  Martin Monahan
  Tel: 708-206-3218
  Fax: 708-206-3207

- Michigan DOT and Members of New Technology Committ
  Kunwar Rajendra
  Tel: 517-335-2893
  Fax: 517-373-2330

- Marshall Macklin Monaghan/PMSK/ZHK & Ass./Constami
  Rob Wanfess
  Tel: 905-882-1100
  Fax: 905-882-0055

D. Description of the Program/Project/Activity

An automated border crossing system, primarily paperless, using the latest IVHS technology is planned to expedite border crossing by commercial and private vehicles. This system will allow for automated toll collection at bridges or tunnel, automated clearance of pre-screened cross-border drivers/travellers through immigration as well as automated customs clearance of cargo. Under this scenario, the pre-screened commercial shipments and pre-screened tourists/travellers will cross the border conveniently and speedily unless yandom enforcement checks are performed by border crossing agencies. The potential application areas include Ontario/Michigan border crossings and Ontario/New York border crossings.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Enforcement of Regulation
- Revenue Generation
- Industrial/Regional Development

F. Project Type

- Feasibility Study
- Research and Development
- Database Development
- System Architech/Intergration
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communication - RoadSide/Vehicle
- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Identification - Cargo/Parcels
- Automatic Vehicle - Classification
- Automatic Vehicle - Location
- Monitoring - Traffic Flow
- Weigh-In-Motion
- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - Microwave

2. Vehicle Positioning
   - AVI

3. In-Vehicle Display
   - LED
   - Beep

4. On-Board Data Storage
   - Smart Transponder
   - TypeIII AVI Tag
   - Smartcard
   - PCMCIA Card

J. Current Status

- Project Active
- Start Date: 1992
- Completion Date: 1996
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- Commercial Fleet Management
  - Route Planning and Scheduling
- Regulatory Compliance and Law Enforcement
  - Commercial Vehicle Preclearance
    - * International border preclearance

L. Project Reports/Publications

- Title: Study of Institutional Impacts of new Technology Applications at St.Clair and Detroit Rivers Highway Border Crossings
  Author: MMM/PMSK/JHK/CCL

- Title: Smart Trucking in Ontario
  Author: M.D. Harmelink, G. Heti, J. Tsai
  Publication Available

M. Comments

A strong sense of consensus has been reached among project participants that movement to an automated border brossing system is beneficial and desirable. Commitment for funding the implements has been obtained from Transport Canada/TDC, U.S. FHWA, Michigan DOT. A firm commitment from the headquarters of customs and immigration on both sides of the border is needed to more this project into the implementation phase.

A. Title of Program/Project/Activity

Project ID: 64
Project Title: **The Ontario AVL/C Initiative**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ministry of Transportation of Ontario

Mr Barry Pekilis, P. Enr.
1201 Wilson Ave, Central Building, Rm. 333
Downsview ON M3M 1J8
Tel: 416-235-3455
Fax: 416-235-4936

C. Other Participating Organizations

- CUTA
  Brendon Hemily
  Tel: 416-365-9800
- Niacad
  David Cain
  Tel: 613-832-3165
- Brampton Transit
- Burlington Transit
- Kitchener Transit
  Blair Allen
  Tel: 519-741-2566
  Fax: 519-741-2640
- London Transit
- Sudbury Transit
- Transit Windsor
- Peterborough Transit

D. Description of the Program/Project/Activity

The purpose of the Ontario AVL/C Initiative is to introduce fleet management and control technology to small and medium Ontario transit properties. The initiative to date has developed a generic bid document package which may be used by transit properties to specify and procure an AVLC system. The London transit commission is presently in the process of procuring an AVLC system for operational use and management of its fleet. LTC has used the Ontario specs during the tender process. System implementation is expected to commence in July 1994, with the system fully operational by Dec. 1995.

E. Project Objectives

- Operational Efficiency/Productivity
- Energy Conservation/Air Quality
- Revenue Generation
- Industrial/Regional Development
- Business/Product Opportunity
- Highlight user requirements of Transit properties

F. Project Type

- Standards Development
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communication - RoadSide/Vehicle
- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Vehicle - Location
- Map DataBase - Road System Only
- Monitoring - Vehicle Systems
- Schedule Adherence Monitoring

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)
   - Microwave
   - Infra-red

2. Vehicle Positioning
   - Magnetic Compass
   - Gyro
   - Map Matching

J. Current Status

- Project Active
- Project Completed

A. Title of Program/Project/Activity

Project ID: 65
Project Title: **Toward a Universal Public Transportation Card**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ontario Ministry of Transportation

Mr W. Wiercienski
1201 Wilson Ave, Central Bldg, Room 333
Downsview ON M3M 1J8
Tel: 413-235-3451
Fax: 416-235-4936

D. Description of the Program/Project/Activity

This initiative proposes a fare collection system solution employing a touchless fare payment/validation method which will help to improve service and meet the intent of the Americans with Disabilities Act (ADA).

The proposed fare collection system and fare card is targeted as a baseline solution for public transportation applications, including urban transit and other related areas. Such a system would allow riders free and easy movement through a seamless, integrated public transportation system without concern for choice of mode, jurisdiction, or geography. This is the ultimate purpose in the creation of a Universal Public Transportation Card.

The system, centred around the concept of a universal public transportation card, must meet, at a minimum, the following criteria: fast operation ease of use flexibility and low cost. Implementation issues such as infrastructure (point-of-sale and clearing house), standardization (media and equipment), compatibility with other systems, simplification of maintenance (regular and preventive), security, and privacy are discussed. Upward and downward compatibility and standardization are also reviewed.

This work may be of particular interest to transit properties, regional and municipal governments, and provincial, state, and federal funding agencies that plan to introduce new, user friendly fare collection systems to transit operations, or those interested in adopting the concept of a universal public transportation card for their communities.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Elderly and Disabled Needs
- Revenue Generation
- Industrial/Regional Development
- Business/Product Opportunity

F. Project Type

- Research and Development
- Standards Development
- System Architech/Intergration

G. Functions/Features

- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops
   - Microwave

3. In-Vehicle Display
   - LCD
   - Chime
   - Voice (synthesized/digitized)

4. On-Board Data Storage
   - Smart Transponder
   - Smartcard

J. Current Status

- Project Active
- Start Date: Aug-93

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)
  (General, Elderly/Disabled)

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
    (General, Elderly/Disabled)
- Personalized Public Transit (para-transit, route deviations, etc.)
  (General, Elderly/Disabled)

L. Project Reports/Publications

- Title: Toward a Universal Public Transportation Card
  Author: B.R. Pekilis & W. Wiercienski
  Publication Available

A. Title of Program/Project/Activity

Project ID: 66
Project Title: **Avion**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ministry of Transportation of Ontario

Mr Joe Tsai
1201 Wilson Ave, Central Bldg, Room 333
Downsview ON M3M 1J8
Tel: 416-235-3453
Fax: 416-235-4936

C. Other Participating Organizations

- Advantage I-75/Kentucky
  502-564-3730
  Tel: 502-564-4809

D. Description of the Program/Project/Activity

AVION is an application of automatic vehicle identification (AVD/Intelligent Vehicle Highway System (IVHS) Technology in Ontario along Highway 401 to improve truck inspection, reduce trucking delays, and improve ministry operations and commercial vehicle data collection. The system will initially feature mainline electronic credential verification and vehicle weighing for participating commercial vehicles. AVION is a starting point of a progression towards electronic paperless trucking in the future. To achieve greater benefits for the trucking industry, AVION will be implemented in cooperation with the ADVANTAGE I-75 project which will deploy a Mainline Automated Clearance System (MACS) for commercial vehicle application along I-75 adn Highway 401. Ontario is a cost-sharing member of the ADVANTAGE I-75 project and is participating in the key implementation tasks.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Enforcement of Regulation

F. Project Type

- Feasibility Study
- Research and Development
- Database Development
- System Architech/Intergration
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communication - RoadSide/Vehicle
- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Identification - Cargo/Parcels
- Automatic Vehicle - Classification
- Automatic Vehicle - Location
- Monitoring - Traffic Flow
- Monitoring - Vehicle Systems
- Weigh-In-Motion

H. Enabling Technologies

1. Mobile Communication
   - Microwave
2. Vehicle Positioning
   - AVI
3. In-Vehicle Display
   - LED
   - Beep
4. On-Board Data Storage
   - Smart Transponder
   - TypeIII AVI Tag

J. Current Status

- Project Active
- Start Date: 1991
- Completion Date: 1996
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Vehicle Adiministrative Processes
  - Electronic Purchase of Credentials
  - Automated Mileage and Fuel Reporting and Auditing
- On-Board Safety Monitoring and Tracking (includes driver, vehicle and cargo)
- Commercial Fleet Management
  - Route Planning and Scheduling
- Regulatory Compliance and Law Enforcement
  - Commercial Vehicle Preclearance
    * Roadside access to carrier
    * Vehicle and driver records
  - Law Enforcement
    * Retrivial of lost or stolen vehicles

L. Project Reports/Publications

- Title: Smart Trucking in Ontario
  Author: A.D. Hamerling, G. Heti, Joe Tsai
  Publication Available

- Title: ADVANTAGE I-75 Motor Carrier Project
  Author: JHK & Associates
  Publication Available

M. Comments

Future AVION enhancement could include commercial vehicle data collection and marketing, truck/cargo tracking and communications, highway travel time data collection and marketing, paperwork burden reduction, and interface with international border crossings.

A. Title of Program/Project/Activity

Project ID: 67
Project Title: **COMPASS (Freeway Traffic Management System)**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ministry of Transportation of Ontario

Mr Phil Masters
1201 Wilson Ave, Central Bldg. Room 333
Downsview ON M3M 1J8
Tel: 416-235-3535
Fax: 416-235-4097

D. Description of the Program/Project/Activity

COMPASS is a Freeway Traffic Management System. Three systems are currently operating in the Greater Toronto Area on Provincial Hwy's. QEQ Burlington, QEQ Mississauga, Hwy 401 Toronto. Are COMPASS systems incorporate Vehicle Detection Closed Circuit Television (CCTV) monitoring, Changeable Message Signs (CMS), Automatic Incident Detection Algorithms, and Emergency Response. The QEQ Mississauga System also incorporated Ramp Metering.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Industrial/Regional Development

F. Project Type

- Full-Scale Application

G. Functions/Features

- InfoTransfer - to Changeable Signs
- InfoTransfer - to Broadcast Media
- Monitoring - Traffic Flow

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops

J. Current Status

- Project Planned
- Project Active
- Project Completed
- Start Date: 1975
- Completion Date: On going
- Evaluation Done
- Evaluation Information Available

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Traffic Management

L. Project Reports/Publications

- Title: Burlington Skyway FTMS Operational Review 85-87
  Author: MTO
  Publication Available

- Title: Drivers' Responses to Changeable Message Signs on Hwy 401
  Author: MTO

- Title: Hwy 401 COMPASS Annual Report - Jan 92 - Mar 93
  Author: MTO
  Publication Available

A. Title of Program/Project/Activity

Project ID: 68
Project Title: **IHIS (Intelligent Highway Information System)**

B. Responsible Organization

Organization ID: O 80
Organization Name: Ministry of Transportation of Ontario

Mr Dave Wallace
1201 Wilson Ave, Central Bldg, Room 333
Dowsview ON M3M 1J8
Tel: 416-235-4154
Fax: 416-235-4255

C. Other Participating Organizations

- ESRI
  Randall Cracknell
  Tel: 416-441-6035
  Fax: 416-441-6838

D. Description of the Program/Project/Activity

Description available (contact the project manager)

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Business/Product Opportunity

F. Project Type

- Full-Scale Application

G. Functions/Features

- Map DataBase - Road Side Attributes

H. Enabling Technologies

1. Mobile Communication
   - Mobile Cellular

2. Vehicle Positioning
   - Map Matching

J. Current Status

- Project Active
- Start Date: Now
- Completion Date: Avr-95
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)
  - Driver Information
    (General, Rural/Small Town)
  - In-Vehicle Signing
    (General, Rural/Small Town)
- Route Guidance (includes general service; no emergency vehicle-specific)
  (General, Rural/Small Town)

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
  (General, Rural/Small Town)
- Parking Management
  (General, Rural/Small Town)

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Vehicle Adiministrative Processes
  - Automated Mileage and Fuel Reporting and Auditing
    (General, Rural/Small Town)
- Commercial Fleet Management
  - Inter-modal Transportation Planning
    (General, Rural/Small Town)
  - Inter-modal Terminal Operation
    (General, Rural/Small Town)

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Fleet Management
    (General, Rural/Small Town)
  - Route Guidance
    (General, Rural/Small Town)
  - Signal Priority
    (General, Rural/Small Town)

A. Title of Program/Project/Activity

Project ID: 77
Project Title:

B. Responsible Organization

Organization ID: O 95
Organization Name: Toronto Fire Department

Ian Parsonage & Walter Shanahan
260 Adelaide St. West
Toronto ON M5H 1X6
Tel: 416-392-1617
Fax: 416-392-0598

D. Description of the Program/Project/Activity

No formal programs in effect. Several projects that would be desirable are unattainable due to each of funding.

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communication - Dispatch/Vehicle

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular

J. Current Status

- Project Planned

M. Comments

Certain station are equipped with push-button control over nearby traffic lights to enable better egress from the station.

A. Title of Program/Project/Activity

Project ID: 79
Project Title: **Automatic Vehicle Location System**

B. Responsible Organization

Organization ID: O 98
Organization Name: Metropolitan Toronto Dept of Ambulance Services

Walt Solo & Irina Pantofaru
4330 Dufferin Street
Downsview ON M3H 5R9
Tel: 416-397-1323 - 392-2191
Fax: 416-392-2227

C. Other Participating Organizations

- Magnavox - Navcom
  Ed Skoblicki
  Tel: 516-667-7710

D. Description of the Program/Project/Activity

- In Vehicle locating unit GPS + rategyro and speed sensor - 120 vehicles

- Mobile Date Terminals / Communication Processor for AVL Date Transmission to the Dispatch Centre and incident information display in the vehicle

- Data transmission over EDACS Trucking system (RDI in vehicle and host radios)

- Message Switch at the control centre

- Map displays c/w vehicle location and status, incident display - at the dispatch positions

- Full interface with existing CAD for incident info transmission to the vehicles incident location on maps, vehicle status update on map displays

- Interface with system status management system.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement

F. Project Type

- Full-Scale Application

G. Functions/Features

- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Vehicle - Location
- Map DataBase - Road Side Attributes
- InfoTransfer - Home/Offc Computers

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
2. Vehicle Positioning
   - Gyro
   - GPS
3. In-Vehicle Display
   - CRT
   - Keyboard
4. On-Board Data Storage
   - RAM

I. Total Estimate Project Cost

Project Cost: $ 1 800 000

J. Current Status

- Project Active
- Start Date: Jul-93
- Completion Date: Dec-94

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)

IV. Advanced Public Transportation Systems (APTS)
- Emergency Notification and Personal Security
  - Hazardous Materials Incident Notification
- Emergency Vehicle Management
  - Route Guidance
  - Signal Priority

A. Title of Program/Project/Activity

Project ID: 81
Project Title: **UTC/SCOOT - Real Time, Adaptive Traffic Signal Control System**

B. Responsible Organization

Organization ID: O 100
Organization Name: Municipality of Metropolitan Toronto

Mr John Greenough
55 John Street, Station 1170, 17 th Floor
Toronto ON M5V 3C6
Tel: 416-397-5767
Fax: 416-397-5777

C. Other Participating Organizations

- Guild Electric Limited
  Gary Lengyel
  Tel: 416-288-8222
  Fax: 416-288-8353

- Fortran Traffic Systems Limited
  Sandu Zeller
  Tel: 416-288-1320
  Fax: 416-288-9914

- Siemens Plessey Control Limited
  Gordon Hay
  Tel: 44-202-782000
  Fax: 44-202-782435

D. Description of the Program/Project/Activity

SCOOT, meaning ½Split, Cycle and Offset Optimization Technique¶, is a computerized traffic signal control system that provides ½real¶ time traffic adaptive control (TAC) on a cycle by cycle basis. SCOOT automatically adjusts coordinated signal timings in frequent small increments to match the actual traffic conditions on-street. This is accomplished by using vehicle flow data retrieved from loop detectors embedded in the roadway pavement upstream from each signalized intersection. This data is analyzed every second by an on-line centralized SCOOT system computer which contains the SCOOT software program that generates and implements optimized timings to for all signalized intersections under SCOOT control.

Currently Metro Toronto operates 85 traffic control signals with the UTC/SCOOT system.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality

F. Project Type

- System Architech/Intergration
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Automatic Vehicle - Location
- InfoTransfer - Home/Offc Computers
- Monitoring - Traffic Flow
- Adaptive Traffic Signal Control

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops
   - Mobile Cellular

2. Vehicle Positioning
   - Inductive Loops

I. Total Estimate Project Cost

Project Cost: $ 20 000

J. Current Status

- Project Completed
- Start Date: Sep-90
- Completion Date: Dec-93
- Evaluation Done
- Evaluation Information Available Later

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Travel Demand Management (regulatory, mode change, parking control, etc.)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Parking Management
- Traffic Management

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Signal Priority

L. Project Reports/Publications

- Title: A Performance Report on the Metropolitain Toronto Scoot System
  Author: Metro Toronto
  Publication Available

- Title: SCOOT Demonstration Project - Evaluation Report An Evaluation of Traffic Adaptive Control Using SCOOT
  Author: Metro Toronto
  Publication Available

- Title: The Metropolitan Toronto SCOOT Demonstration Project
  Author: Kelman Greenough and Quan
  Publication Available

M. Comments

An evaluation study of the Demonstration Project confirmed reductions in travel time, delay, and queuing resulting in more efficient use of existing roadway capacity, proving SCOOT a cost effective means of traffic signal control.

Plans for expansion include additional signals under the Federal/Provincial/Municipal Infrastructure Works Project, although still subject to approvals at time of this report.

A. Title of Program/Project/Activity

Project ID: 82
Project Title: **Gardiner - Lake Shore Corridor Traffic Management System**

B. Responsible Organization

Organization ID: O 100
Organization Name: Metro Transportation

Mr Bruce Zvaniga
55 John Street, 17th Floor, Station 1170
Toronto ON M5H 2Y4
Tel: 416-392-9631
Fax: 416-392-9634

C. Other Participating Organizations

- IBI Group
  Scott Stewart
  Tel: 596-1930
  Fax: 596-0644

- Delcan
  Bowen Tritter
  Tel: 441-4111
  Fax: 441-4131

- McCormick Rankin
  Gene Smallwood
  Tel: 823-8500
  Fax: 823-8503

- Fortran Traffic Systems
  Peter Lengyl
  Tel: 288-1320

- Guild Electric
  Gary Lengyl
  Tel: 288-8222

- Decity
  Dominic Chan
  Tel: 470-0960
  Fax: 470-0961

- Black & MacDonald
  Dominic Chan

- McMaster University
  Fred Hall
  Tel: 525-9140

- Daedalian Systems Group
  Andy Welch
  Tel: 862-1401

D. Description of the Program/Project/Activity

Implementation of a Corridor Traffic Management System on an urban expressway and parallel arterial road.

Four stages of implementation include:

1. Detection and confirmation (Loop Detectors and CCTV)
2. Advisory (Changeable Message Signs)
3. Diversion (Arterial Advisory Signs and Traffic Signal Interface)
4. Control (Lane Control Signing)

More information available (contact the project manager)

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Energy Conservation/Air Quality

F. Project Type

- System Architech/Intergration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communication - RoadSide/Vehicle
- Automatic Vehicle - Classification
- InfoTransfer - to Changeable Signs
- InfoTransfer - to Broadcast Media
- Info Transfer - to Home/Offc Computers
- Monitoring - Traffic Flow

I. Total Estimate Project Cost

Project Cost: $ 34 000 000

J. Current Status

- Project Active
- Start Date: Jan-88
- Completion Date: Dec-96
- Evaluation Done
- Evaluation Information Available

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Traffic Management

A. Title of Program/Project/Activity

Project ID: 83
Project Title: **AVLC Automatic Vehicle Location and Control**

B. Responsible Organization

Organization ID: O 102
Organization Name: OC Transpo

L.P. Van Der Kloot & Doug McCorquodale
1500 St. Laurent Boulevard
Ottawa ON K1G 0Z8
Tel: 613-741-6440
Fax: 613-230-6543

D. Description of the Program/Project/Activity

Improve on-time performance and schedule adherence via on-line control of buses. The tracking of buses is therefore critical and is done currently via stationary detectors with tags on the vehicle (Amtech). Software is developed to use GPS and is essentially hardware independent. Although just about all software applications are impacted, significant emphasis is placed on A). SCM: Service Control Module and B). Develop and Maintain the current planned schedule.

GPS will require intelligence on vehicle which will be combined with applications such as Electronic Fare Collection, Passenger Counting, etc.

This is a multi-phase project, Phase 1 is now ready for production.

E. Project Objectives

- Operational Efficiency/Productivity
- Revenue Generation

F. Project Type

- Database Development
- Models Development
- System Architech/Intergration
- Full-Scale Application

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communication - Dispatch/Vehicle
- Communication - Area-wide Broadcast
- Automatic Identification - Vehicle
- Automatic Vehicle - Classification
- Automatic Vehicle - Location
- Route Guidance -Interactive w/ ATMS
- InfoTransfer - to Changeable Signs
- InfoTransfer - to Broadcast Media
- Monitoring - Traffic Flow
- Monitoring - Vehicle Systems
- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
2. Vehicle Positioning
   - Proximity Beacons
   - GPS
3. In-Vehicle Display
   - Voice (synthesized/digitized)
   - Keyboard
   - in desigh for display
4. On-Board Data Storage
   - Smartcard
   - still in development

I. Total Estimate Project Cost

Project Cost: $ 20 000 000

J. Current Status

- Project Planned
- Project Active
- Start Date: 1988
- Completion Date: Phase 8, 1998
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing
- En Route Transit Information (real time)
- Route Guidance (includes general service; no emergency vehicle-specific)

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Travel Demand Management (regulatory, mode change, parking control, etc.)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Vehicle Adiministrative Processes
  - Automated Mileage and Fuel Reporting and Auditing
- Commercial Fleet Management
  - Route Planning and Scheduling

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
  - Personnel Management
- Personalized Public Transit (para-transit, route deviations, etc.)
- Emergency Notification and Personal Security
  - Driver and Personal Security
- Public Travel Security
- Emergency Vehicle Management

M. Comments

AVLC will allow OC Transpo to develop further applications, eg. trip-planning with increasing levels of automation and transfer commitments. Many of these are in a planning stage but are not yet committed.

A. Title of Program/Project/Activity

Project ID: 87
Project Title: **R.M.O.C. General IVHS Activities**

B. Responsible Organization

Organization ID: O 108
Organization Name: Region of Ottawa-Carleton

Neil Monkman, Louis Shallal
111 Lisgar Street
Ottawa ON K2P 2L7
Tel: 613-560-6001 ext.: 1682
Fax: 613-560-6064

D. Description of the Program/Project/Activity

Monitoring and Tracking of Regional Vehicles (using GIS and GPS)

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity

F. Project Type

- Feasibility Study
- Models Development
- System Architech/Intergration

G. Functions/Features

- Communication - Area-wide Broadcast
- Automatic Vehicle - Location
- Map DataBase - Road System Only

H. Enabling Technologies

1. Mobile Communication
   - Mobile Cellular

2. Vehicle Positioning
   - GPS
   - Differential GPS

J. Current Status

- Project Planned
- Start Date: MID 1994

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Traffic Management

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Fleet Management
  - Route Guidance
  - Signal Priority

M. Comments

No specific project active at this time

A. Title of Program/Project/Activity

Project ID: 88
Project Title: **Central Traffic Control System**

B. Responsible Organization

Organization ID: O 109
Organization Name: Andy Harvey

Mr Graham Savage
3185 Mavis Road
Mississauga ON L5C 1T7
Tel: 905-896-5118
Fax: 905-896-5583

C. Other Participating Organizations

- Regional Municipality of Peel
  Peter Crockett
  Tel: 905-791-7800
  Fax: 905-791-0728

D. Description of the Program/Project/Activity

-Central Traffic Control System for City's 421 signized intersections

-On line vehicle monitoring via inductance loops and emergency vehicle pre-emption devices (fire)

-some infra red and microwave detectors in use

-Various timing plans available according to time of day (i.e. demand)

-T2000 Central Traffic Control System

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality

F. Project Type

- Full-Scale Application

G. Functions/Features

- Monitoring - Traffic Flow

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops
   - Microwave
   - Infra-red

J. Current Status

- Project Completed

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Traffic Management

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Signal Priority

A. Title of Program/Project/Activity

Project ID: 89
Project Title: **Traffic Signal Systems and Traffic Operations Study**

B. Responsible Organization

Organization ID: O 110
Organization Name: The Regional Municipality of Sudbury

R.R. Hortness, Patrick J. Morrow, BASc P.Eng
200 Brady St., Bag 3700, Station A
Sudbury ON P3A 5W5
Tel: 705-673-2171
Fax: 705-673-2960

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Traffic Management

J. Current Status

- Project Active
- Project Completed

M. Comments

Comments available (contact the project manager)

A. Title of Program/Project/Activity

Project ID: 92
Project Title: **Communications and Information System (CIS)**

B. Responsible Organization

Organization ID: O 113
Organization Name: Toronto Transit Commission

J.P. O'Connell, D.J. Taylor, Juri Pill
1900 Yonge Street
Toronto ON M4S 1Z2
Tel: 539-4373 / 539-3730
Fax: 538-6489

C. Other Participating Organizations

- The Province of Ontario
  Gabe Heti
  Tel: 905-235-3454
  Fax: 905-235-4936
- Metropolitan Toronto
- Bell Radiocommunications
  Walley Korbutiak
  Tel: 905-890-0000
  Fax: 905-890-1949

D. Description of the Program/Project/Activity

Description available (contact the project manager)

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Service Improvement
- Safety & Security Improvement

F. Project Type

- Full-Scale Application

G. Functions/Features

- Communication - Dispatch/Vehicle
- Communication - Area-wide Broadcast
- Personal Communication System (PCS)
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Vehicle - Location
- Route Guidance -Interactive w/ ATMS
- Monitoring - Vehicle Systems
- Detailed Route Display

H. Enabling Technologies

1. Mobile Communication
   - Microwave
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
2. Vehicle Positioning
   - Microwave Transmitters and Wheel Odometer
3. In-Vehicle Display
   - LCD
4. On-Board Data Storage
   - RAM
   - Transmitted to central every Poll

I. Total Estimate Project Cost

Project Cost: $ 37 400 000

J. Current Status

- Project Completed
- Start Date: 1974
- Completion Date: 1991
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
  - Personnel Management
- Emergency Notification and Personal Security
  - Driver and Personal Security
- Public Travel Security

L. Project Reports/Publications

- Title: System Description and Technical Manual
  Author: TTC
  Publication Available

- Title: Operators' Manual Inspectors' Console Manual
  Author: TTC
  Publication Available

- Title: CIS Phase VI - Final Report
  Author: TTC
  Publication Available

M. Comments

At present, no new major projects are being undertaken outside of providing a linkage between CIS and the electronic destination signs for updating and reporting to dispatchers.

More comments available (contact the project manager)

A. Title of Program/Project/Activity

Project ID: 95
Project Title: **Emerging Technology - IVHS Technology Assessment**

B. Responsible Organization

Organization ID: O 121
Organization Name: Bell Mobility

Hilbert Chan, Brian O'Shaughnessy
20 Carlson Court
Etobicoke ON M9W 6V4
Tel: 416-798-5041
Fax: 416-674-6211

D. Description of the Program/Project/Activity

The program looks at the applicability of cellular telephony technology for IVHS applications.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Business/Product Opportunity

F. Project Type

- Feasibility Study
- Market Study
- Standards Development
- System Architech/Intergration

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communications - RoadSide/Vehicle
- Communications - Dispatch/Vehicle
- Communications - Area-wide Broadcast
- Personal Communication System (PCS)
- Personal Digital Assistant (PDA)
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Identification - Cargo/Parcels
- Route Guidance - Centrally Driven
- Monitoring - Vehicle Systems
- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
2. Vehicle Positioning
   - Proximity Beacons
3. In-Vehicle Display
   - LCD
   - Voice (synthesized/digitized)
4. On-Board Data Storage
   - Smartcard
   - RAM

I. Total Estimate Project Cost

Project Cost: $ 3 000

J. Current Status

- Project Planned
- Project Active
- Completion Date: 1994
- Evaluation Done
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing
- En Route Transit Information (real time)
- Traveler Services Information (yellow pages, weather, etc.)
- Route Guidance (includes general service; no emergency vehicle-specific)

II. Advanced Traffic Management Systems (ATMS)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)
- Parking Management
- Traffic Management

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Vehicle Administrative Processes
  - Automated Mileage and Fuel Reporting and Auditing
- Commercial Fleet Management
  - Route Planning and Scheduling

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
  - Personnel Management
- Emergency Notification and Personal Security
  - Driver and Personal Security
  - Automated Collision Notification
- Emergency Vehicle Management
  - Fleet Management
  - Route Guidance
  - Signal Priority

L. Project Reports/Publications

- Title: IVHS Technology Assessment
  Author: H. Chan

A. Title of Program/Project/Activity

Project ID: 96
Project Title: **Highway 407 Electronic Toll Collection**

B. Responsible Organization

Organization ID: O 122
Organization Name: Bell Sygma

Mr Cal Avertick
484 Bay Street, F14N
Toronto ON M5G 2E1
Tel: 215-2620
Fax: N/A

C. Other Participating Organizations

- Mark IV IVHS
  Paul Manuel
  Tel: 624-3025

- Hughes T. M.S.
  Tom McDaniel
  Tel: 714-732-4658

D. Description of the Program/Project/Activity

To provide electronic toll collection for the new Highway 407 (approx. 69 km) North of Metro Toronto.

This project provides for all electronic toll collection employing Automatic Vehicle Identification (AVI., video enforcement, high band width communications using fiber optics, systems integration and data collection, processing and billing.

The proposed system will collect tolls electronically at highway speeds in a free-flow, open road environment.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Enforcement of Regulation
- Revenue Generation
- Industrial/Regional Development
- Business/Product Opportunity

F. Project Type

- Education/Training
- Research and Development
- Database Development
- Models Development
- Standards Development
- System Architech/Intergration
- Full-Scale Application

G. Functions/Features

- Communication - RoadSide/Vehicle
- Automatic Identification - Vehicle
- Automatic Vehicle - Classification
- Automatic Vehicle - Location
- InfoTransfer - to Changeable Signs
- InfoTransfer - to Broadcast Media
- InfoTransfer - Home/Offc Computers
- Monitoring - Traffic Flow
- Weigh-In-Motion
- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)

3. In-Vehicle Display
   - Chime

4. On-Board Data Storage
   - Smart Transponder

J. Current Status

- Project Planned
- Start Date: May-94
- Completion Date: 1998
- Evaluation Done
- Evaluation Information Available Later

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)
- Traffic Management

M. Comments

-Geographic Information Systems (GIS)
-Electronic Yellow Pages
-Commercial Vehicle Operations (CVO)

A. Title of Program/Project/Activity

Project ID: 97
Project Title: **Development of Enebling Technologies**

B. Responsible Organization

Organization ID: O 123
Organization Name: Canadian Marconi Company

Mr Yezdi Tamboli
415 Legget Drive
Kanata ON K2K 2B2
Tel: 613-592-6500
Fax: 613-592-7427

D. Description of the Program/Project/Activity

Development of enabling technologies.

-Mobile satellite communications antennas
-Low-cost GPS modules

H. Enabling Technologies

1. Mobile Communication
   - Satellite

2. Vehicle Positioning
   - GPS

J. Current Status

- Project Active

A. Title of Program/Project/Activity

Project ID: 100
Project Title: **Environmental Impacts of IVHS**

B. Responsible Organization

Organization ID: O 132
Organization Name: Envirotrans

Mr Chris Holloway
P.O. Box 565, Station B
Ottawa ON K1P 5P7
Tel: 769-8242
Fax: 819-459-1261

C. Other Participating Organizations

- Environment Canada
  Russ Robinson
  Tel: 819-953-1601

D. Description of the Project/Program/Activity

Preliminary investigation of potential environmental impacts from the implementation of IVHS.

E. Project Objectives

- Mobility Improvement
- Energy Conservation/Air Quality

F. Project Type

- Education/Training
- Research and Development
- Standards Development

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communications - RoadSide/Vehicle
- Automatic Identification - Vehicle
- Route Guidance -Interactive w/ ATMS
- InfoTransfer - Home/Offc Computers
- Monitoring - Traffic Flow
- Monitoring - Vehicle Systems
- Monitoring Driver Alertness
- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
   - Satellite
2. Vehicle Positioning
   - Proximity Beacons
   - Loran-C
   - GPS
4. On-Board Data Storage
   - Smart Transponder
   - Smartcard
   - RAM
   - CD-ROM

I. Total Estimate Project Cost

Project Cost: $ 20 000

J. Current Status

- Project Completed
- Completion Date: Nov-93
- Evaluation Done

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
- En Route Transit Information (real time)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
- Traveller Services Information (yellow pages, weather, etc.)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
- Route Guidance (includes general service; no emergency vehicle-specific)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
- Ride Matching and Reservation (car/vanpool, etc.)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
- Travel Demand Management (regulatory, mode change, parking control, etc.)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)
- Parking Management
- Traffic Management

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Vehicle Adiministrative Processes
  - Automated Mileage and Fuel Reporting and Auditing
- On-Board Safety Monitoring and Tracking (includes driver, vehicle and cargo)
- Regulatory Compliance and Law Enforcement
  - Automated Roadside Inspection
  - Commercial Vehicle Preclearance
    * Roadside access to carrier
    * Vehicle and driver records

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
    (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
  - Planning and Scheduling Services
    (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
  - Personnel Management
- Personalized Public Transit (para-transit, route deviations, etc.)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
- Emergency Notification and Personal Security
  - Driver and Personal Security
    (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
  - Automated Collision Notification
    (General, Rural/Small Town, Elderly/Disabled)
  - Hazardous Materials Incident Notification
- Public Travel Security
  (General, Rural/Small Town, Elderly/Disabled)
- Emergency Vehicle Management
  - Fleet Management
  - Route Guidance
  - Signal Priority

V. Advanced Vehicle Control Systems (AVCS)
- Longitudinal Collision Avoidance
  - Autonomous Intelligent Cruise Control
  - Cooperative Intelligent Cruise Control
  - Head-On Crash Warning and Control
  - Backing Crash Warning
- Lateral Collision Avoidance
  - Lane Keeping Warning and Control
- Intersection Collision Avoidance
- Vision Enhancement for Crash Avoidance (inclement weather and at night)
- Safety Readiness
  - Impaired Driver Warning and Control Override
    (General, Elderly/Disabled)
  - Vehicle Condition Warning
    (General, Ergonomics/Human Factors)
  - In-Vehicle Infrastructure Condition Warning
    (General, Elderly/Disabled)
- Pre-Crash Restraint Deployment
  (General, Elderly/Disabled)
- Automated Highway System
  (General, Rural/Small Town)

M. Comments

Major focus is on environmental benefits of IVHS applications.

A. Title of Program/Project/Activity

Project ID: 102
Project Title: **Cabmate**

B. Responsible Organization

Organization ID: O 136
Organization Name: Gandalf Mobile Systems Inc

Mr Kevin French
2 Gurdwara Rd, Suite 500
Nepean ON K2E 1A2
Tel: 613-723-6500
Fax: 613-727-8951

D. Description of the Project/Program/Activity

Cabmate is a computerized taxi and black car dispatching system. The system is designed to use existing voice grade radios as a basis for constructing a 3600 band data circuit. Each vehicle is equipped with a mobile data terminal (MDT). The MDT has a built in modem which interfaces with the radio. The MDT's communicate with a pair of 486's at up to 400 MDT's. The dispatch software consists of order entry (based on a street directory), management functions, reports, exception handling, and a zone based dispatch algorithm.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Revenue Generation

F. Project Type

- Full-Scale Application

G. Functions/Features

- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Vehicle - Classification
- Automatic Identification - Driver
- Automatic Vehicle - Location
- Map DataBase - Road System Only
- Monitoring - Vehicle Systems
- Monitoring Driver Alertness

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
2. Vehicle Positioning
   - GPS
3. In-Vehicle Display
   - LCD
   - Keyboard
4. On-Board Data Storage
   - RAM

J. Current Status

- Project Completed

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing
- En Route Transit Information (real time)
- Ride Matching and Reservation (car/vanpool, etc.)

II. Advanced Traffic Management Systems (ATMS)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- On-Board Safety Monitoring and Tracking (includes driver, vehicle and cargo)

A. Title of Program/Project/Activity

Project ID: 103
Project Title: **Development of a Mobile Mapping, navigation and data inventory system using GPS, CAD, DBIV and image processing, specially designed for pen computing**

B. Responsible Organization

Organization ID: O 139
Organization Name: Geosurv Inc.

Mr James Ferguson
6 - 1050 Baxter Road
Ottawa ON K2C 3P1
Tel: 613-820-4545
Fax: 613-820-9772

D. Description of the Project/Program/Activity

Description available (contact the project manager)

E. Project Objectives

- Operational Efficiency/Productivity
- Revenue Generation
- Business/Product Opportunity

F. Project Type

- Research and Development
- System Architect/Integration
- Full-Scale Application

G. Functions/Features

- Navigation - Directional Arrows
- Navigation - Full In-Vehicle Map Display
- Map DataBase - Road System Only
- InfoTransfer - Home/Offc Computers
- Map Updating While Driving

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
   - Satellite
2. Vehicle Positioning
   - Map Matching
   - GPS
   - Differential GPS
   - Real Time DGPS (RDGPS)
3. In-Vehicle Display
   - LCD
   - Keyboard
   - Pen Gestures
4. On-Board Data Storage
   - Magnetic Disk
   - PCMCIA Card
   - CD-ROM

I. Total Estimate Project Cost

Project Cost: $ 250 000

J. Current Status

- Project Active
- Project Completed
- Start Date: May-93
- Completion Date: On going
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)
  - Driver Information
    (General, Rural/Small Town)
  - In-Vehicle Signing
    (General, Rural/Small Town)
- En Route Transit Information (real time)
  (General, Rural/Small Town)

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Route Guidance
    (General, Rural/Small Town, Ergonomics/Human Factors)

L. Project Reports/Publications

- Title: Field Notes: A Mobile GIS Adds GPS (Promo flyer)
  Author: Maps Alive
  Publication Available

- Title: Update Maps à 100 mph (Promotional Booklet)
  Author: Paul Mrstik
  Publication Available

- Title: Mobile Mapping - Here Noew (English and French)
  Author: James Ferguson
  Publication Available

M. Comments

Future: -Support external sensers for positioning, measuring, sounding
-Support for in-vehicle communications for Tracking & RDGPS.

A. Title of Program/Project/Activity

Project ID: 104
Project Title: **Guided Electric Vehicle Advanced Transit (GEVAT) System**

B. Responsible Organization

Organization ID: O 140
Organization Name: Guided Vehicle Systems Co.

Mr F.H. Koch
2012 Gatineau View cr.
Ottawa ON K1J 7X1
Tel: 613-744-5611
Fax: 613-748-3157

C. Other Participating Organizations

- University of Ottawa (ESTCO)
  Pr. W.A. Adams
  Tel: 613-564-6818
  Fax: 613-564-9842

D. Description of the Project/Program/Activity

The project aims to design, build, test, and demonstrate a road-to-vehicle electric power transfer system and an automatic steering system for transit vehicles such as electric buses, people movers, and automated personal transit (APT) vehicles.

The design concept involves electric buses which could operate on battery power on the normal street system, and which would operate on road power when they are on special guideways which are similar to bus transitways. The gads would be designed in such a way that they can accommodate all types of vehicles, i.e. regular diesel powered buses, electric buses, and automated people movers and personal transit vehicles.

The IVHS component of the initial project is in the automatic steering of vehicles. Further development of the design concept would necessitate additional IVHS technologies in the areas of communications and traffic control.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Elderly and Disabled Needs

F. Project Type

- Research and Development
- Laboratory/Field Test Prototype
- Demonstration/Field Trial

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communication - RoadSide/Vehicle
- Automatic Identification - Vehicle
- Automatic Vehicle - Location
- Route Guidance - Autonomous (in-veh.)
- Route Guidance - Centrally Driven
- Route Guidance -Interactive w/ ATMS
- Map DataBase - Road System Only
- Monitoring - Traffic Flow
- Monitoring - Vehicle Systems
- Proximity Radar
- Intelligent Cruise (gap radar)
- Lane Assist/Control (lateral)
- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - Microwave
   - Land Mobile Radio (VHF, UHF)
2. Vehicle Positioning
   - Differential Odometer
   - Map Matching
   - Proximity Beacons
3. In-Vehicle Display
   - CRT

4. On-Board Data Storage
   - Smart Transponder
   - RAM
   - Magnetic Disk
   - CD-ROM
   - EEPROM

I. Total Estimate Project Cost

Project Cost: $ 1 500 000

J. Current Status

- Project Planned
- Start Date: Aug-94
- Completion Date: Aug-96

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
  (General, Elderly/Disabled)
- En Route Transit Information (real time)
  (General, Elderly/Disabled)

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
    (General, Elderly/Disabled)
  - Planning and Scheduling Services
    (General, Elderly/Disabled)
  - Personnel Management
    (General, Elderly/Disabled)
- Personalized Public Transit (para-transit, route deviations, etc.)
  (General, Elderly/Disabled)

V. Advanced Vehicle Control Systems (AVCS)
- Longitudinal Collision Avoidance
  - Autonomous Intelligent Cruise Control
  - Cooperative Intelligent Cruise Control
- Lateral Collision Avoidance
  - Lane Keeping Warning and Control
- Intersection Collision Avoidance
- Safety Readiness
  - Vehicle Condition Warning
  - In-Vehicle Infrastructure Condition Warning
- Automated Highway System

L. Project Reports/Publications

- Title: A Guided Electric Vehicle Advanced Transit System
  Author: F.H. Koch

M. Comments

The enclosed pamphlets illustrate the overall design concept, the project described in this questionnaire is a particular application of the wider concept.

More comments available (contact the project manager)

A. Title of Program/Project/Activity

Project ID: 105
Project Title: **Commercial Vehicle Operations**

B. Responsible Organization

Organization ID: O 149
Organization Name: Mobile Computing Corporation

Mr A. Bowman
54 Lesmill Road
Toronto ON M3B 2T5
Tel: 416-449-5757
Fax: 416-449-4615

C. Other Participating Organizations

- Shell
- Imperial Oil
- Ultramar
- Petro-Canada
- Superior Propane
- Browning Ferrous Industries
- Waste Management Inc.
- Laidlaw Waste Systems

D. Description of the Project/Program/Activity

Major fleet customers including, Shell, Imperial Oil, Ultramar, Petro-Canada, Superior Propane, Browning Ferrous Industries, Waste Management Inc., Laidlaw Waste Systems , etc.

Description available (contact the project manager)

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Revenue Generation
- Business/Product Opportunity

F. Project Type

- Research and Development
- Standards Development
- System Architect/Integration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communications - Dispatch/Vehicle
- Communications - Area-wide Broadcast
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Identification - Cargo/Parcels
- Automatic Vehicle - Location
- Route Guidance - Centrally Driven
- InfoTransfer - Home/Offc Computers
- Monitoring - Vehicle Systems
- Weigh-In-Motion

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
   - Spread Spectrun
2. Vehicle Positioning
   - Loran-C
   - GPS
3. In-Vehicle Display
   - Electro-Luminescent
   - Printer
   - Keyboard

4. On-Board Data Storage
   - Smartcard
   - PCMCIA Card
   - EEPROM

J. Current Status

- Project Active

K. IVHS User Services by Application Area

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Vehicle Adiministrative Processes
  - Automated Mileage and Fuel Reporting and Auditing
- On-Board Safety Monitoring and Tracking (includes driver, vehicle and cargo)
- Commercial Fleet Management
  - Route Planning and Scheduling
- Regulatory Compliance and Law Enforcement
  - Commercial Vehicle Preclearance
    * Vehicle and driver records

M. Comments

We provide business information systems that deal with the product or service being delivered by a Fleet of Vehicle. Our applications all have quantifiable payback of less than 1 year. We do not have a «specific» IVHS project but all of our R&D (2.2 million in 1994) is directed towards fleet products.

A. Title of Program/Project/Activity

Project ID: 108
Project Title: **Smart fare payment and data collection system**

B. Responsible Organization

Organization ID: O 157
Organization Name: Precursor Ltd

Mr Michael Blurton
908-35 High Park Ave
Toronto ON M6P 2R6
Tel: 416-769-8079
Fax: 416-769-3869

C. Other Participating Organizations

- Ajax Transit
  Terry Barnett
  Tel: 905-427-5710

- MTO
  Kesh Chandra
  Tel: 416-235-4023

D. Description of the Project/Program/Activity

Fare payment system using smartcards and ID cards. Driver logging with smartcards. On-bus driver workschedules via smartcard. Data downloading to central computers.

E. Project Objectives

- Elderly and Disabled Needs
- Revenue Generation
- Passenger convenience

F. Project Type

- Full-Scale Application

G. Functions/Features

- InfoTransfer - Home/Offc Computers
- Electronic Collection User Charges

H. Enabling Technologies

3. In-Vehicle Display
   - LCD
   - Chime
   - Keyboard

4. On-Board Data Storage
   - EEPROM

J. Current Status

- Project Active
- Start Date: 1991
- Evaluation Information Available

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)

II. Advanced Traffic Management Systems (ATMS)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
    (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
  - Planning and Scheduling Services
    (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
  - Personnel Management
    (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
- Personalized Public Transit (para-transit, route deviations, etc.)
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)

M. Comments

Another project being carried out on Burlington Transit, Ontario.

A. Title of Program/Project/Activity

Project ID: 109
Project Title: **Advanced Traveller Information System for Use in Accessible Taxis**

B. Responsible Organization

Organization ID: O 160
Organization Name: Uwe Rutenberg

Mr U. Rutenberg
302 Legget Drive, Suite 128
Kanata ON K2K 1Y5
Tel: 613-599-8668
Fax: 613-599-8669

C. Other Participating Organizations

- Transportation Development Centre
  Trevus Smith
  Tel: 283-0022

D. Description of the Project/Program/Activity

Feasibility to determine communication between taxi driver and passenger, including those with hearing, speaking and language problems.

Integration with ATIS will be investigated, e.g. drivers information (real time), transit information (real time) and Traveller service information.

E. Project Objectives

- Elderly and Disabled Needs

F. Project Type

- Feasibility Study

G. Functions/Features

- Personal Communication System (PCS)

H. Enabling Technologies

1. Mobile Communication
   - PC/DC-I

3. In-Vehicle Display
   - CRT
   - Voice (synthesized/digitized)

4. On-Board Data Storage
   - DAT (Digital Audio Tape)

J. Current Status

- Project Planned
- Start Date: Jun-94
- Completion Date: Sep-94
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)
  - Driver Information
    (Elderly/Disabled, Ergonomics/Human Factors)
- Traveller Services Information (yellow pages, weather, etc.)
  (Elderly/Disabled)

A. Title of Program/Project/Activity

Project ID: 110
Project Title: **Automatic Vehicle Location/Control (AVLC) System Product**

B. Responsible Organization

Organization ID: O 166
Organization Name: Teleride Sage Ltd

Joseph Ho & Josef Kates
156 Front Street West
Toronto ON M5J 2L6
Tel: 416-596-1940
Fax: 416-595-5653

C. Other Participating Organizations

- Hamilton Street, Railway, BC Transit
- BC Transit

D. Description of the Project/Program/Activity

To develop AVLC product with interfaces to other company transit products.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Revenue Generation

F. Project Type

- Research and Development
- Standards Development
- System Architect/Integration
- Full-Scale Application

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communications - RoadSide/Vehicle
- Communications - Dispatch/Vehicle
- Communications - Area-wide Broadcast
- Automatic Identification - Vehicle
- Automatic Vehicle - Location
- Monitoring - Vehicle Systems

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)
   - Land Mobile Radio (VHF, UHF)
   - Satellite
2. Vehicle Positioning
   - Differential Odometer
   - Loran-C
   - GPS
   - Differential GPS
3. In-Vehicle Display
   - LED
   - Keyboard
4. On-Board Data Storage
   - RAM
   - EEPROM

I. Total Estimate Project Cost

Project Cost: $ 1 000 000

J. Current Status

- Project Active
- Start Date: Jun-93
- Completion Date: Dec-94
- Evaluation Done

K. IVHS User Services by Application Area

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
- Emergency Vehicle Management
  - Fleet Management

A. Title of Program/Project/Activity

Project ID: 111
Project Title: **Metropolitan Toronto Information Production System (MTIPS)**

B. Responsible Organization

Organization ID: O 166
Organization Name: Teleride Sage Ltd

Mr Joseph Ho
156 Front Street West
Toronto ON M5J 2L6
Tel: 416-596-1940
Fax: 416-595-5653

C. Other Participating Organizations

- Ministry of Transportation of Ontario, Toronto
  Marian Beainjon
  Tel: 235-5050

D. Description of the Project/Program/Activity

MTIPS is a real-time traffic and transit data acquisition, processing and dissemination information system which will support the demonstration of Travel Guide, a portable information system that can provide route guidance and route planning assistance to travellers.

E. Project Objectives

- Mobility Improvement

F. Project Type

- Database Development
- Demonstration/Field Trial

G. Functions/Features

- Transportation/Transit data fusion and dissemination

I. Total Estimate Project Cost

Project Cost: $ 80 000

J. Current Status

- Project Active
- Start Date: Jul-93
- Completion Date: Aug-94
- Evaluation Done

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
- En Route Transit Information

A. Title of Program/Project/Activity

Project ID: 112
Project Title: **Travel Guide**

B. Responsible Organization

Organization ID: O 167
Organization Name: Teranet Land Information Services Inc

Mr Brian Scrivens
1405 - 1 Adelaide St East
Toronto ON M5C 2V9
Tel: 416-360-5263
Fax: 416-360-8783

C. Other Participating Organizations

- FBI
  Frank Spitzer

- Navigation Technologies Inc
  Amy Hart

D. Description of the Project/Program/Activity

Project to demonstrate feasibility of hand-held vehicle navigation device.

E. Project Objectives

- Mobility Improvement
- Industrial/Regional Development

F. Project Type

- Feasibility Study
- Research and Development
- Database Development
- System Architect/Integration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial

G. Functions/Features

- Communication - Area-wide Broadcast
- Personal Communication System (PCS)
- Personal Digital Assistant (PDA)
- Navigation - Full In-Vehicle Map Display
- Route Guidance - Autonomous (in-veh.)
- Map DataBase - Road Side Attributes
- InfoTransfer - to Broadcast Media
- Monitoring - Traffic Flow

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops
   - AM/FM Broadcast (HAR/AHAR)
   - Broadcast SCA on FM (ARI, RDS)

2. Vehicle Positioning
   - Keyboard

3. In-Vehicle Display
   - LCD
   - Voice (synthesized/digitized)
   - Keyboard
   - Voice Recognition

J. Current Status

- Project Active
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
   - Pre-Trip Travel Information (transit, driver and ride-sharing)
   - En Route Transit Information (real time)
   - Route Guidance (includes general service; no emergency vehicle-specific)

M. Comments

Teranet provides base map to the project

A. Title of Program/Project/Activity

Project ID: 113
Project Title: **Traffic Signal Controller Development Models 170E and 179**

B. Responsible Organization

Organization ID: O 169
Organization Name: Topping Electronics, A division of Inspection Anal

Mr John Illingworth
215 Nantucket Blvd
Scarborough ON M1P 2P2
Tel: 416-285-1272
Fax: 416-757-8096

D. Description of the Project/Program/Activity

Model 170E and 179 Traffic Signal Controlled Developed.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Business/Product Opportunity

G. Functions/Features

- Info Transfer - to Changeable Signs
- Info Transfer - to Home/Offc Computers
- Monitoring - Traffic Flow

F. Project Type

- Research and Development
- Models Development
- Laboratory/Field Test Prototype
- Demonstration/Field Trial
- Full-Scale Application

I. Total Estimate Project Cost

Project Cost: $ 200 000

J. Current Status

- Project Active
- Start Date: Jan 93
- Completion Date: On going
- Evaluation Done
- Evaluation Information Available

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service) (General, Rural/Small Town)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority) (General, Rural/Small Town)
- Traffic Management (General, Rural/Small Town)

A. Title of Program/Project/Activity

Project ID: 114
Project Title: **Airport ground transportation efficiency**

B. Responsible Organization

Organization ID: O 171
Organization Name: Carleton University

Mr A.M. Khan
Department of Civil Engineering
Ottawa ON K1S 5B6
Tel: 613-788-2600 ext. 5786
Fax: 613-788-3951

C. Other Participating Organizations

- NSERC Research Grant (Operating Grant)

D. Description of the Project/Program/Activity

Airport ground transportation efficiency measures are under investigation that include the application of IVHS technologies for traffic as well as demand management. This area of research is an extension of a preliminary study carried out for the Airports Authority Group, Transport Canada, by Dr. Klan in 1988.

E. Project Objectives

- Operational Efficiency/Productivity
- Energy Conservation/Air Quality
- Enforcement of Regulation
- Revenue Generation

F. Project Type

- Research and Development

G. Functions/Features

- Communication - RoadSide/Vehicle
- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- InfoTransfer - to Changeable Signs
- Monitoring - Traffic Flow
- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - Infra-red
   - Mobile Cellular

4. On-Board Data Storage
   - Smart Transponder
   - Smartcard

J. Current Status

- Project Active
- Start Date: Apr-94
- Completion Date: Apr-96
- Evaluation Planned
- Evaluation Information Available Later

A. Title of Program/Project/Activity

Project ID: 115
Project Title: **Advanced traveller information system (ATIS)**

B. Responsible Organization

Organization ID: O 171
Organization Name: Carleton University

Mr A.M. Khan
Dept of Civil and Environmental Engineering
Ottawa ON K1S 5B6
Tel: 613-788-2600 ext: 5786
Fax: 613-788-3951

C. Other Participating Organizations

- NSERC Research Grant

D. Description of the Project/Program/Activity

Advanced traveller information system (ATIS) studies are underway. the aim is to include in ATIS design, the requirement of five-trip as well as en route information for supporting traveller decisions on departure time, travel mode and choice of route.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality

F. Project Type

- Research and Development

G. Functions/Features

- Communication - RoadSide/Vehicle
- Route Guidance - Autonomous (in-veh.)
- Route Guidance -Interactive W/ATMS

J. Current Status

- Project Active
- Start Date: Apr-94
- Completion Date: Apr-96
- Evaluation Planned

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing
- Route Guidance (includes general service; no emergency vehicle-specific)

A. Title of Program/Project/Activity

Project ID: 118
Project Title: **Dynamic Traffic Assignment Using Environmental Considerations**

B. Responsible Organization

Organization ID: O 176
Organization Name: National Defence, Civil Engineering, R.M.C.

Mr J.A. Stewart
Royal Military College of Canada
Kingston ON K7K 5L0
Tel: 613-541-6398
Fax: 613-545-3481

D. Description of the Project/Program/Activity

Description available (contact the project manager)

E. Project Objectives

- Energy Conservation/Air Quality

F. Project Type

- Research and Development

G. Functions/Features

- Route Guidance - Centrally Driven
- Route Guidance -Interactive w/ ATMS

I. Total Estimate Project Cost

Project Cost: $ 40 000

J. Current Status

- Project Planned
- Start Date: Jun-94
- Completion Date: Jun-95
- Evaluation Done

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing
- Route Guidance (includes general service; no emergency vehicle-specific)

II. Advanced Traffic Management Systems (ATMS)
- Travel Demand Management (regulatory, mode change, parking control, etc.)

M. Comments

$13,000.00 funding received from Academic Research Program (ARP) of P.N.P. for final year 94-95.

A. Title of Program/Project/Activity

Project ID: 141
Project Title: Intelligent In-Vehicle Routing System Based on Adaptative Routing

B. Responsible Organization

Organization ID: O 177
Organization Name: University of Guelph

Dr. James Linders
Dept. Comp. and Info Science
Guelph ON N1G 2W1
Tel: 519-824-4120
Fax: 519-837-0323

J. Current Status

- Project Active

A. Title of Program/Project/Activity

Project ID: 140
Project Title: **Impact of Technologies for Collecting Tolls and Operational Information Electronically**

B. Responsible Organization

Organization ID: O 186
Organization Name: Canadian Trucking Research Institute

M. Louis-Paul Tardif
130 Albert st Suite 300
Ottawa ON K1P 5G4
Tel: 613-236-9426
Fax: 613-563-2701

D. Description of the Project/Program/Activity

The study will seen to:
- survey IVHS programs and projects concerning electronic toll collection;
- survey planning, traffic mgt, regulatory and enforcement staffs of municipalities;
- identify process options and potential criteria;
- identify communication standards and protocols, reporting procedures and formats, database currency and access rules, and system operating and maintenance procedures;
- summarize North American issues.

E. Project Objectives

- Operational Efficiency/Productivity
- Enforcement of Regulation

F. Project Type

- Research and Development

G. Functions/Features

- Communication - RoadSide/Vehicle
- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Electronic Collection User Charges
- Electronic Collection of Operational Info

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)
   - Microwave
   - Infra-red

3. In-Vehicle Display
   - LED
   - Chime
   - Voice (synthesized/digitized)

4. On-Board Data Storage
   - Smart Transponder
   - TypeIII AVI Tag
   - Smartcard

I. Total Estimate Project Cost

Project Cost: $ 25 000

J. Current Status

- Project Active
- Start Date: July-93
- Completion Date: Oct-94

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Vehicle Adiministrative Processes
  - Automated Mileage and Fuel Reporting and Auditing
- Commercial Fleet Management
  - Route Planning and Scheduling
- Regulatory Compliance and Law Enforcement
  - Automated Roadside Inspection
  - Commercial Vehicle Preclearance
    * Roadside access to carrier
    * Vehicle and driver records

A. Title of Program/Project/Activity

Project ID: 122
Project Title: **Automatic Vehicle Location in Urban Transit Systems: Proceedings of the International Conference**

B. Responsible Organization

Organization ID: O 187
Organization Name: Canadian Urban Transit Association

Dr. Brendon Hemily, Ph.D.
55 York Street, Suite 901
Toronto ON M5J 1R7
Tel: 416-365-9800
Fax: 416-365-1295

D. Description of the Project/Program/Activity

AUTOMATIC VEHICLE LOCATION IN URBAN TRANSIT SYSTEMS: PROCEEDINGS OF THE INTERNATIONAL CONFERENCE:

CUTA organized in September 1988 an International Conference on Automatic Vehicle Location (AVL) in Urban Transit Systems. The conference, which attracted over 180 people from eleven countries, provided a unique forum to discuss the managerial and technological issues related to the development and effective use of this advanced technology. This 646 page document remains the most comprehensive reference on AVL in transit, and highlights many of the managerial challenges that systems still face today,even in light of technological advances.

Papers presented at this conference, and contained in the Proceedings, cover the following topics: international experiences with AVL costs and benefits of AVL defining the transit system's needs using AVL to provide management and planning information alternative technological approaches to AVL operational control strategies using AVL real-time information systems for patrons information systems integration operational, organizational, and human impacts of AVL and the future of AVL.

Included with this report is an additional reference, Automatic Vehicle Location and Control - Workshop Proceedings, November 15, 1987. This document contains several background papers that helped to structure the themes to be addressed in the 1988 conference.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement

F. Project Type

- Research and Development

G. Functions/Features

- Automatic Vehicle - Location

J. Current Status

- Project Completed
- Completion Date: 1988

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Transit Information (real time)

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
  - Personnel Management
- Personalized Public Transit (para-transit, route deviations, etc.)
- Emergency Notification and Personal Security
  - Driver and Personal Security
  - Automated Collision Notification
  - Hazardous Materials Incident Notification
- Public Travel Security
- Emergency Vehicle Management
  - Fleet Management
  - Route Guidance
  - Signal Priority

L. Project Reports/Publications

- Title: Automatic Vehicle Location in Urban Transit Systems: Set of 2 proceedings
  Author: CUTA
  Publication Available

A. Title of Program/Project/Activity

Project ID: 123
Project Title: **The Use of Automatic Vehicle Location for Planning and Management Information**

B. Responsible Organization

Organization ID: O 187
Organization Name: Canadian Urban Transit Association

Dr. Brendon Hemily, Ph.D.
55 York Street, Suite 901
Toronto ON M5J 1R7
Tel: 416-365-9800
Fax: 416-365-1295

D. Description of the Project/Program/Activity

THE USE OF AUTOMATIC VEHICLE LOCATION FOR PLANNING AND MANAGEMENT INFORMATION

This study explores from a generic point of view the means through which Automatic Vehicle Location (AVL) systems can be used to provide off-line data and reports for planning and management purposes, and develops guidelines with respect to data and information reporting, AVL system design and organizational requirements.

The review of the literature and current practice reveals that relatively little experience exists in North America or Europe in the use of AVL generated data for management and planning functions in urban transit. The study identifies three distinct types of off-line activities that can benefit from the use of AVL data: Planning & Scheduling Line Management Information and Executive Information and Executive Information.

The system design guidelines are presented in the form of a checklist offering recommendations and suggestions to facilitate the use of AVL for planning and management information in properties designing or tendering new AVL systems. The guidelines cover organizational, systems, and reporting issues. the appendices contain a large selection of actual reports generated from various transit systems using AVLS, organized under the three types of information.

E. Project Objectives

- Operational Efficiency/Productivity

F. Project Type

- Research and Development

G. Functions/Features

- Automatic Vehicle - Location

J. Current Status

- Project Completed
- Completion Date: 1992

K. IVHS User Services by Application Area

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
  - Personnel Management
- Personalized Public Transit (para-transit, route deviations, etc.)

L. Project Reports/Publications

- Title: The Use of Automatic Vehicle Location for Planning and Management Information
  Author: CUTA/Syhes Mueller
  Publication Available

M. Comments

Funded under strategic Transit Research Program - A national cooperative transit research program involving 17 organizations.

A. Title of Program/Project/Activity

Project ID: 124
Project Title: **Transit Priority Traffic Control Systems**

B. Responsible Organization

Organization ID: O 187
Organization Name: Canadian Urban Transit Association

Dr. Brendon Hemily, Ph.D.
55 York Street, Suite 901
Toronto ON M5J 1R7
Tel: 416-365-9800
Fax: 416-365-1295

D. Description of the Project/Program/Activity

The study is intended to document actual experiences with transit priority traffic control systems, is particular in Europe where the use of this technology is more widespread. The study will explore issues related to the applicability of this technology in the North American context.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement

J. Current Status

- Project Active
- Completion Date: Jun-94

K. IVHS User Services by Application Area

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
  - Personnel Management
- Emergency Vehicle Management
  - Signal Priority

L. Project Reports/Publications

- Title: Transit Priority Traffic Control Systems
  Author: CUTA/M.M. Dillon
  Publication Available

M. Comments

Funded under strategic Transit Research Program - a national cooperative transit research program involving 17 organizations.

A. Title of Program/Project/Activity

Project ID: 125
Project Title: **Monitoring of IVHS Developments**

B. Responsible Organization

Organization ID: O 188
Organization Name: EDI Council of Canada

Mr Marshall Spence
5401 Eglinton Ave West
Etobicoke ON M9C 5K6
Tel: 416-621-7160
Fax: 416-620-9175

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Business/Product Opportunity

F. Project Type

- Education/Training
- Standards Development

G. Functions/Features

- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Identification - Cargo/Parcels
- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - Satellite

3. In-Vehicle Display
   - Printer
   - Keyboard

4. On-Board Data Storage
   - CD-ROM

J. Current Status

- Project Active

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)

A. Title of Program/Project/Activity

Project ID: 207
Project Title: **Canadian Road Network GIS Database**

B. Responsible Organization

Organization ID: Q 216
Organization Name: Ressources Naturelles Canada

M. Yves Robitaille
2144 King Ouest, suite 010
Sherbrooke QC J1J 2E8
Tel: 819-564-4803
Fax: 819-564-5698

D. Description of the Project/Program/Activity

This project objective is to supply a basic GIS map for the Canadian territory. To this date, the following has been executed:

•User survey (more than 150 users)
•General specifications of the product (available)
•Multi-phases implementation (Version 1.0 of Quebec and Ontario product is under production).

Based on user request priority will be given to the old Canadian Territory for Version 1.0. Project output will be the Canadian Road Network.

E. Project Objectives

- Info for GIS-T

F. Project Type

- Database Development

G. Functions/Features

- Map DataBase - Road System Only

H. Enabling Technologies

2. Vehicle Positioning
   - Map Matching

I. Total Estimate Project Cost

Project Cost: $ 350 000

J. Current Status

- Project Active
- Completion Date: Sep-95
- Evaluation Done
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing
- En Route Transit Information (real time)
- Traveller Services Information (yellow pages, weather, etc.)

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Travel Demand Management (regulatory, mode change, parking control, etc.)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Traffic Management

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- Regulatory Compliance and Law Enforcement
  - Automated Roadside Inspection
  - Commercial Vehicle Preclearance

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
- Emergency Vehicle Management

V. Advanced Vehicle Control Systems (AVCS)
- Longitudinal Collision Avoidance
- Intersection Collision Avoidance
- Vision Enhancement for Crash Avoidance (inclement weather and at night)
- Automated Highway System

M. Comments

GIS Roadway a Database can be used for numerous applications. Partnership with other users seems very promising.

A. Title of Program/Project/Activity

Project ID: 242
Project Title: **Report on Environmental Impact of IVHS**

B. Responsible Organization

Organization ID: Q 217
Organization Name: Environnement Canada

M. Russ Robinson
351 St-Joseph Blvd, 13th Floor, Place Vincent Mass
Hull QC K1A 0H3
Tel: 819-953-1601
Fax: 819-953-7815

D. Description of the Project/Program/Activity

Overview of IVHS from the environmental perspective.

E. Project Objectives

- Energy Conservation/Air Quality

F. Project Type

- Feasibility Study

I. Total Estimate Project Cost

Project Cost: $ 10 000

J. Current Status

- Project Completed
- Evaluation Planned
- Evaluation Information Available Later

A. Title of Program/Project/Activity

Project ID: 231
Project Title: **Montreal Freeway Traffic Management System**

B. Responsible Organization

Organization ID: Q 218
Organization Name: Ministère des transports du Québec

Mme Sandra Sultana
35, rue Port Royal Est, 4e étage
Montréal QC H3L 3T1
Tel: 514-873-5245
Fax: 514-973-4730

C. Other Participating Organizations

- BBL/MONENCO/STERIA/GESPRO
  Paul Ouimet
  Tel: 514-499-4643
  Fax: 514-499-4515

- CIMA+/WALSH/ISIS
  Paul Gratton
  Tel: 514-688-4970
  Fax: 514-688-6333

D. Description of the Project/Program/Activity

Description available (contact the project manager).

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Industrial/Regional Development

F. Project Type

- System Architecture/Integration
- Full-Scale Application

G. Functions/Features

- Automatic Vehicle - Classification
- Route Guidance- interactive w/ATMS
- InfoTransfer - to Broadcast Media
- Monitoring - Traffic Flow

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops

I. Total Estimate Project Cost

Project Cost: $ 25 000 000

J. Current Status

- Project Active
- Start Date: 28-Jun-94
- Completion Date: 1-Dec-97
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Travel Demand Management (regulatory, mode change, parking control, etc.)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Traffic Management

A. Title of Program/Project/Activity

Project ID: 209
Project Title: **High Speed Weigh In Motion Station-Pilot Project**

B. Responsible Organization

Organization ID: Q 219
Organization Name: Société de l'assurance automobile du Québec

M. Renaud Raymond
333, boul. Jean-Lesage F-M-8
Québec QC G1K 8J6
Tel: 418-528-3561
Fax: 418-646-9704

C. Other Participating Organizations

- Signalisation de Montréal Inc.
  Michael DeSantis
- Agence de distribution M. Fabien Inc.
  Michel Fabien

D. Description of the Project/Program/Activity

The project consists into the validation of the functionality of on board weighting system supplied by two different suppliers.

E. Project Objectives

- Operational Efficiency/Productivity

F. Project Type

- Demonstration/Field Trial

G. Functions/Features

- Weigh-In-Motion

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops

I. Total Estimate Project Cost

Project Cost: $ 85 000

J. Current Status

- Project Active
- Start Date: Aug-93
- Completion Date: Aug-94
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- Regulatory Compliance and Law Enforcement
  - Automated Roadside Inspection (Rural/Small Town)

A. Title of Program/Project/Activity

Project ID: 210
Project Title: **RMU Radiocommunication System use for Data Transfer**

B. Responsible Organization

Organization ID: Q 219
Organization Name: Société de l'assurance automobile du Québec

M. François Binette
333, boul. Jean-Lesage, C-1-44
Québec QC G1K 8J6
Tel: 418-528-3502
Fax:

C. Other Participating Organizations

- Ministère des Communications
  Gaétan Trépanier
  Tel: 528-0418
  Fax: 644-6113
- M3I
- Bell Mobilité

D. Description of the Project/Program/Activity

The project consists into the evaluation of the existing radiocommunication system between S.A.A.Q. and its road patrols to transfer computer data between the central computer facility and the S.A.A.Q. emergency vehicles.

E. Project Objectives

- Operational Efficiency/Productivity

F. Project Type

- Feasibility Study
- Demonstration/Field Trial

G. Functions/Features

- Communication - RoadSide/Vehicle

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)

J. Current Status

- Project Active
- Start Date: Oct-93
- Completion Date: Jul-94
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
   - Traffic Network Monitoring and Control (includes transit priority and HOV priority) (Rural/Small Town)

A. Title of Program/Project/Activity

Project ID: 211
Project Title: **Overloaded Heavy Truck Preselection at Weigh In Motion Stations**

B. Responsible Organization

Organization ID: Q 219
Organization Name: SAAQ - Service du contrôle du transport routier

Mme Monique Dufour
333, boul. Jean-Lesage, S-1-38
Québec QC G1K 8J6
Tel: 418-528-3273
Fax: 418-644-0199

D. Description of the Project/Program/Activity

Opportunity study of wave in motion equipment at waiting station with heavy truck traffic. Such an implementation with alow preselection of heavy vehicles with high potential of overload.

E. Project Objectives

- Operational Efficiency/Productivity
- Enforcement of Regulation
- Preservation Roadway Infrastructure

F. Project Type

- Feasibility Study

G. Functions/Features

- Automatic Vehicle - Classification
- Weigh-In-Motion

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops

J. Current Status

- Project Active

K. IVHS User Services by Application Area

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- Regulatory Compliance and Law Enforcement

A. Title of Program/Project/Activity

Project ID: 235
Project Title: **Computerized Traffic Signals Control System**

B. Responsible Organization

Organization ID: Q 223
Organization Name: Ville de Montréal, division de la circulation

M. Carol Richard, ing., Chef de section
700, rue St-Antoine Est, bu 1-500
Montréal QC H2Y 1A6
Tel: 514-872-5977
Fax: 514-872-9458

D. Description of the Project/Program/Activity

Computer based control system for traffic signals on Viger, St-Antoine and Notre-Dame Streets (42 traffic signals intersections).

The systems automatically adapt itself to the vehicle density measured by induction loops tied down to a central microcomputer that provides control and supervision of all other equipment.

E. Project Objectives

- Road Safety
- Mobility Improvement

F. Project Type

- Full-Scale Application

G. Functions/Features

- Communication - Area-wide Broadcast
- Monitoring - Traffic Flow

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops
   - Microwave
   - Bell Canada Line

I. Total Estimate Project Cost

Project Cost: $ 354 422

J. Current Status

- Project Completed
- Evaluation Done
- Evaluation Information Available

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Traffic Management

M. Comments

Comments available (contact the project manager)

A. Title of Program/Project/Activity

Project ID: 232
Project Title: **SAGEPAS (Automated Bus Fleet Management System - Automated Bus Location System)**

B. Responsible Organization

Organization ID: Q 234
Organization Name: Société de transport de l'Outaouais

M. Robert Lessard
111, rue Jean-Proulx
Hull QC J8Z 1T4
Tel: 819-776-6934
Fax: 819-770-5987

C. Other Participating Organizations

- Fischbach & Moore (Dallas)
- Gandalf (Ottawa)
  John Seymour
  Tel: 613-723-6500
- Transmax (Californie)

D. Description of the Project/Program/Activity

Implement non board automated localisation system with the following objectives:

•Know at all time bus location.
•Real time and identification of the schedule circuits met by the buses.
•Supply telephone information to users to know the exact time of arrival at the specific stop of the circuit.
•Allow the drivers to communicate at anytime with the circuits supervisors.
•Supply to the drivers an emergency system to inform circuits supervisors.
•Detect mechanical problem and automatically transmit the information to the supervisors.
•Build a database for later analysis and management reports.
•Automatically do passenger counts.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity

F. Project Type

- Full-Scale Application

G. Functions/Features

- Communication - RoadSide/Vehicle
- Communication - Dispatch/Vehicle
- Personal Digital Assistant (PDA)
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Vehicle - Location
- Monitoring - Traffic Flow

H. Enabling Technologies

1. Mobile Communication
   - AM/FM Broadcast (HAR/AHAR)
   - Land Mobile Radio (VHF, UHF)
2. Vehicle Positioning
   - Differential Odometer
   - Proximity Beacons
3. In-Vehicle Display
   - LED
   - Keyboard
4. On-Board Data Storage
   - RAM

I. Total Estimate Project Cost

Project Cost: $ 2 000 000

J. Current Status

- Project Completed
- Start Date: Dec 83
- Completion Date: 1986

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)
  - Driver Information

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- On-Board Safety Monitoring and Tracking (includes driver, vehicle and cargo)
- Commercial Fleet Management
  - Route Planning and Scheduling

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
- Emergency Notification and Personal Security
  - Driver and Personal Security

V. Advanced Vehicle Control Systems (AVCS)
- Safety Readiness
  - Vehicle Condition Warning

A. Title of Program/Project/Activity

Project ID: 233
Project Title: **Adaptation of a Visual Communication Network On Board Buses**

B. Responsible Organization

Organization ID: Q 224
Organization Name: Société de transport de l'Outaouais

M. Robert Lessard
111, rue jean-Proulx
Hull QC J8Z 1T4
Tel: 819-776-6934
Fax: 819-770-5987

C. Other Participating Organizations

- Télécité Inc. (Montréal)
  Angelo Guercioni
  Tel: 514-875-2483

D. Description of the Project/Program/Activity

Develop an application for buses of a visual communication network used in Montreal metro to inform it's users.

E. Project Objectives

- Mobility Improvement
- Elderly and Disabled Needs

F. Project Type

- Feasibility Study
- Research and Development
- Demonstration/Field Trial

G. Functions/Features

- InfoTransfer - to Changeable Signs

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)

3. In-Vehicle Display
   - Electro-Luminescent

J. Current Status

- Project Planned
- Start Date: Summer 94

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Traveler Services Information (yellow pages, weather, etc.)

A. Title of Program/Project/Activity

Project ID: 234
Project Title: **SIVT (On Board Buses Computer Fare Collection System)**

B. Responsible Organization

Organization ID: Q 224
Organization Name: Société de transport de l'Outaouais

M. Michel Brissette
111, rue Jean-Proulx
Hull QC J8Z 1T4
Tel: 819-776-6927
Fax: 819-770-5987

D. Description of the Project/Program/Activity

Implement a on board fee management system paste on intelligent smartcard for users. The system must meet the following objectives:

FEE VALIDATION RELATED OBJECTIVES

•Simply the drivers tasks by reducing to a minimum the fee management on board.
•Minimize discussions between drivers and users concerning fee collection.
•Insure a rigorous control of the transfer passes.
•Minimised if not eliminate use of coins or other currency.
•Implement safely systems that will reduce fraud.

OPERATIONAL PLANNING RELATED OBJECTIVES

•Automatically collect information concerning a fee use by the users and the circuit on which is been recording.
•Identified user description in regards with stops and municipal boundaries.
•Identified the various types of user and regroup them for revenues projections.
•Replace the microprocessor in order to improve the location system of vehicle in order to generate more precise data for planning use.

REVENUE MANAGEMENT RELATED OBJECTIVES

•Maintain an efficient retail ticket distribution network (banks, etc.).
•Increase the frequency of revenue collection at distribution location.

EQUIPMENT RELATED OBJECTIVES

•Maintain great flexibility for upcoming technologies.
•Allow for a wide spread of simple fare system of easy implementation.

E. Project Objectives

- Operational Efficiency/Productivity
- Revenue Generation

F. Project Type

- Full-Scale Application

G. Functions/Features

- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Electronic Collection User Charges

H. Enabling Technologies

3. In-Vehicle Display
   - LED
   - Printer
   - Keyboard

4. On-Board Data Storage
   - Smartcard
   - RAM

I. Total Estimate Project Cost

Project Cost: $ 3 100 000

J. Current Status

- Project Planned
- Start Date: Summer 94
- Completion Date: Automne 95
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)
  - Driver Information

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems

A. Title of Program/Project/Activity

Project ID: 228
Project Title: **Desigh of Vocal and Visual Communication Systems On Board Buses and Metros**

B. Responsible Organization

Organization ID: Q 225
Organization Name: Société de transport de la CUM

M. Gilles Gagnon
800, de la Gauchetière Ouest, C.P. 2000, bur E1200
Montréal QC H5A 1J6
Tel: 514-280-5365
Fax: 514-280-5437

D. Description of the Project/Program/Activity

•Signage and announcement of the upcoming transfer stations along bus circuits.
•Bus and metro circuits signage at the main transfer points of the network.
•Animated publicity.

E. Project Objectives

- Mobility Improvement
- Elderly and Disabled Needs
- Business/Product Opportunity

F. Project Type

- Feasibility Study

G. Functions/Features

- Communication - RoadSide/Vehicle
- Communication - Dispatch/Vehicle
- Automatic Vehicle - Location
- InfoTransfer - to Changeable Signs

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)
2. Vehicle Positioning
   - Proximity Beacons
3. In-Vehicle Display
   - Electro-Luminescent
   - Voice (synthesized/digitized)
4. On-Board data Storage
   - Undergoing Evaluation

J. Current Status

- Project Planned
- Start Date: Jun-94

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)
  - In-vehicle Signing
    (General, Elderly/Disabled, Ergonomics/Human Factors)

A. Title of Program/Project/Activity

Project ID: 229
Project Title: **Automatic Data Collection System On Board Buses**

B. Responsible Organization

Organization ID: Q 225
Organization Name: S.T.C.U.M.

Mme Martine Lavoie
800, de la Gauchetière Ouest, C.P. 2000, BUR 1100
Montréal QC H5A 1J6
Tel: 514-280-5373
Fax: 514-280-5333

D. Description of the Project/Program/Activity

These automatic data collection system for on board counts and timing and scheduling up bus circuits is install on twelve percent of the vehicle fleet of MUCTC a sampling of the data is collected.

Data is loaded by stops and memorized and a relational database system. Data are than downloaded and sorted and treated depending on various company and user needs.

E. Project Objectives

- Operational Efficiency/Productivity

F. Project Type

- Full-Scale Application

G. Functions/Features

- Communication - RoadSide/Vehicle
- Automatic Vehicle - Location
- Map DataBase - Road System Only
- Info Transfer - to home/Offc Computer

H. Enabling Technologies

1. Mobile Communication
   - Infra-red

2. Vehicle Positioning
   - Differential Odometer
   - Proximity Beacons

4. On-Board Data Storage
   - EEPROM

J. Current Status

- Project Active
- Start Date: May-94
- Completion Date: Nov-95
- Evaluation Done
- Evaluation Information Available

K. IVHS User Services by Application Area

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Planning and Scheduling Services

A. Title of Program/Project/Activity

Project ID: 230
Project Title: **Radiocommunication System for Buses**

B. Responsible Organization

Organization ID: Q 225
Organization Name: S.T.C.U.M.

M. Gilles Gagnon
800, de la Gauchetière Ouest, C.P. 2000, bur E1200
Montréal QC H5A 1J6
Tel: 514-280-5365
Fax: 514-280-5437

C. Other Participating Organizations

- Pierre Lebel & Ass. Inc.
  Pierre Lebel
  Tel: 514-526-2660
  Fax: 514-526-9684

- Ericsson
  Jean Fortier
  Tel: 514-333-2709
  Fax: 514-333-2712

D. Description of the Project/Program/Activity

Equip urban buses with radiocommunication system allowing:

•Regular and emergency calls with the caller identification.
•Computer control led queues and requests with a bidirectional communication link between central facility in vehicle equipment.
•Establish a private communication between the bus and the central facility that can be monitor by the circuit supervisors.
•Allow for more than a central facility console to monitor the call requests.
•Group calling provision.
•Dynamic regrouping of vehicles.
•Integrate the system to an intelligent operation system.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity

F. Project Type

- Full-Scale Application

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communications - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Vehicle - Classification

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)

3. In-Vehicle Display
   - LCD

4. On-Board Data Storage
   - EEPROM

I. Total Estimate Project Cost

Project Cost: $ 5 200 000

J. Current Status

- Project Completed
- Evaluation Done

K. IVHS User Services by Application Area

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Planning and Scheduling Services
- Emergency Notification and Personal Security
  - Driver and Personal Security

A. Title of Program/Project/Activity

Project ID: 224
Project Title: **High Available Distributed Client-Server Computing System Item for Mission-Critical real-time Monitoring & Control Systems**

B. Responsible Organization

Organization ID: Q 230
Organization Name: CAE Electronics Ltd

M. Roy Hoffman
P.O. Box 1800
St Laurent QC H4L 4X4
Tel: 514-341-2000 ext:2483
Fax: 514-734-5617

D. Description of the Project/Program/Activity

Development of a state-of-the-art, open-architecture, client-server distributed, real-time, high-availability computer system for the management, monitoring, supervision and real time control of complex, geographically distributed systems.

The initial application for this system has been for Supervisory Control and Date Acquisition (SCADA), Energy Management Systems and Distribution Management Systems for Electric Power Utilities as well as for Air Traffic Control Systems.

However, CAE is also pursuing applications in the real time monitoring and control of expressway vehicular traffic systems.

E. Project Objectives

- Operational Efficiency/Productivity
- Enforcement of Regulation

F. Project Type

- Research and Development
- Database Development
- Models Development
- Standards Development
- System Architect/Integration
- Laboratory/Field Test Prototype
- Full-Scale Application

G. Functions/Features

- Communication - Dispatch/Vehicle
- Automatic Vehicle - Location
- Route Guidance -Interactive w/ ATMS
- Map DataBase - Road System Only
- Map Overlays (external) - weather, etc.
- InfoTransfer - to Changeable Signs
- InfoTransfer - to Broadcast Media
- InfoTransfer - Home/Offc Computers
- Monitoring - Traffic Flow
- Monitoring - Vehicle Systems

I. Total Estimate Project Cost

Project Cost: $ 7 000 000

J. Current Status

- Project Active
- Project Completed
- Start Date: 1992
- Completion Date: 1994
- Evaluation Planned

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)
- Traffic Management

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
- Emergency Vehicle Management
  - Fleet Management
  - Route Guidance

V. Advanced Vehicle Control Systems (AVCS)
- Automated Highway System

A. Title of Program/Project/Activity

Project ID: 214
Project Title: **Design of a Vehicle Location and Data Transmission Systems for over 300 Buses Service**

B. Responsible Organization

Organization ID: Q 275
Organization Name: Genitec Télécommunication Inc.

M. Robert Proulx
375, boul. Roland-Therrien, bureau 400
Longueuil QC J4H 4A6
Tel: 442-9608
Fax: 442-0638

C. Other Participating Organizations

- STRSM
  Donald Deschênes
  Tel: 445-7215

D. Description of the Project/Program/Activity

Design a vehicle location and data transmission system for fleet of more than 300 buses.

Each bus will be equiped with a vehicle of a location and data transmission system that will supply at a fixed rate, location of the buses, information about the buses use (as number of passengers on board) and various mechanical equipment of the vehicle status.

This data will be transmitted to two dispatching centres that will treat the informations.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity

F. Project Type

- Full-Scale Application

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communications - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Vehicle - Classification
- Automatic Vehicle - Location
- Route Guidance -Interactive w/ ATMS
- InfoTransfer - Home/Offc Computers
- Monitoring - Vehicle Systems
- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
   - Satellite
   - Undergoing evaluation
2. Vehicle Positioning
   - Gyro
   - Differential Odometer
   - Map Matching
   - Proximity Beacons
   - Loran-C
   - GPS
   - Differential GPS
   - Undergoing evaluation
3. In-Vehicle Display
   - LED
   - Chime
   - Voice (synthesized/digitized)
   - Undergoing Evaluation
4. On-Board Data Storage
   - Undergoing evaluation

J. Current Status

- Project Planned
- Start Date: 1-Apr-94
- Completion Date: 1-Dec-94
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Parking Management
- Traffic Management

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
  - Personnel Management
- Personalized Public Transit (para-transit, route deviations, etc.)
- Emergency Notification and Personal Security
  - Driver and Personal Security
  - Automated Collision Notification
  - Hazardous Materials Incident Notification
- Public Travel Security

A. Title of Program/Project/Activity

Project ID: 221
Project Title: **Chock Resistant Portable Computer Design (PC Mobile)**

B. Responsible Organization

Organization ID: Q 240
Organization Name: M3I Technologies

M. Raymond Granger
1111, rue St-Charles Ouest, bureau 135
Longueuil QC J4K 5G4
Tel: 514-928-4600
Fax: 514-928-3013

D. Description of the Project/Program/Activity

The Mobile PC that M3I Technologies intends to develop meets the requirements of various industrial users with a real time communication link between service personal and the supervising personal. The data exchange will be possible because of the integration of radio and radio-modems within the computer for numerical data communication. R&D activities of M3I Technologies are concentrating onto the development and marketing of an electronic portable PC capable of withstanding hostile environment conditions. Such an environment with include vibrations (as in a vehicle), dust (manufacturers or industrial sites), variable lighting conditions or variable temperature conditions.

The markets aimed for are, in a first, phase, the installation and maintenance service crews for public utilities (hydro, telephone, cable tv and others) and the fleet management authorities (police, fireman, ambulance, trucking industry and others).

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Business/Product Opportunity

F. Project Type

- Research and Development
- Standards Development
- Demonstration/Field Trial

G. Functions/Features

- InfoTransfer - Home/Offc Computers

H. Enabling Technologies

1. Mobile Communication
   - Mobile Cellular
   - Satellite

3. In-Vehicle Display
   - Electro-Luminescent
   - CRT
   - LCD
   - Keyboard

4. On-Board Data Storage
   - RAM
   - PCMCIA Card
   - CD-ROM

I. Total Estimate Project Cost

Project Cost: $ 4 600 000

J. Current Status

- Project Active
- Start Date: Jan-94
- Completion Date: Jun-95
- Evaluation Done

M. Comments

The product undergoing development is useful for all K section applications.

A. Title of Program/Project/Activity

Project ID: 222
Project Title: **Vehicle Fleet Management Systems (Emergency Service Applications)**

B. Responsible Organization

Organization ID: Q 240
Organization Name: Solutions ROADsoft

M Bruce Ricketts
1111, rue St-Charles Ouest, bureau 135
Longueuil QC J4K 5G4
Tel: 514-928-4600
Fax: 514-442-5076

D. Description of the Project/Program/Activity

Description available (contact the project manager).

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Revenue Generation

F. Project Type

- Full-Scale Application

G. Functions/Features

- Communication - RoadSide/Vehicle
- Communication - Dispatch/Vehicle
- Personal Communication System (PCS)
- Automatic Identification - Vehicle
- Automatic Vehicle - Classification
- Automatic Vehicle - Location
- Navigation - Full In-Vehicle Map Display
- Route Guidance - Autonomous (in-veh.)
- Map DataBase - Road System Only
- InfoTransfer - Home/Offc Computers

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
   - Satellite
2. Vehicle Positioning
   - Gyro
   - GPS
   - Differential GPS
3. In-Vehicle Display
   - CRT
   - Keyboard
4. On-Board Data Storage
   - RAM
   - PCMCIA Card

J. Current Status

- Project Completed

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing) (General, Rural/Small Town)
- En Route Driver Information (real time)
  - Driver Information (General, Rural/Small Town)
- En Route Transit Information (real time) (General, Rural/Small Town)

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Fleet Management (General, Rural/Small Town)

A. Title of Program/Project/Activity

Project ID: 223
Project Title: **Feasibility Study of a Intelligent Vehicle Fleet Management System**

B. Responsible Organization

Organization ID: Q 240
Organization Name: Solutions ROADsoft

M. Raymond Granger
1111, rue St-Charles Ouest, bureau 135
Longueuil QC J4K 5G4
Tel: 514-928-4600
Fax: 514-928-3013

C. Other Participating Organizations

- Centre technologique en Aérospatiale
  Yves Paradis
  Tel: 514-678-2001
  Fax: 514-678-3240

D. Description of the Project/Program/Activity

Feasibility study for the design of a intelligent control system of fleets. Evaluate for various user needs potential markets and technologies and identify research and development «niche» with most commercial potential.

Management systems for transportation companies are becoming an interesting business opportunity. Study objective is to identified the best business opportunities taking into accounts market requirements and the manufacturer's highlights.

E. Project Objectives

- Operational Efficiency/Productivity
- Enforcement of Regulation
- Business/Product Opportunity

F. Project Type

- Feasibility Study
- Research and Development

G. Functions/Features

- Personal Communication System(PCS)
- Automatic Identification - Vehicle
- Automatic Identification - Cargo/Parcels
- Automatic Vehicle- Location
- Navigation - Full in-vehicle map Display
- Route guidance - Autonomous (in-veh.)
- Map Database - Road system only
- InfoTransfer - to Changeable Signs
- Monitoring - Traffic Flow
- Weigh-In-Motion
- Electronic Collection User Charges

H. Enabling Technologies

1. Mobile Communication
   - Mobile Cellular
   - Satellite
2. Vehicle Positioning
   - Gyro
   - GPS
   - Differential GPS
3. In-Vehicle Display
   - Undergoing evaluation
4. On-Board Data Storage
   - Undergoing evaluation

J. Current Status

- Project Active
- Start Date: Jan-94
- Completion Date: Oct-95
- Evaluation Done

K. IVHS User Services by Application Area

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- Commercial Fleet Management (Rural/Small Town)
- Regulatory Compliance and Law Enforcement
  - Automated Roadside Inspection (Rural/Small Town)
  - Commercial Vehicle Preclearance (Rural/Small Town)

A. Title of Program/Project/Activity

Project ID: 218
Project Title: **Environment Relational Teleguidance System**

B. Responsible Organization

Organization ID: Q 246
Organization Name: Véhicules et Robots Vitri Inc

M. Pierre F. Alepin
238 de Brullon
Boucherville QC J4B 2J8
Tel: 514-641-3914
Fax: 514-449-2139

D. Description of the Project/Program/Activity

Description available (contact the project managaer).

E. Project Objectives

- Mobility Improvement
- Business/Product Opportunity

F. Project Type

- Research and Development
- System Architech/Intergration
- Simulations

G. Functions/Features

- Analogical artificial Intelligent Structure

J. Current Status

- Project Completed

L. Project Reports/Publications

- Title: Intuitive Communication Environnement (Welcome to the IoCoEo Age) - Ébauche septembre 1991
  Author: Pierre F. Alepin
- Title: The Movement Utility - Septembre 1973
  Author: Pierre F. Alepin
- Title: The Automatic Bus Passenger Information System an Evolutionary Development Project
  Author: CUTA, P.F. Alepin

M. Comments

An Environment Relational Teleguidance System developed by Pierre F. Alepin in 1965 is actually undergoing a computer simulation evaluation. It is a new analogic paradigm applicable to the whole K section applications of the questionnaire.

A. Title of Program/Project/Activity

Project ID: 217
Project Title: **Projet mobilisateur - Transporteur**

B. Responsible Organization

Organization ID: Q 249
Organization Name: Le Groupe CGI

M. J.F. Bissonnette
5300, boul. des Galeries, bureau 300
Québec QC G2K 2A2
Tel: 418-623-0101
Fax: 418-623-4114

C. Other Participating Organizations

- M3I
  Pierre Drolet, Richard Gobeil
  Tel: 514-928-3386
  Fax: 514-442-5076

- Association du camionnage du Québec
  Raymond Bréard
  Tel: 514-932-0377
  Fax: 514-932-1358

D. Description of the Project/Program/Activity

Description available (contact the project manager).

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Enforcement of Regulation
- Business/Product Opportunity

F. Project Type

- Research and Development
- Full-Scale Application

G. Functions/Features

- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Identification - Cargo/Parcels
- InfoTransfer - Home/Offc Computers
- Weigh-In-Motion

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
2. Vehicle Positioning
   - Differential GPS
3. In-Vehicle Display
   - Voice (synthesized/digitized)
   - Keyboard
4. On-Board Data Storage
   - Smartcard
   - RAM
   - PCMCIA Card

J. Current Status

- Project Planned
- Start Date: Jan-95
- Evaluation Done

K. IVHS User Services by Application Area

III. Advanced Freight Management Systems (AFMS)
/ Commercial Vehicle Operations (CVO)
- Commercial Vehicle Adiministrative Processes
  - Electronic Purchase of Credentials
  - Automated Mileage and Fuel Reporting and Auditing
- On-Board Safety Monitoring and Tracking (includes driver, vehicle and cargo)
- Commercial Fleet Management
  - Inter-modal Transportation Planning
  - Inter-modal Terminal Operation
  - Route Planning and Scheduling
- Regulatory Compliance and Law Enforcement
  - Automated Roadside Inspection
  - Commercial Vehicle Preclearance
    * Roadside access to carrier
    * Vehicle and driver records
    * International border preclearance

L. Project Reports/Publications

- Title: Lettre d'intention au Fonds de développement technologique du Québec
  Author: CGI Group

A. Title of Program/Project/Activity

Project ID: 246
Project Title: **A manufacturer of IVHS relayed components**

B. Responsible Organization

Organization ID: Q 250
Organization Name: Dataradio Inc.

M. Frank Bram
5500 Royalmount Ave, bur 200
Ville Mont-Royal QC H4P 1Y7
Tel: 514-737-0020
Fax: 514-737-7883

D. Description of the Project/Program/Activity

Manufactured of radio based modems used in various IVHS applications such as pathfinder, Trautech, Telecite and others. Also used in various AVL and dispatch applications. Our modems are also used in varioux sign projects including Ontario Ministry for Transportation.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Business/Product Opportunity

F. Project Type

- Feasibility Study
- Research and Development
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communication - RoadSide/Vehicle
- Communication - Dispatch/Vehicle
- Communication - Area-wide Broadcast
- Automatic Vehicle - Location
- Navigation - Full In-Vehicle Map Display
- Route Guidance - Centrally Driven
- Map DataBase - Road Side Attributes
- InfoTransfer - to Changeable Signs
- Monitoring - Traffic Flow
- Monitoring - Vehicle Systems

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)

A. Title of Program/Project/Activity

Project ID: 226
Project Title: **Automatic Vehicle Location System**

B. Responsible Organization

Organization ID: Q 252
Organization Name: Canadian Marconi Company

M. Mark Wasserman
600, boulevard Dr. Frederick Philips
St Laurent QC H4M 2S9
Tel: 514-748-3028
Fax: 514-748-3055

C. Other Participating Organizations

- Avel-Tech
  Michel Jarry
  Tel: 514-668-2835

D. Description of the Project/Program/Activity

CMC is developing Automatic Vehicle Location Systems applicable to trucking and service fleets.

Products under development will apply latest technologies available to provide turn-key systems of maximum efficiency at affordable cost.

CMC will apply its own technologies such as DGPS, radio and satellite communications displays, voice recognition, etc., and combine these with product and service offerings of strategic business partners.

E. Project Objectives

- Business/Product Opportunity

F. Project Type

- Research and Development
- System Architect/Integration
- Full-Scale Application

G. Functions/Features

- Communication - Dispatch/Vehicle
- Communication - Area-wide Broadcast
- Automatic Identification - Driver
- Automatic Identification - Cargo/Parcels
- Automatic Vehicle - Location
- Navigation - Directional Arrows
- Navigation - Full In-Vehicle Map Display
- Route Guidance - Autonomous (in-veh.)
- Monitoring - Vehicle Systems
- Monitoring Driver Alertness
- Proximity Radar
- Intelligent Cruise (gap radar)
- Lane Assist/Control (lateral)
- Weigh-In-Motion

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)
   - Broadcast SCA on FM (ARI, RDS)
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
   - Satellite

2. Vehicle Positioning
   - Gyro
   - Map Matching
   - GPS
   - Differential GPS

3. In-Vehicle Display
   - LED
   - LCD
   - Chime
   - Voice (synthesized/digitized)
   - Printer
   - Keyboard
   - Voice Recognition

4. On-Board Data Storage
   - Smart Transponder
   - Smartcard
   - RAM
   - CD-ROM
   - EEPROM

J. Current Status

- Project Active
- Start Date: 1-Apr-94
- Evaluation Done

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing
- En Route Transit Information (real time)
- Route Guidance (includes general service; no emergency vehicle-specific)

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- Commercial Vehicle Adiministrative Processes
  - Automated Mileage and Fuel Reporting and Auditing
- On-Board Safety Monitoring and Tracking (includes driver, vehicle and cargo)
- Commercial Fleet Management
  - Route Planning and Scheduling

IV. Advanced Public Transportation Systems (APTS)
- Emergency Notification and Personal Security
  - Driver and Personal Security
  - Hazardous Materials Incident Notification
- Emergency Vehicle Management
  - Fleet Management
  - Route Guidance
  - Signal Priority

V. Advanced Vehicle Control Systems (AVCS)
- Lateral Collision Avoidance
  - Lane Change/Blind Spot Crash Warning and Control
  - Lane Keeping Warning and Control
- Safety Readiness
  - Vehicle Condition Warning
  - In-Vehicle Infrastructure Condition Warning

M. Comments

Canadian Marconi presently has two distinct products under development which will be introduced to the market in 1994 with more to follow shortly thereafter.

A. Title of Program/Project/Activity

Project ID: 227
Project Title: **Highway Infrastructure Electronic System**

B. Responsible Organization

Organization ID: Q 252
Organization Name: Canadian Marconi Company

M. Mark Wasserman
600, boulevard Dr. Frederick Philips
St Laurent QC H4M 2S9
Tel: 514-748-3028
Fax: 514-748-3055

D. Description of the Project/Program/Activity

CMC is investigating business opportunities evolving through the application of electronic systems in Highway Infrastructure.

The goals of the initial project are:

-Understanding of the evolving requirements

-Identification of business opportunities matching CMC's technologies, engineering, management capabilities and aspiration

-Identification of product opportunities and establishment of product development plans.

CMC will during the project identify potential teaming partners owning appropriate products, technologies, know-how, experience, strengths to permit the widest possible market penetration.

E. Project Objectives

- Business/Product Opportunity

F. Project Type

- Market Study
- Research and Development
- Standards Development
- System Architect/Integration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communication - RoadSide/Vehicle
- Communication - Area-wide Broadcast
- Automatic Identification - Vehicle
- Automatic Vehicle - Classification
- InfoTransfer - to Changeable Signs
- InfoTransfer - to Broadcast Media
- InfoTransfer - Home/Offc Computers
- Monitoring - Traffic Flow
- Intelligent Cruise (gap radar)
- Lane Assist/Control (lateral)
- Weigh-In-Motion
- Electronic Collection of User Changes

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops
   - UHF (low Power Radio Beacons)
   - Microwave
   - Broadcast SCA on FM (ARI, RDS)
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
   - Satellite

4. On-Board Data Storage
   - Smart Transponder
   - Smartcard

J. Current Status

- Project Active
- Start Date: 1-Apr-94

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information
  - In-Vehicle Signing
- En Route Transit Information (real time)
- Traveller Services Information (yellow pages, weather, etc.)
- Route Guidance (includes general service; no emergency vehicle-specific)

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Travel Demand Management (regulatory, mode change, parking control, etc.)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Electronic Payment Services (parking, transit fares, toll collection, etc.)
- Parking Management
- Traffic Management

L. Project Reports/Publications

- Title: Internal

M. Comments

This project is presently funded through PV funding. CMC is presently working on establishing local and international partnerships to address market opportunities.

CMC expects to start specific product development projects by end 1994. Several distinct projects are expected to evolve from this first project.

A. Title of Program/Project/Activity

Project ID: 205
Project Title: **Visual Communication Network in the Montreal Metro**

B. Responsible Organization

Organization ID: Q 255
Organization Name: Télécité Inc.

M. Frank Ruffolo
1010, de la Gauchetière Ouest, suite 400
Montréal QC H2B 2N2
Tel: 514-875-2483
Fax: 514-875-6849

D. Description of the Project/Program/Activity

System has been installed in lines 2, 3 and 4 of the Montreal metro that makes automatic station stop announcements and provides visual public and advertising info to passengers on the trains. A reader has been installed on each train that reads transponder tags installed between the rails to localize the train geographically and make the proper station stop and voice announcements.

E. Project Objectives

- Mobility Improvement
- Elderly and Disabled Needs
- Revenue Generation

F. Project Type

- Full-Scale Application

G. Functions/Features

- Communication - Area-wide Broadcast
- Automatic Identification - Vehicle
- Automatic Vehicle - Location
- InfoTransfer - to Changeable Signs
- Monitoring - Vehicle Systems

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
2. Vehicle Positioning
   - Differential GPS
3. In-Vehicle Display
   - LED
   - Voice (synthesized/digitized)
4. On-Board Data Storage
   - TypeIII AVI Tag

J. Current Status

- Project Completed
- Completion Date: Oct-93
- Evaluation Done
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Transit Information (real time)
- Traveller Services Information (yellow pages, weather, etc.)

A. Title of Program/Project/Activity

Project ID: 225
Project Title: **Vehicle Location System**

B. Responsible Organization

Organization ID: Q 277
Organization Name: S2RK Advanced Technology Inc.

M. R. Giordano
1, Holiday Drive
Pointe Claire QC H9R 5N3
Tel: 514-695-1749
Fax: 514-695-1608

D. Description of the Project/Program/Activity

To launch a vehicle location product in North America aimed specifically at the vehicle anti-theft and personal security market. The commercial market i.e. trucking companies, etc. can also use the product for fleet monitoring.

The technology for this product has been purchased from Europe where the product has been field proven and sold to government agencies primarily for covert police operations.

Our objective is to bring this technology using canadian based manufacturing to the commercial markets.

The product is an integrated unit containing GPS along with a cellular com system and/or VHF, UHF, COM module. the company will also offer monitoring services.

More information available (contact the project manager)

E. Project Objectives

- Operational Efficiency/Productivity
- Elderly and Disabled Needs
- Revenue Generation
- Industrial/Regional Development
- Business/Product Opportunity
- Vehicle anti-theft

F. Project Type

- Research and Development
- Database Development
- Models Development
- System Architect/Integration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communication - Dispatch/Vehicle
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Vehicle - Location
- Route Guidance - Centrally Driven
- Map DataBase - Road System Only

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
2. Vehicle Positioning
   - Differential GPS
3. In-Vehicle Display
   - LCD
   - Keyboard
4. On-Board Data Storage
   - EEPROM

I. Total Estimate Project Cost

Project Cost: $ 500 000

J. Current Status

- Project Active

K. IVHS User Services by Application Area

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- Regulatory Compliance and Law Enforcement
  - Law Enforcement
    - * Retrieval of lost or stolen vehicles

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Personnel Management
- Emergency Notification and Personal Security
  - Driver and Personal Security
  - Hazardous Materials Incident Notification
- Emergency Vehicle Management
  - Fleet Management

A. Title of Program/Project/Activity

Project ID: 215
Project Title: **Modular LED Variable Message Signs Design**

B. Responsible Organization

Organization ID: Q 278
Organization Name: Technologies Balios Inc.

M. François Fortier
140, 4e Avenue
La Pocatière QC G0R 1Z0
Tel: 418-856-1525
Fax: 418-856-3458

D. Description of the Project/Program/Activity

Technologies Balios Inc. has developed a LED prototype sign that can be integrated into an ATMS System.

The modular system allows to create various configuration based on a 2 by 4 feet modules and allows the use of up to a hundred modules. Modules are composed of 1 inch diameter pixel composed of 15 LED: 8 greens and 7 reds. Consequently, 256 combinations of colour an intensity are obtained and are sufficient for road signing applications even under bright sunshine. Green colour is of excellent quality. The controller allows to show a large spread of animated graphics, pictograms and numeric images as well as real time information alternately are simultaneously. The modules also allow for a video camera image to be interface too.

The product can consequently be easily integrated into a road signage system. It will allow to rapidly capture the automobilist's attention and supply the appropriate information efficiently. Wether it be by video image, pictogram or alpha numeric information using the three fundamental colours of road signage are available: green, yellow and red.

More information available (contact the project manager).

E. Project Objectives

- Road Safety
- Road Network Use Optimisation

F. Project Type

- Research and Development

G. Functions/Features

- InfoTransfer - to Changeable Signs

H. Enabling Technologies

3. In-Vehicle Display
   - LED

I. Total Estimate Project Cost

Project Cost: $ 400 000

J. Current Status

- Project Completed
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Parking Management
- Traffic Management

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities

A. Title of Program/Project/Activity

Project ID: 241
Project Title: **Autonomous Transit Vehicles**

B. Responsible Organization

Organization ID: Q 262
Organization Name: Concordia University, Dept of Mechanical Eng

Dr R. Rajagopalan, Dr. R.M.H. Cheng, Dir
1455, de Maisonneuve Ouest, Bur B300
Montréal QC H3G 1M8
Tel: 514-848-3149
Fax: 514-848-4524

D. Description of the Project/Program/Activity

Description available (contact the project manager).

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality
- Elderly and Disabled Needs
- Business/Product Opportunity

F. Project Type

- Education/Training
- Research and Development
- System Architech/Intergration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial
- Full-Scale Application

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communication - RoadSide/Vehicle
- Route Guidance - Autonomous (in-veh.)
- Route Guidance - Centrally Driven
- Intelligent Cruise (gap radar)
- Lane Assist/Control (lateral)

H. Enabling Technologies

2. Vehicle Positioning
   - Differential Odometer
   - Map Matching
   - CCD Camera Vision

3. In-Vehicle Display
   - CRT
   - LED
   - LCD
   - Keyboard

4. On-Board Data Storage
   - RAM
   - EEPROM
   - On-board computer with parallel processing modules

I. Total Estimate Project Cost

Project Cost: $ 150 000

J. Current Status

- Project Active
- Start Date: Sep-91
- Completion Date: In Progress
- Evaluation Planned

K. IVHS User Services by Application Area

V. Advanced Vehicle Control Systems (AVCS)
- Longitudinal Collision Avoidance
  - Rear-End Crash Warning and Control
    (General, Rural/Small Town, Elderly/Disabled)
  - Autonomous Intelligent Cruise Control
    (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
  - Cooperative Intelligent Cruise Control
    (General, Rural/Small Town, Elderly/Disabled)
  - Head-On Crash Warning and Control
    (General, Rural/Small Town, Elderly/Disabled)
  - Passing Warning (on two-lane roads)
    (General, Rural/Small Town, Elderly/Disabled)
  - Backing Crash Warning
    (General, Rural/Small Town, Elderly/Disabled)
- Lateral Collision Avoidance
  - Lane Change/Blind Spot Crash Warning and Control
    (General, Rural/Small Town, Elderly/Disabled)
  - Lane Keeping Warning and Control
    (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)
- Intersection Collision Avoidance
  (General, Rural/Small Town, Elderly/Disabled)
- Vision Enhancement for Crash Avoidance (inclement weather and at night)
  (General, Rural/Small Town, Elderly/Disabled)
- Safety Readiness
  - Vehicle Condition Warning
    (Rural/Small Town, Elderly/Disabled)
- Automated Highway System
  (General, Rural/Small Town, Elderly/Disabled, Ergonomics/Human Factors)

L. Project Reports/Publications

- Title: List of publications available (contact the project manager)
  Publication Available

M. Comments

Comments available (contact the project manager).

A. Title of Program/Project/Activity

Project ID: 216
Project Title: **Fiber Optics Based On board Weighing System Design**

B. Responsible Organization

Organization ID: Q 267
Organization Name: Institut National d'Optique

M. Claude Belleville
369 Franquet
Sainte-foy QC G1P 4N8
Tel: 418-657-7006
Fax: 418-657-7009

D. Description of the Project/Program/Activity

The on board waiting system development by INO (Institut national d'optique) aims at supplying the truckers with a reliable system that will provide to the driver the exact load over each axle. The system will produce a precise major of the load under all ground an environmental situations. The system will also allow to prevent overloads as well as optimizing the actual on board load. A specific characteristic of this system is a long term reliability because of the endurance of fiber optic gauges.

E. Project Objectives

- Operational Efficiency/Productivity
- Enforcement of Regulation
- Industrial/Regional Development
- Business/Product Opportunity

F. Project Type

- Research and Development
- Demonstration/Field Trial

G. Functions/Features

- Automatic Identification - Cargo/Parcels
- Weigh-In-Motion

H. Enabling Technologies

1. Mobile Communication
   - optic detection

3. In-Vehicle Display
   - LCD

4. On-Board data Storage
   - Undergoing Evaluation

I. Total Estimate Project Cost

Project Cost: $ 200 000

J. Current Status

- Project Active
- Start Date: Jul-89
- Completion Date: Dec-94
- Evaluation Planned
- Evaluation Information Available Later

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)

III. Advanced Freight Management Systems (AFMS) / Commercial Vehicle Operations (CVO)
- Commercial Vehicle Adiministrative Processes
- Commercial Fleet Management
  - Route Planning and Scheduling
- Regulatory Compliance and Law Enforcement

L. Project Reports/Publications

- Title: White-light interferometric multitude fiber optic strain sensor
  Author: Claude Belleville, Gaétan Duplain
  Publication Available

- Title: Système de pesée embarqué basé sur des jauges extensions métriques par fibre optique
  Author: C. Belleville, G. Duplain, A. Bergeron
  Publication Available

A. Title of Program/Project/Activity

Project ID: 202
Project Title: **Development of a on board autonomous guidance system for articulated industrial vehicles: mining vehicles application**

B. Responsible Organization

Organization ID: Q 270
Organization Name: École Polytechnique de Montréal, Dépt génie électr

M. Richard Hurteau
Case Postale 6079, succ. Centre-ville
Montréal QC H3C 3A7
Tel: 514-340-4886
Fax: 514-340-4174

D. Description of the Project/Program/Activity

Development of a on board autonomous guidance system for articulated industrial vehicles: mining vehicles application

This project is a study and the development of a on board guidance system for articulated industrial vehicles based on GIS data. It aims particulary at the mining vehicles guidance.

The onboard guidance problem of an articulated vehicle moving on a non levelled land with a low resolution based on data from a GIS sensor is considered. This problem is solving two phases: first, the path is planned taking into account grade levels and vehicle characteristics. Second, the path following is considered and a controlled strategy of the vehicle movement is developped taking into account the vehicle dynamics.

In the particular case of an underground mining vehicle, the onboard guidance problem is essentially related to displacement within tunnels. In this case, only the path following problem based on GIS data is considered. The difficulty then consist into real time evaluation of navigational errors and the tunnel alignment in order to built an appropriate movement controller.

Finally, the problem of detection and avoidance of obstacle is considered.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement

F. Project Type

- Research and Development
- Models Development
- System Architect/Integration
- Laboratory/Field Test Prototype

G. Functions/Features

- Automatic Vehicle - Location
- Navigation - Full In-Vehicle Map Display
- Route Guidance - Autonomous (in-veh.)
- Lane Assist/Control (lateral)

H. Enabling Technologies

2. Vehicle Positioning
   - Gyro
   - Differential Odometer
   - Map Matching

4. On-Board Data Storage
   - Magnetic Disk

J. Current Status

- Project Active

K. IVHS User Services by Application Area

IV. Advanced Public Transportation Systems (APTS)
- Emergency Vehicle Management
  - Route Guidance

V. Advanced Vehicle Control Systems (AVCS)
- Longitudinal Collision Avoidance
  - Autonomous Intelligent Cruise Control
- Lateral Collision Avoidance

L. Project Reports/Publications

•Title: Using Laser Range Data to Model Tunnel Curvature for autonomic guidance & timing Vehicle
Author: Juneau, L., Hurteau, R.
Publication Available

A. Title of Program/Project/Activity

Project ID: 239
Project Title: **Development of a Multimedia Tourist Database for Use On Board Tourist Buses**

B. Responsible Organization

Organization ID: Q 274
Organization Name: Association des Propriétaires d'autobus du Québec

M. Jacques Guay
225, boul. Charest Est
Québec QC G1K 3G9
Tel: 418-522-7131
Fax: 418-522-6455

J. Current Status

- Project Planned

A. Title of Program/Project/Activity

Project ID: 212
Project Title: **S.A.A.Q. Radiocommunication Requirements and Needs Update Study**

B. Responsible Organization

Organization ID: Q 275
Organization Name: STRA Conseil Inc.

M. Réjean Asselin
85, rue Saint-Charles Ouest, bureau 101
Longueuil QC J4H 1C5
Tel: 514-463-9111
Fax: 514-463-3707

C. Other Participating Organizations

- Société de l'assurance automobile du Québec
  Paul-Philippe Doucet
  Tel: 418-528-3335

D. Description of the Project/Program/Activity

Requirements in feasibility study for the implementation of a new radiocommunication system (voice-data) for the vehicles fleet of S.A.A.Q. The whole Quebec territory is under study.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement

F. Project Type

- Feasibility Study
- System Architech/Intergration
- Laboratory/Field Test Prototype
- Demonstration/Field Trial

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communications - Dispatch/Vehicle
- Communications - Area-wide Broadcast
- Automatic Identification - Vehicle
- InfoTransfer - Home/Offc Computers

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)
   - Mobile Cellular
   - Satellite

3. In-Vehicle Display
   - Electro-Luminescent
   - Flash MEM

4. On-Board Data Storage
   - Flash MEM

I. Total Estimate Project Cost

Project Cost: $ 2 000 000

J. Current Status

- Project Planned
- Evaluation Done

K. IVHS User Services by Application Area

IV. Advanced Public Transportation Systems (APTS)
- Public Travel Security
- Emergency Vehicle Management
  - Fleet Management
  - Route Guidance
  - Signal Priority

A. Title of Program/Project/Activity

Project ID: 213
Project Title: **Update of Transport Cabano Radiocommunications Systems**

B. Responsible Organization

Organization ID: Q 275
Organization Name: STRA Conseil Inc.

M. Réjean Asselin
85, rue Saint-Charles Ouest, bureau 101
Longueuil QC J4H 1C5
Tel: 514-463-9111
Fax: 514-463-3707

C. Other Participating Organizations

- Transport Cabano Inc.
  E. Pelletier
  Tel: 418-872-2811

D. Description of the Project/Program/Activity

Feasibility study to upgrade the vocal radiocommunication systems of the vehicles fleet of Transport Cabano.

E. Project Objectives

- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality

F. Project Type

- Feasibility Study
- System Architech/Intergration
- Full-Scale Application

G. Functions/Features

- Communication - Dispatch/Vehicle

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)

I. Total Estimate Project Cost

Project Cost: $200 000

J. Current Status

- Project Completed

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- En Route Driver Information (real time)
  - Driver Information
- En Route Transit Information (real time)

A. Title of Program/Project/Activity

Project ID: 129
Project Title: **Intelligent Vehicle Highway Systems - N.B.D.O.T. Roundtable**

B. Responsible Organization

Organization ID: NB 196
Organization Name: New Brunswick Dept of Transportation

Michael Jackart & Darrell Manauel
Second Floor, Kings Place, P.O. Box 6000
Fredericton NB E3B 5H1
Tel: 506-453-7984
Fax: 506-453-2900

D. Description of the Project/Program/Activity

An in-house activity to increase awareness of the current status of IVHS, especially in our region and nationally.

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Revenue Generation

F. Project Type

- Education/Training

J. Current Status

- Project Active
- Start Date: Sep-93

M. Comments

We are not directly involved in any IVHS activity. Our primary goal at this stage is to be aware of the developments in this area and be prepared to initiate the appropriate action when it is deemed advantageous to the New Brunswick Department of Transportation.

A. Title of Program/Project/Activity

Project ID: 131
Project Title: **GPS/GIS INTEGRATION**

B. Responsible Organization

Organization ID: NB 201
Organization Name: Geoplan Consultants Inc.

Mr David K. Loukes
115 Prospect Street W.
Fredericton NB E3B 2T7
Tel: 506-451-0055
Fax: 506-450-4838

D. Description of the Project/Program/Activity

We are currently investigation opportunities for the integration of GPS and GIS for highway infrastructure data capture. However, no formal projects are underway at present.

E. Project Objectives

- Operational Efficiency/Productivity
- Business/Product Opportunity

F. Project Type

- Feasibility Study
- Market Study
- Research and Development
- Database Development
- Standards Development

G. Functions/Features

- Map DataBase - Road System Only
- Map DataBase - Road Side Attributes

H. Enabling Technologies

2. Vehicle Positioning
   - GPS
   - Differential GPS
3. In-Vehicle Display
   - Laptop PC
4. On-Board Data Storage
   - Magnetic Disk

M. Comments

After some thought, I decided to submit this anyway. Good Luck.

A. Title of Program/Project/Activity

Project ID: 132
Project Title: **SCOOT Traffic Management System (ATMS)**

B. Responsible Organization

Organization ID: NS 204
Organization Name: City of Halifax, Traffic Services Division

Mr B.N. Kennedy
P.O. Box 1749
Halifax NS B3J 3A5
Tel: 902-421-6496
Fax: 902-421-2947

C. Other Participating Organizations

- GEC Traffic Automation - U.K.
  George Astaniou
  Tel: 4481-207-7249
  Fax: 4481-953-5262

- Novax Industries Corp. - B.C.
  Bill Phillips
  Tel: 604-525-5644
  Fax: 604-525-2739

- Fenco Lavalin - Halifax
  Paul Nause
  Tel: 902-492-4544
  Fax: 902-492-4540

- N.S. Dept of Economic Development
  None - transferred
  Tel: 902-424-8920
  Fax: Gen. inquiries

- Black & McDonald - Darmouth
  don Hiltz
  Tel: 902-467-3101
  Fax: 902-468-3102

- Maritime Telephone & Telegraph
  Allan Forsey
  Tel: 902-421-6352
  Fax: 902-422-2377

D. Description of the Project/Program/Activity

Description available (contact the project manager)

E. Project Objectives

- Road Safety
- Operational Efficiency/Productivity
- Mobility Improvement
- Energy Conservation/Air Quality

F. Project Type

- Full-Scale Application

G. Functions/Features

- Monitoring - Traffic Flow

H. Enabling Technologies

1. Mobile Communication
   - Inductive Loops

J. Current Status

- Project Completed
- Start Date: 1990
- Completion Date: Sep-94

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Incident Detection and Management (no emergency vehicle management service)
- Travel Demand Management (regulatory, mode change, parking control, etc.)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)
- Traffic Management

A. Title of Program/Project/Activity

Project ID: 134
Project Title: **GOTIME**

B. Responsible Organization

Organization ID: NS 206
Organization Name: Metro Transit

Moss Mombourquette & Brian Smith
200 Ilsley Avenue
Dartmouth NS B3B 1V1
Tel: 421-2647
Fax: 421-8072

C. Other Participating Organizations

- City of Halifax
  George Moxsom
  Tel: 421-6680

D. Description of the Project/Program/Activity

-Real Time Public Information System for Bus Departure Times

-AVL & C Vehicle & Control System.

E. Project Objectives

- Operational Efficiency/Productivity
- Revenue Generation

F. Project Type

- Database Development

G. Functions/Features

- Communications - Vehicle/Vehicle
- Communication - RoadSide/Vehicle
- Automatic Identification - Vehicle
- Automatic Identification - Driver
- Automatic Vehicle - Location

H. Enabling Technologies

1. Mobile Communication
   - UHF (low Power Radio Beacons)

2. Vehicle Positioning
   - Differential Odometer
   - Proximity Beacons

3. In-Vehicle Display
   - LED

4. On-Board Data Storage
   - EEPROM

J. Current Status

- Project Completed
- Evaluation Done
- Evaluation Information Available

K. IVHS User Services by Application Area

I. Advanced Traveller Information Systems (ATIS)
- Pre-Trip Travel Information (transit, driver and ride-sharing)
- En Route Driver Information (real time)
  - Driver Information

IV. Advanced Public Transportation Systems (APTS)
- Public Transportation Systems
  - Operations of Vehicles and Facilities
  - Planning and Scheduling Services
- Emergency Notification and Personal Security
  - Driver and Personal Security

A. Title of Program/Project/Activity

Project ID: 139
Project Title: **Development of VHF Radio Link to Remote Traffic Counters**

B. Responsible Organization

Organization ID: Y 213
Organization Name: Government of Yukon, Dept. of Community & Transport

W.P. Hidingor, P. Eng. & John Cormie
P.O.Box 2703
Whitehorse YT Y1A 4T1
Tel: 403-633-7930
Fax: 403-667-2647

C. Other Participating Organizations

- Contractor
  G. Hnatiw
  Tel: 403-668-2087

- Government of Yukon, Communications Branch
  P. Wintemute
  Tel: 403-821-3304
  Fax: 403-821-4013

D. Description of the Project/Program/Activity

Development of hardware and software to permit communication with and control of traffic counting equipment installed at remote locations. Communication would be from a PC based in Whitehorse, through a dedicated VHF radio communication system owned by the Yukon Government to Goldon Rivor Traffic Counters at various locations.

E. Project Objectives

- Operational Efficiency/Productivity

F. Project Type

- Research and Development
- Demonstration/Field Trial

G. Functions/Features

- Monitoring - Traffic Flow

H. Enabling Technologies

1. Mobile Communication
   - Land Mobile Radio (VHF, UHF)

I. Total Estimate Project Cost

Project Cost: $ 5 000

J. Current Status

- Project Active
- Start Date: 1-Oct-93
- Completion Date: 30-Jun-94
- Evaluation Planned

K. IVHS User Services by Application Area

II. Advanced Traffic Management Systems (ATMS)
- Traffic Network Monitoring and Control (includes transit priority and HOV priority)

APPENDIX C

LIST OF ORGANIZATIONS INCLUDED IN THE RESEARCH

- Federal Agencies
- Provincial Agencies
- Municipal Agencies
- Private Sector Suppiers
- Universities
- Associations
- Consultants

- Québec

NATIONAL INVENTORY OF IVHS PROGRAMS, PROJECTS AND RELATED ACTIVITIES

A LISTING OF RESPONDENTS (ORIGINAL MAIL-OUT)

[PRIMARY SORT: RESPONDENT CATEGORY & SECONDARY SORT: PROVINCE & TERTIARY SORT: ORGANIZATION]

(Based on S-A3.DOC / 25 May 94 / 11:26 File Resorted)

Seq PC	Last	First	Title	Division	Organization	City	Province
Federal							
1. 1 1	Patrick	Paul	Mobile Support Equipment Officer	CFB Esquimalt	FMO Victoria (DND)	Victoria	British Columbia
57. 5 1	Rasmussen	Nils	Manager - Research and Development	Corporate services	Canada Ports Corporation	Ottawa	Ontario
58. 5 1	Landry	Philippe-Eric	Project Manager		Canada Post Corporation	Ottawa	Ontario
59. 5 1	Desfossés	Alain F	Vice President	Policy Coordination and Government Liaison	Canadian Space Agency	Ottawa	Ontario
60. 5 1	Akgun	Metin	Director - Broadcast Info Tech Res		Communications Research Centre	Ottawa	Ontario
61. 5 1	Goatbe	Greg L	Director - Project Mgt Div	Commercial Operations	Customs Operations - Revenue Canada	Ottawa	Ontario
62. 5 1	White	W A	Acting Director	Port of Entry Immigration	Department of Citizenship & Immigration	North York	Ontario
63. 5 1	Riley	G	Director - Emergency Arrangements		Emergency Preparedness Canada	Ottawa	Ontario
64. 5 1	Anderson	Neil M	Director - Planning & Devt Branch	Canadian Hydrographic Service	Fisheries and Oceans	Ottawa	Ontario
65. 5 1	Fournier	Luc	Manager Gov. and Industry Liaison	Communications	Industry Canada	Ottawa	Ontario
66. 5 1	Walker	Melville	R&D Staff Officer (ORDCS 11)	Directorate of R&D in Comm and Space	National Defence	Ottawa	Ontario
67. 5 1	LeFeuvre	Tom	Director	Engineering Programs Office	National Research Council of Canada	Ottawa	Ontario
68. 5 1	Allam	Mosaad	Director	GIS Division	Natural Resources Canada	Ottawa	Ontario
69. 5 1	Crawford	J	Director - Highways Directorate	Land Transportation	Public Works Canada	Ottawa	Ontario
70. 5 1	Warren	E D	Director General Commercial Operations		Revenue Canada	Ottawa	Ontario
71. 5 1	Glickman	Victor B	Director Geography Division		Statistics Canada	Ottawa	Ontario
72. 5 1	Chandan BEng DAE	Arjan	Senior Techno-Economic Advisor	Research Planning & Development	Transport Canada	Ottawa	Ontario
210. a 1	Dawe	Byron			Canadian Centre for Marine Communications	St. John's	Newfoundland
Provincial							
2. 1 2	Brown	Murray	Director	Motor Vehicle Branch	B.C. Ministry of the Attorney General	Victoria	British Columbia
3. 1 2	Zhou	Wei-Wu	Senior Traffic Engineer		B.C. Ministry of Transportation & Highways	Victoria	British Columbia
4. 1 2	Sawayama	Gary T	Director - Surveys & Resource Mapping Br	Land Services Division	Ministry of Environment Lands and Parks	Victoria	British Columbia
23. 2 2	Schellenberger	Stan	Assistant Deputy Minister	Industry Technology and Research	Alberta Economic Development and Tourism	Edmonton	Alberta
24. 2 2	Chang	Ernest J	Head - Advanced Computing & Engineering	Advanced Technologies	Alberta Research Council	Calgary	Alberta
25. 2 2	Lowe	John	Manager	Roadway Engineering and Equipment	Alberta Transportation & Utilities	Edmonton	Alberta
42. 3 2	Gilks	Greg	Transportation Planning Eng - Rd Tr Br	Policy-Programs Division	Saskatchewan Highways and Transportation	Regina	Saskatchewan
43. 3 2	Turnbull	John B	General Manager	Central Survey & Mapping Agency	Saskatchewan Property Mgt Corp (SPMC)	Regina	Saskatchewan
51. 4 2	Hosang	John R	Assistant Deputy Minister	Engineering & Technical Services Division	Manitoba Highways and Transportation	Winnipeg	Manitoba
52. 4 2	Leahey	Stephen	Managing Partner/Director	Information & Telecommunications	Manitoba Industry Trade and Tourism (MITT)	Winnipeg	Manitoba
73. 5 2	Brown	James A	Executive Director	Operations Division	GO Transit	Downsview	Ontario
74. 5 2	Lefebvre	John R	Manager	Drinking/Driving Countermeasures	Ministry of Attorney General	Toronto	Ontario
75. 5 2	Lanyon	Mary Ann	Director	Tourism Marketing and Customer Service Br	Ministry of Culture Tourism and Recreation	Toronto	Ontario
76. 5 2	McCalla	Joan	Director - Telecommunications Branch	Technology and Communications Division	Ministry of Economic Development and Trade	Toronto	Ontario

Seq PC	Last	First	Title	Division	Organization	City	Province
77. 5 2	Yang	Bunli	Sr Mgr - Conservation & Renewables	Energy Liaison and Planning Br	Ministry of Environment and Energy	Toronto	Ontario
78. 5 2	Costello	Barry	Manager - Provincial Mapping Office	Natural Resources Information Branch	Ministry of Natural Resources	North York	Ontario
79. 5 2	Gibson	E F	Commander	Support Services Division	Ministry of Solicitor General & Correctional Srv	Toronto	Ontario
80. 5 2	Crawford	Susan B	Director	Strategic Transportation Research Branch	Ministry of Transportation Ontario	Downsview	Ontario
196. 7 2	Manuel	Darrell	Executive Director	Engineering Services Division	N.B. Department of Transportation	Fredericton	New Brunswick
203. B 2	Stonehouse	Don L	Assistant Director	Transportation Policy	N.S. Transportation & Communications	Halifax	Nova Scotia
208. 9 2	Bailey	Michael J	Director	Policy and Planning Division	P.E.I. Transportation and Public Works	Charlottetown	P.E.I.
211. a 2	Tufts	Gordon E	Senior Policy Analyst	Policy and Planning Division	NF Dept of Works Services & Transportation	St. John's	Newfoundland
213. b 2	Cormie	John	Assistant Deputy Minister	Transportation Division	Yukon Community and Transportation Services	Whitehorse	Yukon
214. c 2	Rattray	Bruce	Assistant Deputy Minister	Operations	Department of Transportation (NT)	Yellowknife	Northwest Territories

Municipal

5. 1 3	Henderson	Don	Transportation Engineer	Transportation Dept	City of Vancouver	Vancouver	British Columbia
6. 1 3	Vopnfjord	Len	Director	Planning Dept	City of Victoria	Victoria	British Columbia
7. 1 3	Lee	Paul C	Adm. Transp. Planning		Greater Vancouver Regional District	Burnaby	British Columbia
26. 2 3	Homes	R J	Commissioner	Planning Transportation and Community Services	City of Calgary	Calgary	Alberta
27. 2 3	Borbridge	G	Chief of Police		City of Calgary (Police)	Calgary	Alberta
28. 2 3	Milligan	Rick	General Mgr	Transportation Dept	City of Edmonton	Edmonton	Alberta
29. 2 3	Baldwin	James S	Director of Public Works		Municipal District of Rocky View #44	Calgary	Alberta
44. 3 3	Aldcorn	B	Director	Public Works Department	City of Regina	Regina	Saskatchewan
45. 3 3	Guebert	Alfred A	Traffic Operations Engineer		City of Saskatoon	Saskatoon	Saskatchewan
53. 4 3	Rosin	K A	Manager	Transp. Planning & Development	City of Winnipeg	Winnipeg	Manitoba
B1. 5 3	Koehle	Larry T	Commissioner of Public Works & Bldg		City of Brampton	Brampton	Ontario
82. 5 3	Wood	Wayne-Douglas	Deputy City Engineer		City of Brantford	Brantford	Ontario
83. 5 3	Forbes	Gerald	Traffic Operations Engineer	Traffic Dept	City of Hamilton	Hamilton	Ontario
84. 5 3	Perry	Kenneth L	Director of Planning & Development		City of London	London	Ontario
85. 5 3	Harvey	Andy	Manager	Traffic Engineering & Operations	City of Mississauga	Mississauga	Ontario
86. 5 3	Murphy	Vince	Commissioner of Transportation		City of North York	North York	Ontario
87. 5 3	Goodchild	Ted	Director of Planning		City of Oshawa	Oshawa	Ontario
88. 5 3	Leclair	Rosemary	Director - Transportation & Parking Br	Department of Engineering and Works	City of Ottawa	Ottawa	Ontario
89. 5 3	Redmond	Donald C	Commissioner of Engineering and Planning		City of Sault Ste Marie	Sault Ste Marie	Ontario
90. 5 3	Price	Michael A	Commissioner of Works & Environment		City of Scarborough	Scarborough	Ontario
91. 5 3	Coughlin	James M	Director of Planning		City of St Catharines	St Catharines	Ontario
92. 5 3	Clausen	Greg	Director of Maintenance		City of Sudbury	Sudbury	Ontario
93. 5 3	Harper	Paul	Director of Planning		City of Thunder Bay	Thunder Bay	Ontario
94. 5 3	Millward	Robert	Director of Planning		City of Toronto	Toronto	Ontario
95. 5 3	Shanahan	Walter J	Fire Chief	Fire Department	City of Toronto	Toronto	Ontario
96. 5 3	Todd	George W	Commissioner of Works		City of Vaughan	Vaugan	Ontario
97. 5 3	Harding	Gordon T	Commissioner of Works		City of Windsor	Windsor	Ontario
98. 5 3	Pantofaru	Irina	Communications Engineer		Department of Ambulance Services (Metro Toronto)	Downsview	Ontario
99. 5 3	Allen	Blair	Transportation Planner		Kitchener Transit	Kitchener	Ontario
100. 5 3	Kaufman	David C	Dir. Traffic & Planning		Municipality of Metropolitan Toronto	Toronto	Ontario

Seq	PC	Last	First	Title	Division	Organization	City	Province
101.	5 3	Keklikian	Arto S	Senior Planner		National Capital Commission	Ottawa	Ontario
102.	5 3	McCorquodale	Doug	Manager	Planning and Development	Ottawa-Carleton Regional Transit Commission	Ottawa	Ontario
103.	5 3	Michael	Mofeed	Commissioner of Planning		Regional Municipality of Durham	Whitby	Ontario
104.	5 3	Kennaley	L	Commisssioner of Planning & Devt		Regional Municipality of Haldimand-Norfolk	Townsend	Ontario
105.	5 3	Mohammed	Rash	Commissioner of Planning & Devt		Regional Municipality of Halton	Oakville	Ontario
106.	5 3	Turvey	L Dale	Commissioner -Transportation/Environment S		Regional Municipality of Hamilton-Wentworth	Hamilton	Ontario
107.	5 3	Veale	Alan	Director of Planning		Regional Municipality of Niagara	Thorold	Ontario
108.	5 3	Shallal	Louis A Y	Director - Transportation Planning		Regional Municipality of Ottawa-Carleton	Ottawa	Ontario
109.	5 3	Savage	Graham J	Director of Engineering		Regional Municipality of Peel	Brampton	Ontario
110.	5 3	Morrow	Patrick J	Engineering Road Superintendant	Planning Dept	Regional Municipality of Sudbury	Sudbury	Ontario
111.	5 3	Pyatt	William R	Commissioner of Engineering		Regional Municipality of Waterloo	Waterloo	Ontario
112.	5 3	Ireland	John R	Commissioner of Transportation		Regional Municipality of York	Newmarket	Ontario
113.	5 3	Pill	Juri	General Manager	Administration and Planning	Toronto Transit Commission	Toronto	Ontario
114.	5 3	Keliar	Dalo	Commissioner of Works		Town of Markham	Markham	Ontario
115.	5 3	Ellis	Hal O H	Director of Public Works		Town of Oakville	Oakville	Ontario
197.	7 3	Bliss	E John	City Engineer		City of Fredericton	Fredericton	New Brunswick
198.	7 3	MacKinnon	Claude	Commissioner	Environment/Infrastructure Services	City of Saint John	Saint John	New Brunswick
204.	8 3	Kennedy	B N (Sonny)	Supervisor of Traffic Services		City of Halifax	Halifax	Noca Scotia
205.	8 3	Gordon	Basil	General Manager		Halifax-Dartmouth Bridge Commissions	Darmouth	Nova Scotia
206.	8 3	Smith	Brian	Manager	Metro Transit Division	Metropolitan Authority	Darmouth	Nova Scotia
212.	a 3	de Jong	T A	Director	Planning Dept	City of St. John's	St. John's	Newfoundland

Private Sector (suppliers)

8.	1 4	Johnson	Jan A	President		ALM Resources Ltd	Sooke	British Columbia
9.	1 4	Hurley	John J	President and CEO	Research & Development	Glenayre Electronics Ltd	Vancouver	British Columbia
10.	1 4	Thomson	James B	President	Engineering - Manufacturing - Consulting	James Thomson & Associates Inc	Sidney	British Columbia
11.	1 4	Atnikov	David	President		Novax Industries Corporation	New Westminster	British Columbia
12.	1 4	Spaeth	J Douglas	Director		Oracle Communications	Burnaby	British Columbia
13.	1 4	Blueschke	Arnold	President		Traffic Vision Systems International Inc	Delta	British Columbia
14.	1 4	McMillan	M G	President		TransTech Data Services	Victoria	British Columbia
30.	2 4	Krest	Brian	Communications Engineer		Airtel	Edmonton	Alberta
31.	2 4	Miller	Gavin	Design Engineer		Austec Electronic Systems Ltd	Edmonton	Alberta
32.	2 4	Lockhart	Tom	President		AVL Automatic Vehicle Location Systems Ltd	Calgary	Alberta
33.	2 4	Waldie	Alan	Chairman		Ensel Corporation	Calgary	Alberta
34.	2 4	Chan	Paul	Transportation Engineer		Infrastructure Systems Ltd	Edmonton	Alberta
35.	2 4	Timinski	Brad G	Director	GPS Products Group	NovAtel Communications Ltd	Calgary	Alberta
36.	2 4	Streader	Gerry	General Manager		Precision Scale Co (Edmonton) Ltd	Edmonton	Alberta
37.	2 4	McLellan	James F	Manager		Pulsearch Navigation Systems	Calgary	Alberta
38.	2 4	Coward	Julian			Syncrude	Edmonton	Alberta
46.	3 4	Bergan	Terry	President		International Road Dynamics Inc (IRD)	Saskatoon	Saskatchewan
47.	3 4	Pacholik	D	Mgr - Fiance & Product Devt	Mobile Communications	SaskTel	Saskatoon	Saskatchewan
54.	4 4	Jenkins	Dave	Manager	Industry Marketing	Stentor Resource Centre Inc	Winnipeg	Manitoba

Seq	PC	Last	First	Title	Division	Organization	City	Province
55.	4 4	Burgener	Edward			Transcom International Ltd	Winnipeg	Manitoba
116.	5 4	Kucar	Andy D	President		4U Communications Research	Ottawa	Ontario
117.	5 4	Papaevangelou	Bill	Vice President - Engineering		AlliedSignal Aerospace Canada	Rexdale	Ontario
118.	5 4	Griffith	Ann	Vice-President Operations		Applied AI Systems Inc	Kanata	Ontario
119.	5 4	Oecosemo	Terry	National Sales Manager		ARGO Instruments Inc	Mississauga	Ontario
120.	5 4	D'Eon	Phil	Director	Business Development	Atlantis Aerospace Corporation	Brampton	Ontario
121.	5 4	O'Shaughnessy	Brian E	Director - Technology Planning		BCE Mobile	Etobicoke	Ontario
122.	5 4	Lester	David W		Customer Systems Engineering (CSE)	Bell Canada	Toronto	Ontario
123.	5 4	Tamboli	Yezdi	Business Development Manager		Canadian Marconi Company	Ottawa	Ontario
124.	5 4	Elvidge	John E H	President		Canstar	North York	Ontario
125.	5 4	Mulla	Shaukat	Manager System Design		CANTEL	North York	Ontario
126.	5 4	Cope	George	President		Clearnet Inc	Pickering	Ontario
127.	5 4	Bowen	James	Vice President		COMPENGSERV Ltd	Ottawa	Ontario
128.	5 4	Bettger	Susan	Senior Account Manager		Digital Equipment of Canada Ltd	Toronto	Ontario
129.	5 4	Gadula	Christopher	Executive Vice-President		Disys Corporation	Weston	Ontario
130.	5 4	Keen	Peter	General Manager		Econolite Canada Inc	Scarborough	Ontario
131.	5 4	Manor	Dan	President		EIS Electronic Integrated Systems Inc	Toronto	Ontario
132.	5 4	Holloway	Chris	President		Envirotrans	Ottawa	Ontario
133.	5 4	Maxwell	Ian		Engineering Dept	Ericsson GE Mobile Communication	Mississauga	Ontario
134.	5 4	Cox	W (Bill)	Vice President		ESRI Canada Limited	Don Mills	Ontario
135.	5 4	Zeller	Sandu	Manager	Systems Division	Fortran Traffic Systems Ltd	Scarborough	Ontario
136.	5 4	Cody	Gord			Gandalf Mobile Systems Inc	Nepean	Ontario
137.	5 4	Holland	I H	Director	Research Unit	General Motors of Canada Ltd	Oshawa	Ontario
138.	5 4	Linders	James G			GEOREF Systems Ltd	Waterloo	Ontario
139.	5 4	Ferguson	James	Vice President		Geosurv Inc	Ottawa	Ontario
140.	5 4	Koch	Frans H	President		Guided Vehicle Systems Company	Gloucester	Ontario
141.	5 4	Giroux	Fern		Sperry Aerospace Div	Honeywell Ltd	Rockland	Ontario
142.	5 4	Mathur	Ashok	Marketing Representative	Telecomm-Industrial-Public Sector	IBM Canada Ltd	Markham	Ontario
143.	5 4	Maffini	Giulio	Executive Vice President		Intera Tydac Technologies Inc	Nepean	Ontario
144.	5 4	McConomy	Kevin	National Transport Marketing		Intergraph Canada Ltd	Mississauga	Ontario
145.	5 4	Thack	Michal	Manager		Lafrentz Road Services Ltd	Oakville	Ontario
146.	5 4	Ashton	R W	V.P. - Engineering		Leigh Instruments Ltd	Carleton Place	Ontario
147.	5 4	Borth	Larry	Vice President	Engineering Department	Litton Systems Canada Ltd	Rexdale	Ontario
148.	5 4	Gravelle	Kelly P	Vice President	I.V.H.S. Division	Mark IV Industries Ltd	Mississauga	Ontario
149.	5 4	Bowman	Allan R	Vice President Business Development		Mobile Computing Corporation	Toronto	Ontario
150.	5 4	Dixon	Michael	Manager - Systems Technology	Engineering	Motorola Canada	North York	Ontario
151.	5 4	Spolsky	Andrew	Program Manager		MPR Teltech Ltd	Ottawa	Ontario
152.	5 4	Gandell	Allen	General Manager		Niagara Falls Bridge Commission	Niagara Falls	Ontario
153.	5 4	Patnaik	P C	Manager Research & Technology Development		Orenda Inc (Div of Hawker-Sidley)	Mississauga	Ontario
154.	5 4	MacDonald	Bill	Vice President Transportation Systems		Ortech International	Mississauga	Ontario
155.	5 4	Lampman	Ron	Secretary Treasurer		Peace Bridge	Fort Erie	Ontario
156.	5 4	Perley	Daniel R	President		Perley Technologies Corporation	Constance Bay	Ontario

Seq PC	Last	First	Title	Division	Organization	City	Province
157. 5 4	Blurton	Michael	President		Precursor Ltd	Toronto	Ontario
158. 5 4	Warr	Patrick H J	General Manager		Racal-Decca Canada Inc	Brampton	Ontario
159. 5 4	Foulds	Geoff	Marketing Manager		RMSL Traffic Systems Inc	Toronto	Ontario
160. 5 4	Rutenberg	Uwe	President		Rutenberg Design Inc	Kanata	Ontario
161. 5 4	Ali	Rahamat			Seltech Satellite Systems	Toronto	Ontario
162. 5 4	Farrokhzad	Manoutchehr	Product Manager		Siemens Electric Ltd	Mississauga	Ontario
163. 5 4	Morrissey	Patrick	President		Stemco Canada Inc	Mississauga	Ontario
164. 5 4	Hudgin	Brian	Sales Representative		Sun Microsystems of Canada Inc	Markham	Ontario
165. 5 4	Davis	Don	President C.E.O.		Telefix Canada	Richmond Hill	Ontario
166. 5 4	Kates	Josef	Chairman		Teleride Sage Ltd	Toronto	Ontario
167. 5 4	Scrivens	Brian	Coordinator - Marketing & Communications		Teranet Land Information Services Inc	Toronto	Ontario
168. 5 4	Carlin	David R	VP - Sales & Marketing		TMI Communications	Ottawa	Ontario
169. 5 4	Illingworth	John C	General Manager		Topping Electronics	Scarborough	Ontario
170. 5 4	Guillén	Juan	Director		Wyvern Technologies Inc	Ottawa	Ontario
207. 8 4	Currie	J	President		Internav Ltd	Sydney	Nova Scotia
209. 9 4	Thomas	W L	Highways Technology Instructor		Holland College of Technology	Charlottetown	P.E.I.

Universities

15. 1 5	Amlin	Eric	Group Supervisor Transportation		Forest Engineering Research Institute of Canada	Vancouver	British Columbia
16. 1 5	Hinds	B			Institute of Ocean Studies	Sydney	British Columbia
17. 1 5	Navin	Frank	Professor	Civil Engineering Dept	University of British Columbia	Vancouver	British Columbia
18. 1 5	Dong	Zuomin	Assistant Professor	Dept of Mechanical Engineering	University of Victoria	Victoria	British Columbia
39. 2 5	Karimi	Hassan		Faculty of Science	Athabasca University	Athabasca	Alberta
40. 2 5	Krakiwsky	Edward J	Professor Dept of Geometrics		University of Calgary	Calgary	Alberta
48. 3 5	Hutch	Jim	President		Saskatchewan Research Council	Saskatoon	Saskatchewan
49. 3 5	Sharma	Satish C	Professor of Engineering		University of Regina	Regina	Saskatchewan
50. 3 5	Bergan	Arthur T	Professor	College of Engineering	University of Saskatchewan	Saskatoon	Saskatchewan
56. 4 5	Clayton	Alan	Professor - Civil Engineering		University of Manitoba	Winnipeg	Manitoba
171. 5 5	Khan	Ata M	Professor		Carleton University	Ottawa	Ontario
172. 5 5	Easa	Said	Professor		Lakehead University	Thunder Bay	Ontario
173. 5 5	MacLeod	J A	Chair Arch-Civil-Transp Technology		Mohawk College of Applied Arts & Technology	Hamilton	Ontario
174. 5 5	Turcotte	J Gerry	President		Ottawa-Carleton Research Institute	Kanata	Ontario
175. 5 5	Van Aerde	Michel W	Associate Professor		Queen's University	Kingston	Ontario
176. 5 5	Stewart	J A	Assistant Professor		Royal Military College	Kingston	Ontario
177. 5 5	Linders	James G	Professor	Dept. of Computing & Information Science	University of Guelph	Guelph	Ontario
178. 5 5	Soberman	Richard M	Chair of Civil Engineering	Dept of Civil Engineering	University of Toronto	Toronto	Ontario
199. 7 5	Wilson	F R	Prof. & Vice President Research		University of New Brunswick	Fredericton	New Brunswick

Seq	PC	Last	First	Title	Division	Organization	City	Province
Associations								
19.	1 6	Weston	Rob			B.C. Trucking Association	Port Coquitlam	British Columbia
20.	1 6	Hanchard	Ivan W	President/Director		Western Canada Roadbuilders Association	Richmond	British Columbia
41.	2 6	Wilson	Scott			Alberta Motor Association	Edmonton	Alberta
179.	5 6	Thérien	Émile-J	President		Canada Safety Council	Ottawa	Ontario
180.	5 6	Long	David	Executive Director		Canadian Association of Logistics Management	Markham	Ontario
181.	5 6	Godding	Rick	V.P. Public and Government affairs		Canadian Automobile Association	Ottawa	Ontario
182.	5 6	Beaudin	Sheila	Executive Director		Canadian Bus Association	Ottawa	Ontario
183.	5 6	Rehner	Maria	President		Canadian Industrial Transportation League	Don Mills	Ontario
184.	5 6	Davis	John	Project Manager		Canadian Standards Association	Rexdale	Ontario
185.	5 6	Phillips	Terry	President		Canadian Transportation Research Forum	Saskatoon	Saskatchewan
186.	5 6	Tardif	Louis-Paul	Executive Director		Canadian Trucking Research Institute	Ottawa	Ontario
187.	5 6	Hemily	Brendon	Manager of Research & Technical Services		Canadian Urban Transit Association	Toronto	Ontario
188.	5 6	Spence	Marshall A	President		EDI Council of Canada	Etobicoke	Ontario
189.	5 6	Tansey	Micheline	Executive V.P.		Freight Carriers' Association of Canada	Etobicoke	Ontario
190.	5 6	Kennedy ALS CLS	Edward A	President		Geomatics Industry Assoc of Canada	Ottawa	Ontario
191.	5 6	Moyer	Janice M	President/CEO		Information Technology Association of Canada	Mississauga	Ontario
192.	5 6	Gauvin	Michel	Executive Director		Intergovernmental Comm on Urban&Regional Res	Toronto	Ontario
193.	5 6	Sharples	Betsy	General Manager		Ontario Trucking Association	Rexdale	Ontario
194.	5 6	Richards	Bruce J	President		Private Motor Truck Council of Canada	Oakville	Ontario
195.	5 6	Hedges	Christopher	Manager		Transportation Association of Canada	Ottawa	Ontario
Consultants								
21.	1 7	Small	S J (Steve)	Project Engineer	Consulting Engineers	M A Thomas & Associates Ltd	Vancouver	British Columbia
22.	1 7	Oaswani	Jack	Senior Electrical Engineer		R P Shaflik Engineering Ltd	Burnaby	British Columbia
200.	7 7	Herbert	Gilles			Comtrac Engineers Ltd	Moncton	New Brunswick
201.	7 7	Loukes	David K	Vice-President - Information Systems		Geoplan Consultants Inc	Fredericton	New Brunswick
202.	7 7	O'Neil	Thomas	Chairperson		New Brunswick Geographic Information Corp	Fredericton	New Brunswick

File: SAJR-ORG.00C

Liste originale des répondants: base de données SIVR

Province: QC

ID	Répondant(s)	Organisation	Adresse	Ville, Province, Code
Type d'organisation 1				
Q 216	Yves Robitaille	Ressources Naturelles Canada	2144 King Ouest, suite 010	Sherbrooke QC J1J 2E8
Q 217	Russ Robinson	Environnement Canada	351 St-Joseph Blvd, 13th Floor, Place Vincent Mass	Hull QC K1A 0H3
Type d'organisation 2				
Q 218	Sandra Sultana	Ministère des transports du Québec	35, rue Port Royal Est, 4e étage	Montréal QC H3L 3T1
Q 219	François Janelle	S.A.A.Q., Service de gestion immobilière	333, boul. Jean-Lesage, E-M-B	Québec QC G1K 8J6
Q 219	Yolande Paré	Société de l'assurance automobile du Québec	333, boul. Jean-Lesage, C-4-22, C.P. 19600	Québec QC G1K 8J6
Q 219	Renaud Raymond	Société de l'assurance automobile du Québec	333, boul. Jean-Lesage F-M-8	Québec QC G1K 8J6
Q 219	François Binette	Société de l'assurance automobile du Québec	333, boul. Jean-Lesage, C-1-44	Québec QC G1K 8J6
Q 219	Monique Dufour	SAAQ - Service du contrôle du transport routier	333, boul. Jean-Lesage, S-1-38	Québec QC G1K 8J6
Q 220	Anne Martineau	Ministère de l'Industrie commerce et Technologie	710, Place d'Youville	Québec QC G1R 4Y4
Type d'organisation 3				
Q 221	Jean-Luc Goyer	Ville de Boucherville	500 Rivière-aux-Pins	Boucherville QC J4B 2Z7
Q 222	Jean-Marie Beaudoin	Ville de Québec	65, rue Sainte-Anne	Québec QC G1R 3X5
Q 223	Carol Richard	Ville de Montréal, division de la circulation	700, rue St-Antoine Est, bu 1-500	Montréal QC H2Y 1A6
Q 224	Michel Brissette	Société de transport de l'Outaouais	111, rue Jean-Proulx	Hull QC J8Z 1T4
Q 224	Robert Lessard	Société de transport de l'Outaouais	111, rue Jean-Proulx	Hull QC J8Z 1T4
Q 225	Martine Lavoie	S.T.C.U.M.	800, de la Gauchetière Ouest, C.P. 2000, BUR 1100	Montréal QC H5A 1J6
Q 225	Gilles Gagnon	S.T.C.U.M.	800, de la Gauchetière Ouest, C.P. 2000, bur E1200	Montréal QC H5A 1J6
Type d'organisation 4				
Q 226	Jean-Pierre Lévesque	ABL Canada Inc.	8550, Place du Commerce	St-Laurent QC H4T 1H2
Q 227	Louis Roy	Ballistech Systems	1250, Marie-Victorin	St-Bruno QC J3V 6B8
Q 228	Georges Mony	Bell-Northern Research Lte	161, Place du Commerce	Verdun QC H3E 1H6
Q 229	Tuan Nguyen Dong	Bibyte Inc.	249, rue Rainville	Beloeil QC J3G 4M4

Type d'organisation: 1) Fédéral 2) Provincial 3) Municipal 4) Industriel 5) Académique 6) Association 7) Experts-conseils

* Répondant ajouté suite à la liste originale d'envoi

Liste originale des répondants: base de données SIVR

Province: QC

ID	Répondant(s)	Organisation	Adresse	Ville, Province, Code
Q 230	Roy Hoffman	CAE Electronics Ltd	P.O. Box 1800	St Laurent QC H4L 4X4
Q 231	J.A. Reoch	Canadian National Raliways	P.O. Box 8100	Montréal QC H3C 3N4
Q 232	J. Carlos Parente	Centrodyne Inc	3485 Thimens Blvd	St Laurent QC H4R 1V5
Q 233	Édouard Choquette	Électromega Ltée	105, avenue Liberté	Candiac QC J5R 3X8
Q 234	A.E. Bethune	C.P. RAIL	P.O. BOX 6042, Stn Centre-Ville	Montreal QC H3C 3E4
Q 235	Robert Proulx	Genitec Télécommunication Inc.	375, boul. Roland-Therrien, bureau 400	Longueuil QC J4H 4A6
Q 236	Roland Oliver	GEC Aisthom International Inc	9, Place du Commerce, Suite 5	Brossard QC J4W 2V8
Q 237	Marcel Dallaire	Gespro Informatique Inc.	1000, de la Gauchetière O.	Montréal QC H3B 4W5
Q 238	Alain Bouchard	Les Systèmes de circulation Fortran	3685, Georges Corbeil	Terrebonne QC J6W 5C7
Q 239	Marc Dupont	Logiroute Inc.	75, Port Royal Est, bureau 500	Montréal QC H3L 3T1
Q 240	Raymond Granger	M3I Technologies	1111, rue St-Charles Ouest, bureau 135	Longueuil QC J4K 5G4
Q 240	Bruce Ricketts	Solutions ROADsoft	1111, rue St-Charles Ouest, bureau 135	Longueuil QC J4K 5G4
Q 241	Michel Robin	National Mobile Radio Communication Inc	7350 route Trans-Canadienne, bur 200	Montréal QC H4T 1A3
Q 242	Luc G. Bellerose	Primetech	275 Kesmark	Dollard-des-O QC H9B 3J1
Q 243	Christian Tremblay	Robotomation Inc.	1170, Route St-Marc O.	Chicoutimi No QC G7H 5B2
Q 244	Michael De Santis	Signalisation de Montréal Inc.	7400, rue Vérité	St-Laurent QC H4S 1C5
Q 245	René Gendreau	Tektron Développement Inc.	33 rue Prince	Montréal QC H3C 2M7
Q 246	Pierre F. Alepin	Véhicules et Robots Vitri Inc	238 de Brullon	Boucherville QC J4B 2J8
Q 247	Denis Parrot	ViaSat Geo-Technologie Inc.	419, boul. Rosemont, Bur 301	Montréal QC H2S 1Z2
Q 248	Michel Besner	Besner Transport	54, Route du Pont	St-Nicolas QC G0S 2Z0
Q 249	J.F. Bissonnette	Le Groupe CGI	5300, boul. des Galeries, bureau 300	Québec QC G2K 2A2
Q 250	Frank Bram	Dataradio Inc.	5500 Royalmount Ave, bur 200	Ville Mont-Ro QC H4P 1Y7
Q 251	Guy Rainville	IST Société de services informatiques	1135, chemin St-Louis, Suite 100	Sillery QC G1S 1E7
Q 252	Pierre Gasser	Canadian Marconi Cie	600, Dr. Frédérick Philips	St-Laurent QC H4M 2S9
Q 252	Mark Wasserman	Canadian Marconi Company	600, boulevard Dr. Frederick Philips	St Laurent QC H4M 2S9
Q 253	Peter L. Steeves	Vehicle Tracking Systems	6600, Trans Canada Highway	Pointe Claire QC H9R 4S2
Q 254	Pierre Savignac	Virtual Prototypes	5252, de Maisonneuve O., Bur 318	Montréal QC H4A 3S5
Q 255	Frank Ruffolo	Télécité Inc.	1010, de la Gauchetière Ouest, suite 400	Montréal QC H2B 2N2
Q 256	Jacques McNeil	Citec	710, boul. St-Germain	St-Laurent QC H4L 3R5

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Liste originale des répondants: base de données SIVR

Province: QC

ID	Répondant(s)	Organisation	Adresse	Ville, Province, Code
Q 257	Michel Jarry	Alveltech Inc.	1685, rue Fleetwood, 5e étage	Laval QC H7N 4B2
Q 258	Normand Lucas	CIDEM	770, rue Sherbrooke O., 11e étage	Montréal QC H3A 1G1
Q 277	R. Giordano	S2RK Advanced Technology Inc.	1, Holiday Drive	Pointe Claire QC H9R 5N3
Q 278	François Fortier	Technologies Balios Inc.	140, 4e Avenue	La Pocatière QC G0R 1Z0
Type d'organisation 5				
Q 259	Julian Lebensold	CRIM	500-3744, rue Jean Brillant	Montréal QC H3T 1P1
Q 260	Brian Marshall	Transportation Development Center	200, René-Lévesque O. Tour 601	Montréal QC H2Z 1X4
Q 261	Roger Garceau	Centre de recherche industrielle du Québec	475, Ave Christophe-Colomb	Montréal QC H2P 2X1
Q 262	R. Rajagopalan	Concordia University, Dept of Mechanical Eng	1455, de Maisonneuve Ouest, Bur B300	Montréal QC H3G 1M8
Q 263	Gabriel Teodor Crainic	Université de Montréal	P.O. Box 6128, Station A	Montréal QC H3C 3J7
Q 264	V. Rajagopalan	Université du Québec	11 QTR, C.P. 500	Trois-Rivière QC G9A 5H7
Q 265	Mme Ruest	Université de Laval	2480, chemin Ste-Foy, Suite 110	Québec QC G1V 1T6
Q 266	Denis N. Beaudry	Centre de développement technologique	3744, Jean-Brillant, 6e étage, C.P. 6079, Succ A	Montréal QC H3C 3A7
Q 267	Claude Belleville	Institut National d'Optique	369 Franquet	Sainte-foy QC G1P 4N8
Q 268	Claire Laberge-Nadeau	C.R.T. Université de Montréal	C.P. 6128, Succ. A	Montréal QC H3C 3J7
Q 269	Gérard Simian	Université de Laval	2480, chemin Ste-Foy, Suite 110	Québec QC G1V 1T6
Q 270	Richard Hurteau	École Polytechnique de Montréal, Dépt génie électr	Case Postale 6079, succ. Centre-ville	Montréal QC H3C 3A7
Q 273	Jean Michel Salvador	Conseil de la recherche et du dévelopg en transpor	6455, Ave Christophe-Colomb, Suite 300	Montréal QC H2S 2G5
Type d'organisation 6				
Q 271	Raymond Bréard	Association du camionnage du Québec	450, rue Notre-Dame O., Bureau 200	Montréal QC H4C 1V4
Q 272	R.H. Ballantyne	The Railway Association of Canada	800, blvd René Lévesque West	Montreal QC H3B 1X9
Q 274	Jacques Guay	Association des Propriétaires d'autobus du Québec	225, boul. Charest Est	Québec QC G1K 3G9
Type d'organisation 7				
Q 275	Réjean Asselin	STRA Conseil Inc.	85, rue Saint-Charles Ouest, bureau 101	Longueuil QC J4H 1C5
Q 276	Pierre Asselin	Beauchemin-Beaton-Lapointe Inc.	2045, rue Stanley, 11e étage	Montréal QC H3A 2V4

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