TELECOMMUNICATIONS PLANNING IN THE METROPOLITAN ENVIRONMENT

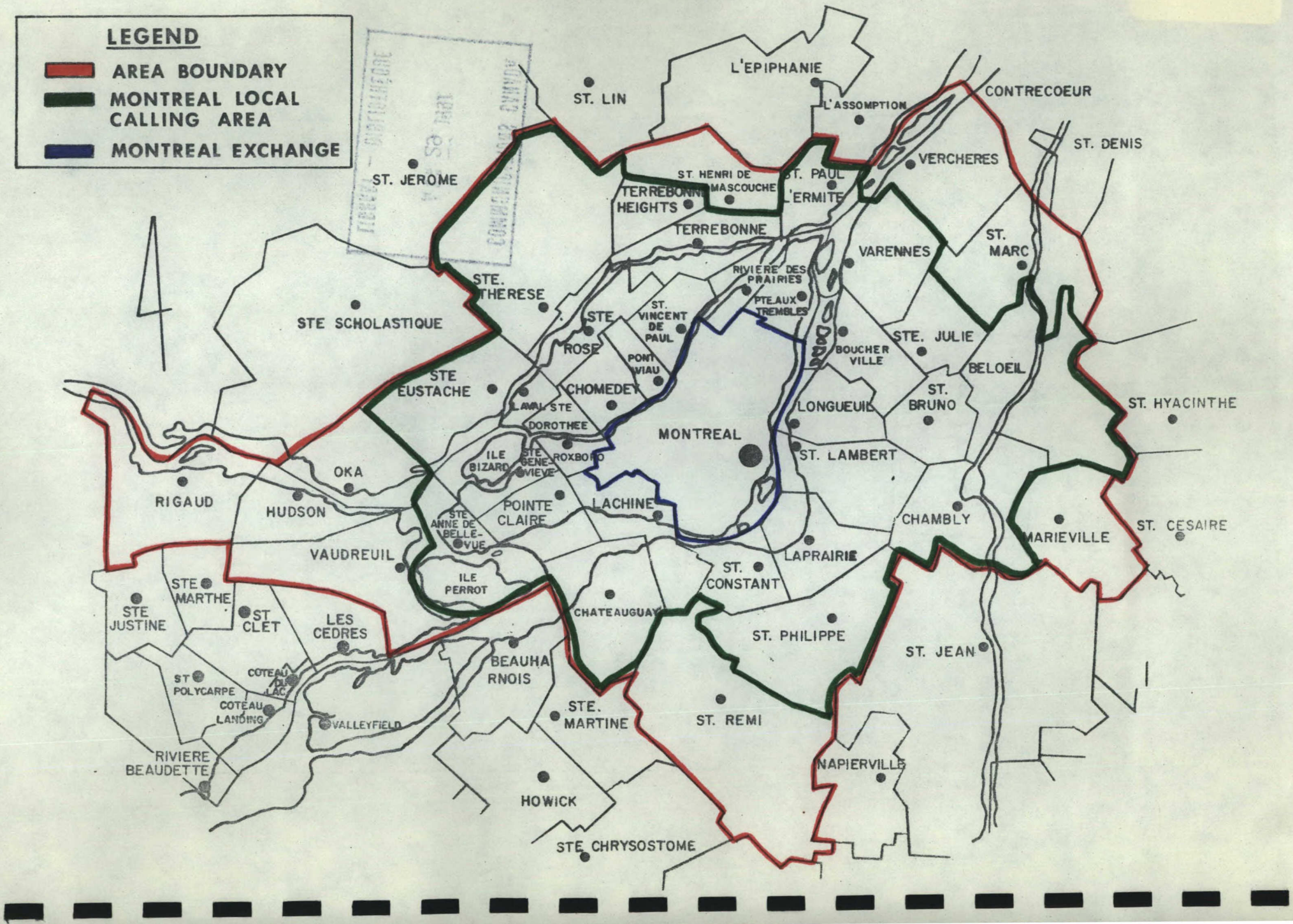
Bell Canada

A Summary of Discussions
held 12 November 1969 between
The Department of Communications
and Bell Canada

EPARED FOR THE DEPARTMENT OF COMMUNICATIONS, OTTAWA

Dec, 1969

MONTREAL AREA



MONTREAL AREA

	1965	1970	1975	1980	1985
TOTAL TELEPHONES (000)	1,139	1,456	1,820	2,185	2,575
INTER-OFFICE TRUNKS (000)	66	73	102	131	160
SPECIAL SERVICE TRUNKS (000)	40	58	88	138	188
CALLS PER DAY (000)	7,927	10,850	13,850	17,000	20,600
SWITCHING CENTRES	54	54	54	53	54

TELECOMMUNICATIONS PLANNING IN THE METROPOLITAN ENVIRONMENT

A study of Telecommunications Planning for the Montreal and Toronto Metropolitan Areas of Bell Canada

These notes on Telecommunication Planning in the Metropolitan Environment were prepared following the meeting held in Ottawa on 12 November 1969 between:

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INDEX

LIST OF EXHIBITS

1. INTRODUCTION

Planning is the action taken by an organization to prepare itself for the future by defining the what, where, why, when and how of future events. All planning attempts to predict the future, which is a hazardous venture at best, but attempting to meet the future without a plan is an even greater hazard. The choice is not really whether or not to plan, but how to do it.

To reduce planning activities to manageable proportions, it is necessary to segment it into types, and in large organizations these take the form of Financial, Administrative, Materiel, Manpower and Technical Planning. In Bell Canada, these corporate planning activities also encompass Northern Electric Co. activities in the areas of production, supply, installation, etc., as well as Research and Development effort, due to the corporate and contractual relationships between the two companies. Corporate policies, programs and plans are developed for the information and guidance of the administrative sections of Bell Canada, such as Montreal and Toronto Areas, who are on the firing line of provision of service to our customers.

In Bell Canada's Operating Areas the planning is segmented in a similar manner to corporate planning but it is Technical Planning which dominates and forms the basis of all other planning activities. This is because Technical Planning concerns itself with service to our customers. It is this paramount concern for present and future service to our customers, the what, how, when, why, of it, that is reflected in the Technical Plans produced by these Areas.

It is in Bell Canada's Metropolitan Areas of Toronto and Montreal that Technical Planning has been refined to a large degree. (An appreciation of the reasons for this will be found in Section 2). Maps of these two areas will be found inside the front and back covers, together with forecasts of telephone development to 1985.

Exhibit A gives some of the pertinent data pertaining to Montreal and Toronto. It should not be surprising these two Areas emphasize planning to a high degree for their growth and operation, encompassing as they do approximately 40% of the total Company operation. They thus absorb a substantial amount of the resources of capital, material, manpower, etc., available to the Company.

Hence, this brief memorandum on Technical Planning for telecommunications for a Metropolitan Area will deal with this type of planning as applied to our Montreal and Toronto Areas. It cannot be a complete treatise on the subject and its brevity will call for an appreciation of the complexity of the telephone network in a large city that may not exist with all readers. Similarly, the impact on our customers' service of changes in technology, restricted capital availability, abrupt changes in service demands, etc., may not always be fully defined to the satisfaction of all.

However, the end goals of Technical Planning are clear. They are: to meet the service demands of customers both in quality and quantity, now and in the future. Our service at present is the finest in North America and our goal is to maintain this position even with the rise in public expectations in terms of cost and quality of service.

2. TELECOMMUNICATIONS FROM A METROPOLITAN AREA VIEWPOINT

What is a Metropolitan Area

In its broadest terms, a metropolitan area is a region with a large central city surrounded by a number of tiers of satellite municipalities. Initially, the latter were separated from the core city and each other by undeveloped or rural type territory and were relatively self-sustaining. The intervening territory gradually filled up until urban development became nearly continuous throughout the majority of the metropolitan area. The outlying areas are usually predominately residential whose inhabitants provide a substantial proportion of the manpower for the business and industry concentrated in the core. The satellite areas have a strong community of interest with the central city and areas adjacent to themselves.

The growth of the metropolitan region has of necessity been paralleled by growth in telephone service. In the early stages with isolated satellite communities, calling requirements to and from the core city could be adequately met on a toll charge basis. As core and fringes grew together, community of interest increased until toll charges on calls between them were no longer found to be acceptable. This led to the introduction of Extended Area Service which provides for toll-free calling between the satellite communities and the core exchange, and requires a complex network of switching and transmission facilities. For example, the local calling area of the Montreal exchange at present covers an area of almost 1000 square miles (currently one of the largest local calling areas in North America and probably in the world) and includes 30 exchanges served by 44 switching centre buildings. Each of these

buildings must be interconnected by a network of transmission facilities to provide for the required scope of local calling.

Hence, from a communications point of view, a metropolitan area is one where a large group of neighbouring communities with varying characteristics and interests are served by a communication network of common switching machines, private (customer) switching machines, interconnecting transmission facilities of many types, and customers' station equipment. To be exact, it is an overlay of many networks: the Radio and Video networks overlaying the Special Services network, overlaying the Data network, etc., all overlaying the basic POTS (Plain Ordinary Telephone Service) network.

These networks are also intertwined with the Long Distance network, the adjacent networks of non-metropolitan areas and last but by no means least, the comprehensive networks of our large business customers.

As in mathematical network theory, elements in our telecommunication network are rarely independent of each other. Hence, making a change in any one component of this intermeshing complexity of relationships spreads its affects out through the meshes of the network like ripples in a pond. The problem is to keep all elements working as efficiently as possible and to determine and react to any significant ripples when a change in an element is planned. Theoretically, the effects of one new telephone in Montreal could be felt as far away as Vancouver; thankfully, in practice the effects are unnoticeable. However, the introduction of a new office code (a regular occurrence in metropolitan centres) introduces sizeable waves within the metropolitan network with lesser ripples along the interconnecting configurations.

Determining and reacting to the significant ripples in such changes calls for considerable experience and expertise, along with the use of various planning techniques which will be discussed later.

Metropolitan and Non-Metropolitan Differences

Differences between metropolitan and non-metropolitan areas are largely ones of degree. Basically the same types of services are provided in all parts of the Company's territory if the demand for it exists.

From a telephone point of view the metropolitan type of network exists in an elementary form whenever there are two or more local switching centres forming a local network. Many of these local network situations exist in the non-metropolitan areas ranging from localities having only two offices to such city complexes as Quebec, Ottawa-Hull, Hamilton, London and Windsor, which have substantial metropolitan developments. These latter, though quite large, do not compare with the Montreal and Toronto situation, principally due to size and complexity.

New developments, new services and modernization tend to be introduced first into the metropolitan areas as the requirements for them are usually more pressing there. The impact of such new developments is generally more severe in these Areas due to the need to integrate them with the existing complex overlay of networks.

The non-metropolitan areas do, however, have their own unique challenges, not the least of which is the problem of economically providing

service in thinly populated and isolated parts of their territory such as Labrador, Northern Quebec and Ontario, and the Arctic Islands, but in general they have less complex business arrangements, fewer trunk groups, simpler networks, and a more simplified toll structure.

Toll - Outlet To The World

A distinction must be made at this point between the type of call which is covered by the basic charge for telephone service (a local call) and those for which an individual charge is made which varies with distance and length of call (a long distance or toll call). In the metropolitan situation the former are handled by the local switching and trunking network and the latter by the toll network.

In the case of the toll call, it is necessary to provide means for recording, timing and subsequently billing for the call. Originally all such recording was done by operators at toll switchboards, but within the past 25 years automatic switching was introduced into the toll network, however operators still had to record and time all calls. More recently the introduction of Direct Distance Dialing and Automatic Message Accounting has eliminated the need for operator handling of most toll calls. Plans are now being developed for the installation of further special equipment which will provide for the automatic recording and timing of all types of calls with only a minimum intervention by an operator in some cases.

Every local switching unit must have the ability to reach the toll office for the placing and reception of toll calls, and separate trunk routes

must be provided for those calls which will be placed through the Automatic Message Accounting system and those which must be placed through the operator.

In order for calls originating in one toll centre area to reach any telephone in any other toll centre area on this continent or anywhere else in the world, facilities must be provided to interconnect the various toll centres. This is done by means of intertoll trunks and an hierarchical arrangement of toll centres. These arrangements are beyond the scope of Metropolitan Planning except as they involve the facilities entering or leaving the metropolitan area.

Currently the local and toll calls use separate and distinct networks within the metropolitan area but with automatic recording of toll calls, changes in the rate structure, and increasing complexity of both networks, differences between the two are diminishing. Plans are under development to effectively combine the two networks through what are known as Sector Tandems which would lead to more efficient network usage.

Continuity of Service

Due to the complexity of the metropolitan network and the interdependence of its various components, the failure of any one part can have far-reaching effects. Various measures are taken to ensure the continuity of services not directly involved in a failure or to minimuze the effect of such failures particularly those of a catastrophic nature which might occur in a national emergency. This especially applies to services provided to

public bodies and officials, police, fire, doctors, hospitals, etc. Planning for continuity of service is an essential part of metropolitan planning. Some of the means taken to ensure continuity of service are:

(a) Route Diversity

Where possible two or more separate routes are used for all types of trunking in the metropolitan area. Thus, if one route is interrupted, access would still be available via the other. While service would not be up to standard, sections of the area would not be isolated.

(b) Metropolitan Junctions

Major toll routes, which could be microwave or coaxial cable, are carried around, rather than through, the metropolitan area so that intertoll trunks not terminating there would not be interrupted due to a catastrophic failure in the metropolitan centre. Two or more terminating points known as Metropolitan Junctions are located on these by-pass routes outside the metropolitan perimeter and intertoll trunks terminating at the metropolitan toll centre are routed inwards from there. Route diversity is also used in this case.

(c) Line Load Control

During a national emergency or a major civil disturbance, demands for telephone service can be so high as to severely overload our facilities and impede the completion of essential or high-priority calls. Line Load Control provides a system which permits limiting of access by non-essential customers to the switching network. This restrictions applies to originating

service only; terminating calls can still be completed to any telephone irrespective of the operation of the control system.

(d) Terminal Area Protection

In the event of catastrophic failure of the toll centre it would be impossible to complete calls beyond the metropolitan area. Hence, a small number of trunks have been provided between peripheral local switching centres outward to remote toll centres. These lines can only be accessed by special numbers which have been provided to a selected small group of gevernment officials to permit them to place official calls during the emergency.

Challenges

An appreciation of the planning job facing Toronto and Montreal Areas will perhaps be clearer if it is realized that the telephone development of each of these areas is expected to double by about 1985 to 1990. Moreover, the local calling area of both core exchanges will likely double within 10 years. It is expected that past achievements, such as:

- conversion from manual to dial operation
- introduction of electro-mechanical switching and integration with other switching systems
- implementation of operator and customer long distance dialing
- introduction of electronic switching
- introduction of TOUCH-TONE calling for normal use and as an input device for communication with computers.

- transmission of data at low, medium and high speed
- design and manufacture of CONTREMPRA telephone in Canada
- provision of CENTREX service for business customers, etc.

will be mirrored by the achievements in the future. While these have been by no means unique to the Metropolitan Areas, they tend to be implemented earlier and with greater intensity in these Areas.

Some of the challenges which face us now or will in the very near future are:

- the gradual conversion of a large part of our networks from analog to digital transmission with its inherent low noise and low distortion capabilities.
- the need for increased diversity in our networks to improve their ability to withstand disaster.
- the rapid growth in the requirement to transmit data at high speed.
- the growing demand for "vertical services"
- the need for faster switching which can best be achieved at this time by means of electronic switching systems.
- following on the previous item, the need to plan for the economical change-over from the present electro-mechanical switching systems to electronic.
- the partial combining of local and toll networks through sector tandems.
- further development of the "Wired City" concept.

- initiation of PICTUREPHONE service.
- further exploration with educational authorities as to how we can best meet their needs for storage, retrieval and dissemination of information.
- the search for new techniques to economically provide for urban type service in non-urban areas.

If we are to repeat the past successes of Bell Canada, it is absolutely mandatory that we chart our future actions and progress to the best of our ability. Recognizing that all future situations, changes, demands, etc., cannot be explicitly defined, we must strive to ensure that our year-by-year progress will meet growth requirements of the existing services and have sufficient flexibility to accommodate reasonable unknowns.

Planning must recognize our obligation to meet the service demands of our customers both in quality and quantity. We intend to meet these demands with high quality service even in the face of sharply rising costs and increasing public expectations in terms of service improvements. This means, of course, that not only are we required to meet projected demands, but also anticipate new services, new demands - requirements of our customers that even they are not aware of at the moment.

We are also obliged to ensure that the complex telephone network that we are building is compatible with the network in adjacent communities of our own country and also with the whole North American and intercontinental telephone systems and has the capability of adapting to future communication needs.

We can only do all of these things through a series of well documented, short and long term plans reflecting the needs of the customer and the business.

3. BASIC PLANNING DATA

The basic purpose of planning in the context of these notes is to anticipate the telephone service needs of the general public, government and business, and to meet these needs at the right place, at the right time, in a manner beneficial to the customers, employees and shareholders.

To do this requires that we have a forecast of demand for the many services we now supply and where they will occur. At present we provide regular telephone service both business and residence (or what is sometimes called POTS - Plain Ordinary Telephone Service) and a variety of special services such as CENTREX, WATS, low and high speed data, etc.* Each of these types of service requires some anticipatory action through planning and hence a forecast of demand.

Long Range Forecast

The starting point for a Long Range Forecast of telephone service is the forecast of population by the Economic Council of Canada, the Chief Statistician of Bell Canada, or a combination of the two, depending on the circumstances and time frame in question. The future population of Ontario and Quebec is projected on the basis of recent trends and assumptions about such factors as impact of foreign immigration, interprovincial migration and relative economic conditions. Population projections for the five Bell areas (of which Toronto and Montreal are two) are then developed. Exhibit B is the most recent population forecast to year 1991 published by our Chief Statistician in September 1969.

*See Glossary of Telephone Terms in Appendix I

An estimate of future households in each Area is derived by dividing the population estimates by estimated persons per household (PPH) factors. The PPH factors used must reflect the impact of new family formation resulting from marriages, single persons or several young adults establishing households, and families living in shared accommodation but planning to set up their own households. The expected increase in marriages, the trend toward non-family household formation and the trend away from shared accommodation implies that demand for residence main telephone service will not only increase, but increase faster than population growth. Exhibit C is an estimate of households by Areas to year 1991.

The forecast of residence main telephones in service at the end of any year in the forecast period is then a product of the household forecast and the estimated residence main telephone development (main telephones per household). The estimate of residence main telephone development is itself dependent on such factors as economic conditions expected to prevail at various points in time, popularity of or need for a second residence line, regional growth, etc.

An extrapolation of past relationships between residence and business main services, modified by judgement and knowledge yields a forecast of business main telephone demand on an Area basis. Similarly, we can analyze the business market and determine what the demand will be for various classes of business service, including CENTREX.

A Long Range Forecast, as described in the foregoing, is normally prepared once a year on an Area and Company basis for a period of up to 20 years. It is an administration type of forecast and serves as a basic reference in many planning matters.

Fundamental Planning Forecast

While a long range forecast is essential for the overall planning process, forecasts for territorial segments much smaller than a metropolitan area are required in order to plan the type, quantity, and location of facilities required to serve the expected demand.

A Fundamental Planning Forecast is prepared for the same time span as the Long Range Forecast and for whatever territory the Fundamental Planning covers. It may be for a part of a switching centre, all of a switching centre or a large metropolitan territory. Fundamental Planning forecasts for all switching centres are updated at least annually. The 1969 forecast for switching centres in one district is shown in Exhibit D.

General Planning Forecast

Probably the most important forecast is the General Planning Forecast since it is used as the prime input to the short range planning process which initiates the expenditure of large amounts of capital, and many other forecasts are, in some way, dependent on it. It is a five-year forecast of demand for various types of communication services for a particular switching centre (Exhibit E). The General Planning Forecast is subject to continuous review and revisions are issued as required.

Forecast of Customer Usage

A further basic input to the planning process is the forecast of customer usage. Usage depends on two factors: number of calls placed per telephone in unit time, or calling rate; length of average call, or holding time. The product of holding time and calling rate gives usage, which on this continent is usually expressed in hundred-call-seconds, or CCS.

Considerable historical data is available which can be used as a basis for the forecast, however, many factors must be considered in its development. Among these are:

- Trends of existing services
- Impact of new service offerings
- Grade of service to be provided
- Rate structure - extent to which toll-free calling will be extended
- Telephone development - as expressed by previously-mentioned planning forecasts

Other Forecasts

In addition to the foregoing key forecasts used in planning, many other forecasts are required and prepared, such as Revenue, Expense, Station Apparatus, Outside Plant, to name but a few.

Forecasting Techniques

In order for the forecaster to arrive at appropriate levels of growth, it is necessary to seek out, sift, and evaluate a great deal of information

which is available from sources inside and outside the Company. He must be in constant contact with town planners, municipal officials, etc., to keep abreast of short and long range growth plans which they may have, to know the zoning by-laws which are applicable, to guage the availability of various public services, and so on.

The techniques used in the preparation of forecasts are numerous and varied. They may range from simple extrapolation of trends (with or without the aid of a computer) to logistic growth curves. The latter technique is only used for long-run forecasts when a carefully developed value of the probable saturation level can be obtained, normally by land use analysis.

At present there are two research teams in Bell Canada working to improve the forecaster's ability to foresee the future. The first group, in Headquarters Planning and Research, is undertaking studies (The Environment Study) with both the Universities of Toronto and Montreal to explore man's value systems and his use of space as they will relate to communication needs. The project is currently examining present conditions with the hope of uncovering significant trends that will assist in forecasting conditions in 1980, 1990 and 2000. Some 22 papers on subjects such as Urban Structure and Growth, Urban Mobility, Urban Redevelopment, Urban-Rural Trends, etc. have been received.

The second group, working in Toronto, is examining various computer forecasting techniques for short range forecasting. Such techniques as time-series, regression and uncertainty analysis are currently under

review. Both of these groups are working together to permit the forecaster to better perform his role in the planning process.

4. PLANNING SYSTEM

A planning system is not a static device using rigid data and formal rules, but is rather a dynamic, evolving process - testing, probing, comparing, evaluating alternatives and consequences of choices as the future unfolds. Its objective is the formulation of well-conceived, well-documented and accepted guidelines to the means of providing the services our customers will want and expect in the future.

In broad outline, the planning process starts with the development of a view of what the future service needs and desires of our customers will be. This view, compared with the existing or a future service position, identifies a planning need. Once a need has been identified, it is necessary to evaluate the existing situation and determine what options or means will be available to fulfill the need.

The identification of the problem is sometimes done on a negative basis, such as a service or maintenance failure, costs getting out of hand, etc. In the metropolitan situation, the problem is frequently generated by one of the many buildings, switching machines or trunk cable structures approaching the point of exhaustion, which could lead to either the extension of the existing structure or the requirement to provide a new structure, such as the opening of a new switching centre with all its attendant complications of switching, coding and trunking.

Thus the planning problem can range from a day-to-day situation involving growth in an existing service using existing technology, to one

involving a new type of service, a technological advance, etc., which contain considerations which are difficult if not impossible to input directly into the planning process. The latter deficiency can only be filled by the flexibility of the planning, the ability to accommodate to change and the experienced imagination of the planner.

Many problems are quite broad in scope and it is frequently possible to divide them into a number of narrower problems which can be handled more readily. The goals to be achieved or the purpose of the study, such as a best design or an optimum utilization, must be clearly stated. In general, these involve a maximizing or a minimizing process - maximum service and utilization, minimum expenditure and cost to the customer.

In most planning situations there are many variables which can significantly affect the achievement of the objectives. Some of these are beyond our control, such as the location of customers, layout of streets, geographical features, etc., and while they must be considered, are not alternatives in the study. Others, such as which route to use to serve a group of customers, whether to extend an existing building or build a new one, etc., are alternatives which need to be compared.

With the identification of possible alternative plans of action each must be evaluated in terms of its impact on service, on the remainder of the network and on the financial resources of the Company. In addition to meeting requirements of service and cost, a plan must be flexible enough to meet any unforeseen change in the situation.

It can be appreciated that masses of data must be accumulated and manipulated in order to analyze and plan the complex telecommunications network required to serve a metropolitan territory. Statistical information must be summarized in many ways to meet the individual needs of various planning groups. Each group must interpret and manipulate the input data to permit analysis of the current and projected requirements with respect to their particular responsibility.

The extensive use of the latest techniques in mechanized procedures and the constant striving for improved methods to reduce the raw data into appropriate input information is fundamental to this process. The use of a Time-Sharing Computer system in this activity is currently expanding at a rapid pace.

Various plans to meet the projected future requirements are tested by creating suitable models using the input information. These models are then tested for feasibility, flexibility, economic and service aspects before final selection of a plan is made. Once again the Time-Sharing Computer system has proven to be useful in making engineering economic studies and testing various complex proposals for optimum use of equipment and facilities.

Subdividing the planning into smaller specialized or geographic plans provides the very necessary means to deploy available manpower to the overall task. This by nature imposes a need to develop some organized means to bring the various plans to a cohesive overall plan. At the same time it

is necessary to establish a system of priorities so that the various segments of the plan are available at the appropriate time for implementation.

Planning priorities are established from both the Metropolitan area and Corporate viewpoint with appropriate weight being given to a variety of considerations including:

- Resources of manpower
  money
  materials
- Expressed growth demands
- Customer demand for new services
- Improvement in service
- Reduction of operation expense

Planning documents are issued to cover each aspect of the overall plan as it is developed. This results in a series of plans ranging from a specific detailed proposal for implementation of a segment of the overall plan, through plans covering specific topics of territorial segments, to the overall plan for the entire metropolitan area. These plans are the end product of the process. The scope and purpose of these plans are described in more detail in the next section.

Plans are only of lasting value if they are kept up to date to meet a changing situtation. They must therefore be reviewed periodically and adjusted as necessary if conditions have changed which make some of the

basic assumptions no longer valid. This should not be regarded as a reflection on the validity of the original plan. It is merely a recognition that the plan does not reflect a static situation but one of continual change.

5. OUTPUT DOCUMENTS

The final stage of the planning process for Metropolitan Areas culminates in the issuance of a variety of Planning Documents.

These documents can be divided into three broad categories:

1. Documents of a long range planning nature.
2. Documents of a current or short range planning nature.
3. Documents that support the planning activity.

The following types of plans fall specifically into these three categories:

Category 1: Long Range

a. The Metropolitan Plan
b. Sector Plans
c. Switching Centre Fundamental Plans
d. Fundamental Plans for Special Studies

The Long-range planning covers an interval of 20 years or more, into the future.

Category 2: Current

a. Switching Centre Current Plans
b. Special Study Current Plans
c. Current Jobs

Current planning covers, on the average, the ensuing five years, but may vary depending on conditions from 3 to 7 years.

Category 3: Support Documents

a. Computer Programs

b. Planning Summaries

Considered in their entirety, all of these outputs of the planning process form a "Hierarchy of Planning Documents". This hierarchy is described graphically in Exhibit F.

Description of Planning Documents

In the Hierarchy of Planning Documents, there is a chain of documents primarily concerned with the development of the Metropolitan Area for the provisioning of switching equipment and transmission paths to meet customer needs, present and future, in an economic and orderly manner.

At the head of the chain is the Metropolitan Plan, followed by a small group of Sector Plans and finally a larger group of Switching Centre Fundamental Plans and Switching Centre Current Plans.

The first three groups are long range in scope; the fourth covers a short range interval.

a. The Metropolitan Plan

The plan covers the whole Metropolitan area and is broad in scope, embodying developments that are generally applicable throughout the Area in terms of switching arrangements, service offerings, modernization, etc.

This is the master plan for the Area and its prime purpose is to ensure that meeting the telecommunications requirements for the future will be developed throughout the area in a compatible, cohesive manner.

b. The Sector Plans

These documents cover development plans for geographically contiguous groups of Switching Centres (and/or exchanges) within the Metropolitan Area.

These plans are less general in nature, than the Metropolitan Plan and are basically intended to cover the development of areas with common features and problems, to recognize community of interest between municipal groupings and to take into account the interaction between switching centres in the same general area.

Taking the Montreal Metropolitan Area as an example, six of these documents are planned to cover various sectors of the total area, viz., all switching centres or Exchanges on:

- The South Shore
- Ile Jesus
- The North Shore
- West Montreal Island
- The Montreal Core
- The Vaudreuil Peninsula

The planning documented in the Sector Plan is broad in scope and indicates, for the long range planning period:-

1. New Switching Centres to be established (resulting from Wire Centring Studies)
2. Overall growth patterns.
3. New Extended Area Service offerings proposed, within the sector and between this and other sectors.
4. Establishment or phasing out of Theoretical Switching Centres.
5. Interim and Ultimate Switching Centre and Exchange Boundaries.
6. Trunk Routes in the sector and to other sectors.
7. Central Office codes.
8. Other broad planning considerations.

c. Switching Centre Fundamental Plans

These are similar to and written to coordinate with the "Sector Plans" but cover only a single switching centre territory (and its Theoretical Offices, if applicable). There is considerably more detail in these documents than in the Sector Plans. Planning considerations for each S.C. include boundaries, type of urban development, growth, lot, building and switching equipment development, interim and ultimate switching capacities, central office codes and Extended Area Service arrangements, area transfers, etc., etc.

Timing for each development specified in the Fundamental Plan is stated only in indefinite terms (e.g. mid 1970's, early 1980's) since fluctuating conditions of demand and supply will shift the occurrence of the criteria necessary for the implementation of a particular part of the plan.

The Switching Centre Fundamental Plans form the "grass-roots" of our hierarchy of Planning Documents.

An example of the cover sheet and table of contents of a Switching Centre Fundamental Plan is shown in Exhibit G to indicate the scope of such a plan.

d. Switching Centre Current Plans

These documents cover the same topics as the Switching Centre Fundamental Plans but for the immediate five-year development. These plans are considerably more detailed and the timing for implementation of each part of the plan is more specific than in the Fundamental Plan.

It is from these documents that the work order for each job is developed. The work order both authorizes the expenditure of Company funds and sets in motion the detailed engineering, specification, ordering and installation of new equipment or modifications to existing equipment.

The scope of a Current Plan is shown by Exhibit H.

e. Special Studies

Another grouping in the hierarchy consists of Fundamental (10-20 yrs) and Current (3-7 years) Plans for Special Studies.

These documents have much the same degree of detail as the Fundamental and Current Plans for Switching Centres but refer to special items in the overall development of the Metropolitan Area.

Typical Fundamental Plans in this series have been, or are expected to be written, in the following topics:-

1. Fundamental Switching Plan (Tandem switching)
2. Special Services Operating (Test) Centre
3. Operator Force Location
4. Directory Assistance
5. Intercept and Vacant Code Intercept
6. Official PBX and Business Office etc.

These plans refer to specific items or developments and more often than not involve a single location or a few locations. The Toronto Operator Force Study is a typical example and the attached index (Exhibit I) gives an appreciation of its scope.

f. Planning Guides

These are primarily used for stating Area policy in the introduction and/or implementation of new services, new switching equipment, new equipment features (e.g. CENTREX, SF-1, SP-1, Line Load Control, etc.) or as aids to the design of equipment or services (e.g. Application of Flexibility Design to Switching Equipment, Application of Forecast Volatility, No. 5 Crossbar Class of Service Option, Size of Line Link Frame, Line Link Networks, Concentration Ratio, etc.) or as guides to implementation of programs such as Step-by-Step replacement, new Extended Area Service offerings in terms of policy, criteria, etc.

The cover sheet of the Montreal Area Planning Guide on Line Load Control is shown in Exhibit J as an example of this type of document.

As can be seen from Exhibit F, these basic Planning Guides can serve as a planning input to all of the other planning documents.

Finally, there are two types of document that provide the Metropolitan planner with support data and computer techniques for use in the study process.

g. Computer Programs

These programs are developed and run by Plant Extension employees as an invaluable aid in overcoming repetitous and time-consuming calculations and studies in Plant Extension.

The Computer Programs are described and documented in the same format as other planning documents and distributed for the benefit of other groups who might find them useful.

Programs have been written for:-

1. Calculation of Outside Plant First Costs and Annual Charges.
2. Sector Tandem Trunk Forecasts.
3. Switching Centre Equipment Utilization.
4. Allocation of CENTREX customers to available switching machines.
5. Wire (Switching Centre) Centring Studies.
6. Cost Ratio Calculations.

h. Planning Summaries

These documents simply list information that the Planning Groups are called upon, from time to time, to provide to other groups or that is used in the study process.

Planning Summaries cover such topics as:-

1. Switching Centre Areas & Development Densities.
2. Office Codes in Use & Installed Lines.
3. Working Terminals by Type of Switching Equipment.

6. CONCLUSION

The conclusion that can be drawn from the foregoing brief document on Telecommunications Planning in the Metropolitan Environment is that Bell Canada has a systematic approach to planning for its metropolitan centres.

Its effectiveness can best be evaluated in terms of the cost and quality of service we are now providing for our customers. Our present situation of providing service that is amongst the best and cheapest in North America, indicates that in the past we have had the scope of planning and the resources of money, manpower and materials required.

Our planning system assures us the plans for future needs, however the implementation of these plans is dependent upon future resources. Of these resources, capital dollars is a most pressing concern.

Our management of available capital is a developing art as is our planning and this is as it should be, for the two go hand-in-hand. Continued success of the Company depends not only on planning to meet growth and service requirements but also on our ability to detect and devise opportunities to increase efficiency. Without sufficient resources to take advantage of such opportunities, our ability to produce earnings such that we can attract further capital would be impaired. Hence, a prolonged period of capital restriction would be self-perpetuating.

As long as we can attract and retain resources of capital and manpower through the confidence of the public and government in our Company, we have the means, through our planning skills, to ensure the continued success of the communication story in our territory.

APPENDIX I

GLOSSARY OF TELEPHONE TERMS

Automatic Message Accounting - (AMA)

A system for automatically recording details of chargeable telephone calls (DDD calls) on tape for subsequent processing to a customer's account.

CENTREX

A means of serving a customer with a complete automated service which provides to the user direct inward and outward calling, plus local intercommunication, along with attendant assistance when required.

Direct Distance Dialing (DDD)

A system whereby the customer is able to place long distance calls without the need to call in an operator. Recording and timing of the call is effected by means of an AMA system.

Exchange

A basic unit for the administration and furnishing of telephone service which normally includes a city, town or village, and adjacent territory. An exchange consists of one or more Switching Centres.

Extended Area Service (EAS)

A local service arrangement whereby customers in a particular exchange may call and be called by customers in one or more other exchanges without a toll charge.

Local Calling Area

The grouping of exchanges to and from which a customer in a specific exchange can call or be called without a toll charge.

Main Telephone

A telephone which is directly connected (including connection through a radio channel) to a switching unit by an individual or party line.

PICTUREPHONE

A proposed service which will provide visual as well as oral communication between two points over the switched network. A private line service and a conference-type service is also possible.

Switching Centre

A building wherein one or more switching units are located and from which outside plant facilities radiate. It contains the necessary facilities required to establish circuits within the territory it serves and with other switching centres.

Switching Unit

A unit of switching equipment (manual, electro-mechanical or electronic) which provides service interconnections. There are various types of switching units, e.g. Toll, Local, Tandem.

Toll Centre

The site of one or more toll switching units; the point from which outside plant or radio facilities radiate to other toll centres and switching centres.

Touch Tone Calling (TTC)

A method of establishing telephone calls by the use of numbered push buttons in place of the more usual rotary dial.

Wide Area Telephone Service (WATS)

An outgoing long distance service designed for customers with a requirement for voice and/or data communication within specific geographical areas. There are two basic types of service offerings: a measured time service, providing a basic 10 hours per month with hourly overtime; a full time service, providing full time calling at a fixed monthly charge. Calls may be placed within any of seven progressively larger calling areas or zones for which the customer may contract, the largest encompassing all of Canada.

COMPARISON (As of 31 Dec 68)

MONTREAL AREA		TORONTO AREA
2,699,00	POPULATION	2,414,000
739,000	HOUSEHOLDS	661,000
1,454	AREA (SQ. MI.)	1,304
54	CENTRAL OFFICE BUILDINGS	47
13	OTHER MAJOR BUILDINGS	16
1,341,400	TOTAL TELEPHONES	1,330,200
70	% RESIDENCE TELS. OF TOTAL	68
367,200	TELEPHONE INWARD MOVEMENT (YEAR 1968)	360,200

EXHIBIT A

Bell Canada

PROJECTED POPULATION OF BELL AREAS

(In Thousands)

YEAR	EASTERN	MONTREAL	CENTRAL			TORONTO	WESTERN	TOTAL
			Ontario	Quebec	Total			
1967	3,030	2,666	1,798	214	2,012	2,349	3,104	13,161
1968	3,048	2,699	1,823	215	2,038	2,414	3,155	13,354
1969	3,067	2,732	1,849	216	2,065	2,481	3,208	13,553
1970	3,092	2,780	1,879	217	2,096	2,553	3,266	13,787
1971	3,117	2,827	1,910	218	2,128	2,624	3,327	14,023
1972	3,146	2,878	1,942	219	2,161	2,695	3,389	14,269
1973	3,175	2,930	1,975	220	2,195	2,767	3,452	14,519
1974	3,204	2,983	2,010	221	2,231	2,840	3,517	14,775
1975	3,233	3,037	2,046	222	2,268	2,913	3,583	15,034
1976	3,262	3,092	2,084	223	2,307	2,987	3,650	15,298
1977	3,291	3,148	2,124	224	2,348	3,062	3,718	15,567
1978	3,320	3,205	2,165	225	2,390	3,138	3,787	15,840
1979	3,349	3,263	2,208	226	2,434	3,214	3,857	16,117
1980	3,378	3,320	2,252	227	2,479	3,291	3,928	16,396
1981	3,407	3,379	2,297	228	2,525	3,368	4,001	16,680
1982	3,436	3,438	2,343	229	2,572	3,446	4,076	16,968
1983	3,465	3,507	2,387	230	2,617	3,519	4,149	17,257
1984	3,494	3,576	2,432	231	2,663	3,593	4,223	17,549
1985	3,523	3,647	2,477	232	2,709	3,669	4,299	17,847
1986	3,552	3,720	2,522	233	2,755	3,747	4,376	18,150
1987	3,581	3,794	2,568	234	2,802	3,826	4,455	18,458
1988	3,610	3,869	2,615	235	2,850	3,907	4,536	18,772
1989	3,639	3,946	2,662	236	2,898	3,989	4,619	19,091
1990	3,668	4,023	2,709	237	2,946	4,073	4,703	19,413
1991	3,697	4,103	2,756	238	2,994	4,160	4,790	19,744
Avg. Annual % increase	.83	1.81	1.80	.44	1.7	2.40	1.82	1.71
Avg. Ann. Absol. Incr.	28	60	40	1	41	75	70	274

Chief Statistician's Office
September 1969

EXHIBIT B

EXHIBIT C

Bell Canada

ESTIMATED NUMBER OF HOUSEHOLDS

(In Thousands)

YEAR	EASTERN	MONTREAL	CENTRAL	TORONTO	WESTERN
1967	649	720	513	640	862
1968	658	739	524	661	879
1969	668	755	533	684	899
1970	683	772	546	709	917
1971	694	792	558	735	936
1972	709	813	572	757	958
1973	722	837	586	782	980
1974	735	862	598	807	1,004
1975	748	888	613	832	1,028
1976	762	909	625	858	1,055
1977	776	931	643	884	1,078
1978	789	954	655	915	1,104
1979	801	980	672	940	1,132
1980	814	1,005	689	971	1,156
1981	827	1,031	707	1,002	1,181
1982	840	1,057	727	1,033	1,206
1983	853	1,088	743	1,060	1,237
1984	867	1,118	761	1,084	1,262
1985	881	1,149	775	1,111	1,289
1986	895	1,182	791	1,138	1,317
1987	909	1,216	806	1,165	1,344
1988	923	1,251	823	1,193	1,373
1989	938	1,287	839	1,222	1,402
1990	953	1,323	855	1,251	1,433
1991	968	1,361	872	1,282	1,462

FUNDAMENTAL PLANNING FORECAST

F.P.F. (A) 3/69

1968 - 1986

SHEET 1 OF 5

DATE MAY 1969

SWITCHING CENTRE, DISTRICT OR AREA	D = A + B + C TOTAL TERMS INCLUDING CENTREX IN-SERVICE DEC 31			
	1968	1976	1981	1986
COTE DES NEIGE	56379	79515	92725	104525
DUDEMAINE	22322	37880	49200	60430
ROXBORO	8959	13950	16825	19450
ST. DOMINIQUE	65953	75565	82410	88925
ST. LAURENT	16364	22290	25940	29170
DISTRICT	169977	229200	267100	302500

E TOTAL LINES (ASSOCIATED WITH "D") IN-SERVICE DEC 31			
1968	1976	1981	1986
55942	79200	92600	106600
22007	37500	48950	61050
8792	13700	16550	19200
63500	72900	80750	87600
15997	21950	25750	29050
166238	225250	264100	303500

MTL AREA COMM'L DEV.

EXHIBIT D
Page 1 of 5

FUNDAMENTAL PLANNING FORECAST

F.P.F. (B) 3.69

1968 – 1986

SHEET 2 OF 5

DATE MAY 19 69

SWITCHING CENTRE, DISTRICT OR AREA	A				PBX MARKET							
	TOTAL TERMINALS LESS (PBX TRUNKS & CTX CO. TERMS)				B				C			
					PBX TRUNKS				CENTREX CO. TERMINALS			
	IN-SERVICE DEC 31				IN-SERVICE DEC 31				AS.OF DEC 31			
	1968	1976	1981	1986	1968	1976	1981	1986	1968	1976	1981	1986
COTE DES NEIGE	51541	64375	72175	79925	3165	2140	1550	1600	1653	13000	19000	23000
DUDEMAINE	21743	34950	43450	52250	579	930	750	680	—	2000	5000	7500
ROXBORO	8852	13650	16400	18900	107	300	425	550	—	—	—	—
ST. DOMINIQUE	64723	74325	80325	86325	1230	1240	1085	1100	—	—	1000	1500
ST. LAURENT	15456	19100	21250	23600	908	690	590	570	—	2500	4000	5000
DISTRICT	162335	206460	233700	261000	5989	5300	4400	4500	1653	17500	29000	37000

MTL. AREA COMM'L DEV.

EXHIBIT D
Page 2 of 5

FUNDAMENTAL PLANNING FORECAST

F.P.F. (C) 3/69

1968 – 1986

3 OF 5
MAY 69

SWITCHING CENTRE, DISTRICT OR AREA	TOTAL PBX MARKET (PBX TELS + CENTREX TELS)				CENTREX TERMINALS				MISC. CENTREX TERMINALS CENTREX C.O. LINES ADD'L			
	1968	1976	1981	1986	1968	1976	1981	1986	1968	1976	1981	1986
COTE DES NEIGE	19374	26500	30925	35800	1653	13000	19000	23000	20	500	900	1100
DUDEMAINE	3039	6950	9575	12350	–	2000	5000	7500	–	100	250	370
ROXBORO	466	1500	2150	2800	–	–	–	–	–	–	–	–
ST DOMINIQUE	4443	4700	5200	5800	–	–	1000	1500	–	–	50	80
ST. LAURENT	6774	8250	9250	10250	–	2500	4000	5000	–	120	200	250
DISTRICT	34096	47900	57100	67000	1653	17500	29000	37000	20	720	1400	1800

MTL. AREA COMM'L DEV.

EXHIBIT D
Page 3 of 5

FUNDAMENTAL PLANNING FORECAST

F.P.F. (D) 3/69

1968 – 1986

4 OF 5
MAY 69

SWITCHING CENTRE, DISTRICT OR AREA	CENTREX EXTENSIONS				% CENTREX (CENTREX TELS ÷ TOTAL PBX MARKET)				PBX TELS TO PBX TRUNKS RATIO			
	1968	1976	1981	1986	1968	1976	1981	1986	1968	1975	1981	1986
CÔTE DES NEIGE	816	4360	6340	7670	12.6	63.7	77.0	82.6	5.4	4.5	4.2	3.9
DUDEMAINE	–	670	1670	2500	–	37.0	67.0	78.0	5.2	4.7	4.2	4
ROXBORO	–	–	–	–	–	–	–	–	4.4	5.0	5.0	5.0
ST. DOMINIQUE	–	–	330	500	–	–	24.6	33.1	3.6	3.8	3.6	3.5
ST. LAURENT	–	830	1330	1670	–	39.1	55.4	62.6	7.5	7.3	7.0	6.7
DISTRICT	816	5900	9670	12340	7.2	47.2	65.1	70.7	5.3	4.8	4.5	4.3

MTL. AREA COMM'L DEV.

EXHIBIT D
Page 4 of 5

FUNDAMENTAL PLANNING FORECAST

F.P.F. (E) 3/69

1968 – 1986

5 OF 5
MAY 69

SWITCHING CENTRE, DISTRICT OR AREA	TOTAL MISC. PAIRS IN SERVICE DEC. 31 DATA FROM 507 PART 2									MISC. PAIRS		
	1964	1965	1966	1967	1968	19	19	19	19	1976	1981	1986
COTE DES NEIGES	3643	4601	6591	6213	6003					11000	14400	18250
DUDEMAINE	260	537	678	599	787					1900	2800	4000
ROXBORO	80	117	136	130	206					450	600	800
ST. DOMINIQUE	5554	6130	8224	11212	11342					20400	27200	35600
ST. LAURENT	1500	1887	1891	1403	1674					2850	3650	4450
DISTRICT	11037	13272	17520	19557	20012					36600	48650	63700

EXHIBIT D
Page 5 of 5

MTL. AREA COMM'L DEV.

GENERAL PLANNING FORECAST

AREA	DIST	WIRE CENTRE	T/F	IDENTIFICATION	DAY	M	YR.
4	1	150	F	SCARB VICTORIA PARK	24	1	69

YEAR	EXCH	MISC	TYPE	MAIN SERVICE GAIN	INCREASE					% RES. MAIN OF TOT. MAIN	% RES. EXT. OF RES. MAIN	% BUS. EXT. OF BUS. MAIN	RATIO PBX TELS. TO TRKS.	RES. MULTI PTY.	% RES. IND. OF 1 + 2 PTY.	BUS. MULTI PTY.	% BUS. IND. OF 1 + 2 PTY.	RATIO 2 PTY. TELS. TO LINES	RATIO MULTI. TELS. TO LINES	OTHER LINES NET
					PBX TRUNKS	ADD'L I.B. LINES	CENTREX CO.	CENTREX CU.	OTHER TERMS. NET											
69	1	0	3	415	40	25	165		7	871	267	775	55		880		1000	174		151
70	1	0	3	575	15	60	580		10	871	279	787	55		895		1000	175		195
71	1	0	3	660	25	35	940		9	870	293	799	55		910		1000	175		228
72	1	0	3	650	25	25	285		10	870	307	812	55		930		1000	175		257
73	1	0	3	640	25	15	95		10	870	310	825	55		940		1000	175		287

YEAR	DURING YEAR				31 DEC.									
	MAIN SERV. GAIN		INCREASE		TOTAL TERMINALS	PBX TRUNKS	ADD'L I.B. LINES	MAIN			EXTENSIONS		PBX	TOTAL TELEPHONES
	TOTAL	%	TERMINALS	LINES				RES.	BUS.	TOTAL	RES.	BUS.		
68	801	24	943	1244	35889	1323	140	29478	4292	33770	7436	3254	7282	52377
69	415	12	587	725	36476	1363	165	29719	4401	34120	7935	3411	7497	53763
70	575	17	1165	1359	37641	1378	225	30154	4466	34620	8413	3515	7579	55507
71	660	19	1609	1807	39250	1403	260	30641	4579	35220	8978	3659	7717	57894
72	650	18	945	1212	40195	1428	285	31163	4657	35820	9567	3781	7854	59627
73	640	18	745	885	40940	1453	300	31685	4735	36420	9822	3906	7992	60840

YEAR	TELEPHONES 31 DEC.						LINES 31 DEC.			% RES. MAIN OF TOT. MAIN	% RES. EXT. OF RES. MAIN	% RES. IND. OF 1 + 2 PTY.	RATIO 2 PTY. TELS. TO LINES	RATIO MULTI. TELS. TO LINES
	CENTREX CO.	CENTREX CU.	RES.		BUS.	RES. & BUS.								
			IND.	2 PTY.	IND.	2 PTY.	MULTI-PTY.	2 PTY.	MULTI-PTY.	TOTAL LINES						
68	635		25530	3948	4292	3948		2304		34358	873	252	866	171		
69	800		26153	3566	4401	3566		2050		35083	871	267	880	174		
70	1380		26988	3166	4466	3166		1810		36442	871	279	895	175		
71	2320		27883	2758	4579	2758		1576		38249	870	293	910	175		
72	2605		28982	2181	4657	2181		1247		39461	870	307	930	175		
73	2700		29784	1901	4735	1901		1087		40346	870	310	940	175		

EXHIBIT E
Page 1 of 2

PREPARED BY J. G. Morton C.D.P.
SCARB. VICTORIA PARK

GENERAL PLANNING FORECAST - INPUT SUPPLEMENT

CODE	AREA	DIST	SWITCHING CENTRE
	4	1	150

SCARB. VICTORIA PARK SWITCHING CENTRE

31 DECEMBER

	ITEM	ACTUAL 1968	FORECAST 1969	1970	1971	1972	1973
1	POPULATION - TOTAL TERRITORY						
2	- PER CENT B.T. CO. OPERATED						
3	- B.T. CO. OPERATED						
4	- IND. CO. & OTHER						
5	- SERVICE SYSTEM						
6	- B.T. CO. TERRITORY						
7	P.P.H. - B.T. CO. TERRITORY						
8	HOUSEHOLDS - B.T. CO. TERRITORY						
9	RES. MAIN PER 100 HOUSEHOLDS						
10	RES. MAIN TELS.						
11	BUS. M.R. TELEPHONES	326	345	370	405	435	460
12	HOTEL M.R. TRUNKS	—	—	5	5	5	5
13	PBX TRUNKS - 1 WAY IN						
14	" " - 1 WAY TO SC INC. LEVEL 9						
15	PBX TELEPHONES						
16	MISC. CENTREX - TERMINALS	17	20	25	30	35	40
17	" " - LINES	78	90	125	150	170	190
18	CENTREX CO. LINES ADDITIONAL	6	10	15	20	25	30
19	CENTREX EXTENSIONS	172	220	260	295	345	390
20	PUBLIC TELEPHONES - B.T. CO. TERR.	200	205	208	211	214	217
21	" " - IND. CO. TERR.						
22	SEMI-PUBLIC TELEPHONES	76	75	77	80	82	85
23	TOLL TERMINALS & HOTEL TOLL CIRCUITS						
24	TOLL TELEPHONES - NON RADIO & RADIO						
25	" " - EXTENSIONS						
26	FRINGE RADIO						
27	TWX LINES	23	25	27	29	30	32
28	WATS LINES - FT						
29	" " - MT + ½ M	28	28	30	32	35	38
30	WATS TELEPHONES FT & MT INC IN L 28 & 29	2	2	2	3	3	3
31	MOBILE SERVICE DESPATCH TERMINALS						
32	MOBILE TELEPHONES						
33	DESPATCH TERMINAL TELEPHONES						
34	HUNTING TERMINALS — INC. CENTREX	3526	3900	4295	4830	5110	5310
35	~~BRIDGED CONNECTIONS~~ CENTREX	315	330	580	955	1080	1120
36	IND & 2 PTY OUTSIDE BRA.						
37	FOREIGN EXCH. SERV-CUST. LOC. IN OTHER EXCH.						
38	TOUCH-TONE— Lines	972	2260	3550	4850	6175	7500
39	" " - TELEPHONES	1368	3050	4600	6300	7700	9375
40	RES. SERV. IN EDUCATIONAL INSTS - IND						
	" " " " " - 2 PTY						
	PAY SYSTEM - LINES						
	" " - TELEPHONES						
	OTHER LINES NET ♦♦	133	151	195	228	257	287
46	OTHER TERMINALS NET ♦	21	28	38	47	57	67
	TOTALS IN EXCESS OF 31 DECEMBER						
47	SEASONAL SERV - MAIN						
48	" " - COIN						
49	" " - LINES						

♦♦ 1?, 15, 23, 27, 28, 29, 31-24-26-30-32-33

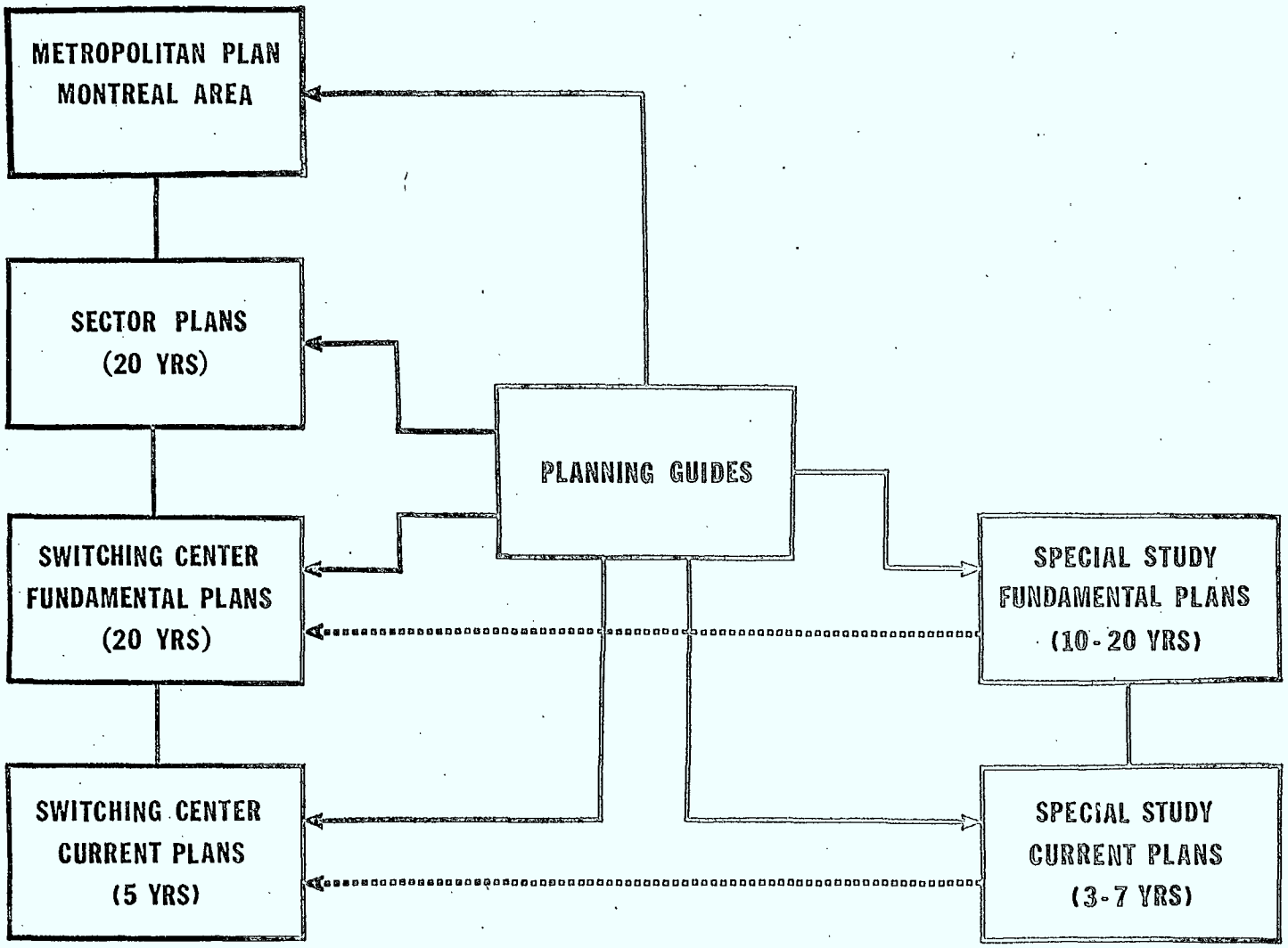
♦ 16, 18-24-26-30-32-33

PREPARED BY _____

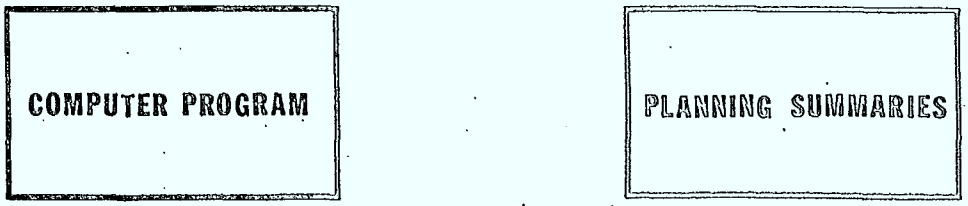
DATE 24-10-69

EXHIBIT F

MONTREAL AREA
HIERARCHY OF PLANNING DOCUMENTS



SUPPORT DOCUMENTS



PLAN FONDAMENTAL	PF-M-139
	EDITION: 1
BUREAU D'ÉTUDES - ZONE DE MONTRÉAL BELL CANADA	DATE: 15 dec. 69
TITRE: CENTRAL MONTREAL - DUDEMAINE	DISTRIBUTION: Liste - 1

Ce plan fondamental presente des recommandations pour l'expansion à longue échéance du centre de commutation de la rue Dudemaine à Montreal.

Un maximum de quatre auto-commutateurs de type crossbar seront utilisés pour pourvoir aux demandes de service; le transfert des abonnés du central St.Laurent sera complété dans le troisième auto-commutateur.

Les frontières existantes seront conservées; les conséquences qui en découlent quant à la grosseur du centre de commutation sont expliquées dans le texte.

Le plan d'expansion de l'édifice ci-joint donne les plans détaillés de l'utilisation de l'espace dans ce central.

	RECOMMANDÉ	DATE		APPROUVÉ	DATE
II	Ing. Principal Adjoint-Dév. du Réseau	27/11/69	IV	Ing. en chef adj.-Dév. du Réseau & Trans.	Dec/69
III	Ing. Principal-Dév. du Réseau	28 Nov 69			

TABLE DES MATIÈRES

CURRENT PLAN	CP-M-119-1
	ISSUE: 1
ENGINEERING DEPARTMENT – MONTREAL AREA THE BELL TELEPHONE COMPANY OF CANADA	DATE: 26 November 1969
TITLE: ST. LAMBERT-ELM ST. SWITCHING CENTRE (1969 - 1975)	DISTRIBUTION: List 2

St. Lambert-Elm a first fringe step/bar switching centre, is part of the St. Lambert exchange on the St. Lawrence River South Shore. It has EAS links with the Montreal exchange (Core) as well as several South Shore exchanges. The moderate growth rate of about 600 MS per year is somewhat volatile. TTC and ANI are available from the XB entity only with SXS replacement well out of the planning interval. Loading indices are not presently very attractive in either entity. The growth entity (MGO) and the building capacities will exhaust long outside of the planning interval. This switching centre contains Toll 3CL switchboards and a test centre testing all of the South Shore.

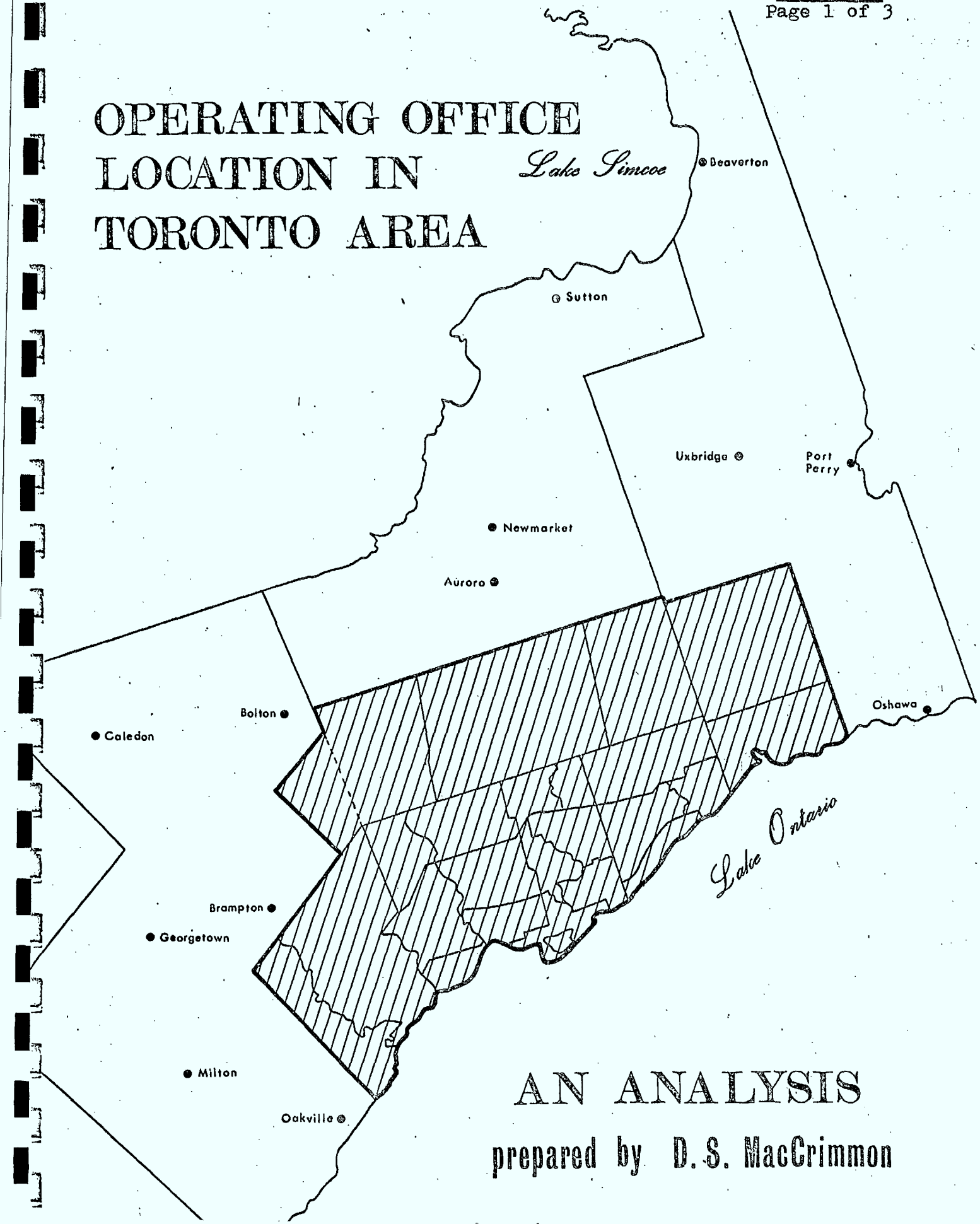
The design of both the SXS and XB entities will be improved during the planning interval to improve loading indices and reduce administrative and operative costs. EAS scope is expected to be increased significantly. No CTX service is foreseen at this time. The 672 code will exhaust and a new code (654) will be required.

The Current Plan, details of which are included in the attached memorandum, is in accordance with the St. Lambert-Elm St. Switching Center Fundamental Plan, FP-M-119, dated 19 March 1969.

	RECOMMENDED	DATE		APPROVED	DATE
I	Sr. Engr.-Current Plans (COE)	1 Dec.69	IV	Area Plant Extn.&Trans. Engr.	Dec 3/69
II	Supvg.Engr.-Current Plans (COE)	1/12/69			
III	Current Plans&Transmission Engr.	1/12/69			

INDEX

OPERATING OFFICE LOCATION IN TORONTO AREA



AN ANALYSIS

prepared by D. S. MacCrimmon

TABLE OF CONTENTS

TABLE OF EXHIBITS

EXHIBIT J

PLANNING GUIDE	PG-M-30
ENGINEERING DEPARTMENT – MONTREAL AREA THE BELL TELEPHONE COMPANY OF CANADA	ISSUE: 1
TITLE: LINE LOAD CONTROL	DATE: Sept. 24/69.
	DISTRIBUTION:

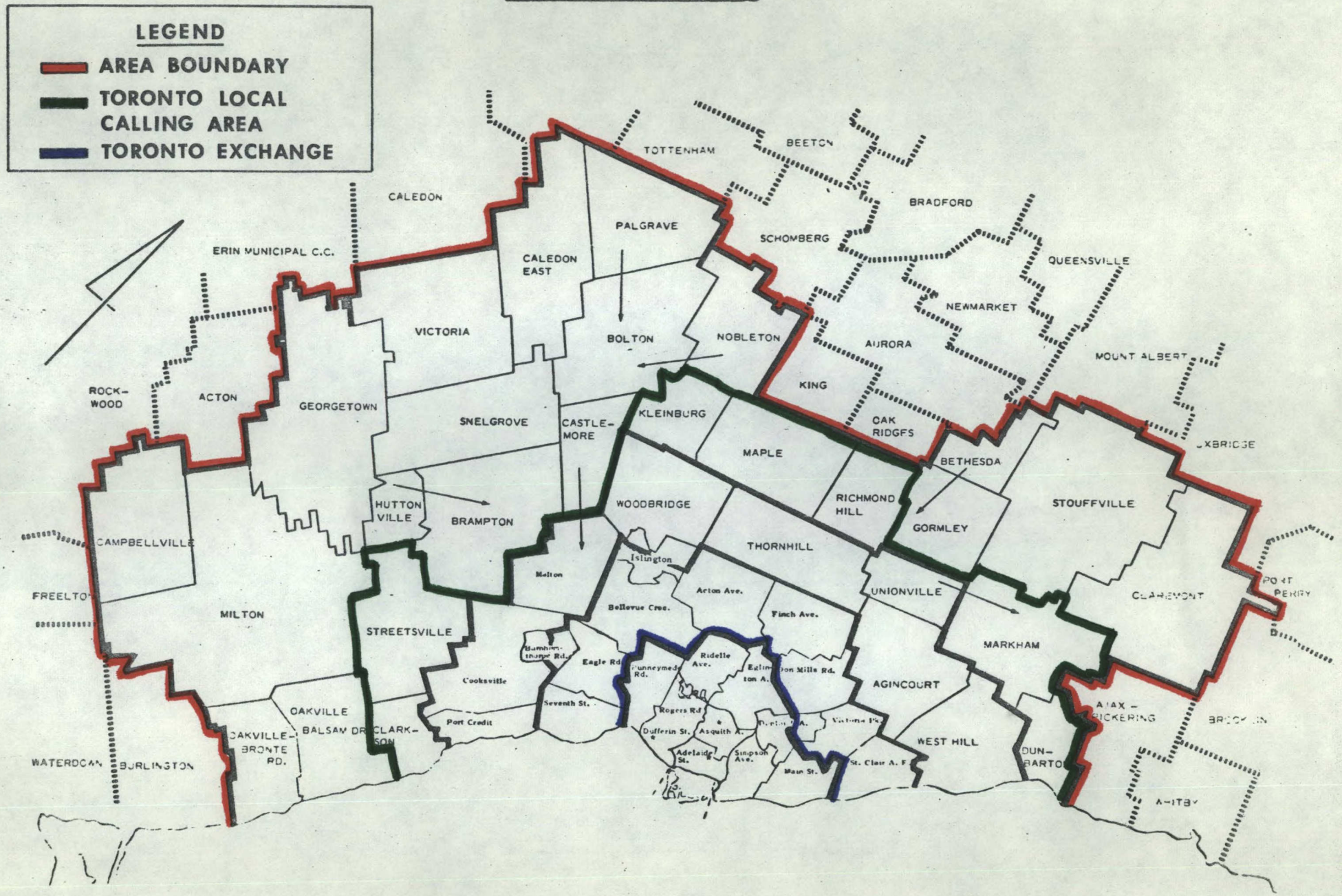
Line Load Control equipment has been provided in all but a few switching centers in Montreal Area. It is intended that this system be provided and maintained in this Area for use in the event of major emergencies.

As new switching centers are created, new EAS services are established, or emergency procedure policies are modified, it will be necessary to make additions or changes to Line Load Control facilities.

This Planning Guide describes the existing system, and provides direction for its future application.

	RECOMMENDED	DATE		APPROVED	DATE
II	Supvg. Engr.-Plt.Extn., M.A.	29/9/69	IV	Div. Tfc. Mgr.-Fac., M.A.	
III	P.A Wilkins Plt. Extn. Engr., M.A.	30 Sep 69	IV	Area Plant Supvr., M.A.	22-10-69
IV	W. N. Spratt Area Eqpt. Engr., M.A.	7 oct/69	IV	Area Plt. Extn.&Trans.Engr. M.A.	oct 28/69

TORONTO AREA



TORONTO AREA

	1965	1970	1975	1980	1985
TOTAL TELEPHONES (000)	1,108	1,511	1,950	2,460	3,000
INTER-OFFICE TRUNKS (000)	47	61	81	101	122
SPECIAL SERVICE TRUNKS (000)	33	50	75	113	169
CALLS PER DAY (000)	7,879	10,400	14,150	17,800	21,500
SWITCHING CENTRES	47	49	52	54	57

TELECOMMUNICATIONS PLANNING IN THE METROPOLITAN ENVIRONMENT : A SUMMARY OF DISCUSSIONS HELD 12 NOVEMBER 1969 BETWEEN THE DEPARTMENT...