

A photograph of a busy city street, likely in Toronto, showing a red and white bus, pedestrians, and buildings. The street is lined with utility poles and traffic lights. A semi-transparent grey box is overlaid on the upper right portion of the image, containing the title text.

Street Addressing and the Management of Cities



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Module 01 Introduction to Street Addressing



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1. What is street addressing?

Street addressing is a system for locating a plot or building in a given area using the street name and entrance number. A street addressing operation involves designing the system, installing street signs, numbering entrances and recording these data, producing maps and conducting public education campaigns.

As cities in the developing world have confronted a demographic explosion, their systems for identifying streets, buildings and plots have been unable to keep up with the pace of urbanization. As a result, 50% or more of the city streets in these countries have no names or addresses, with the problem being particularly acute in the poorest neighbourhoods. This creates a worrisome predicament for urban services.

Makeshift solutions to these problems exist, but the delivery of urban services according to these methods is generally problematic or ineffective.

Over the past two decades, several projects aimed at improving urban information systems in developing countries were launched. Most of these projects had a limited impact because the proposed approach involved techniques that exceeded available local resources.

The lack of available local resources stimulated the search for a simpler, more progressive approach to urban information systems. The challenge is to move gradually forward by teaching local leaders a step-by-step approach to managing information about their cities.

In recent decades, many cities in the developing world have experienced extremely rapid growth, which has created many under serviced neighbourhoods. The street identification systems initially used in old neighbourhoods in the city centres have rarely been extended to new ones.

Street addressing enables city officials to strengthen their urban management expertise in four priority areas

- a. Collecting information on their cities and facilitating the updating of simplified urban planning documents.
- b. Planning investments.
- c. Maintaining facilities and infrastructure.
- d. Mobilizing local resources more effectively.

More than just a simple street identifying operation, street addressing provides an opportunity to:

- a. Create a map of the city that can be used by different municipal units.



- b. Conduct a systematic survey that collects a significant amount of information about the city and its population.
- c. Set up a database on the built environment, a rich source of urban information that is too often unavailable.

The real advantage lies in the potential of the urban information database, which, in conjunction with a street addressing plan and street index, can be used for various applications and benefit local governments, the private sector and the population as a whole.

2. Historical Perspective and Street Addressing Across Countries

2.1 France

Until the 17th century, cities in France had very few streets,¹ and the issue of what to call them arose only with efforts to restructure urban areas (Louis XIV).

At this time, new streets were created to replace the walls of the city or to extend old streets. The next task was to make the chosen street name visible. Although this appeared to be a simple undertaking, it took more than two centuries to draw up and establish procedures to do so.

Numbering of houses in Crest (France) in 1766

The first mention of house numbering is found as early as 1766. Two years later, in 1768, a government order made the process official. Numbering fulfilled a real need, and the majority of cities in the Dauphiné region hastened to conform to the order. The numbering system was put in place by two artisans in Crest, Jean Fréau, a glazier, and Pascal Giri. It was initiated on December 23, 1766, and completed on January 3 of the following year. The system consisted of a single series of numbers beginning at the town hall.

Reading

We can find out more through the reading (mandatory): "Inscribing the names of streets in Paris." Available in the Virtual Library.

¹ Paris had about 300 streets in 1300, 650 in 1700, 1100 in 1800, 4300 in 1900, and 5200 in 1960.



2.2 Quebec, Canada

Circumstances over the course of history often lead to changes in a street's name. Both the way these changes occur and how citizens can become involved in effecting changes, which often come about through a long process, need to be articulated. The merging of cities in the old metropolitan area of Quebec provides a good example of the mechanisms, participants and selection criteria.

Reading

We can find out more through the mandatory reading: "Changes to street names in Quebec." Available in the Virtual Library.

2.3 China

Street names and the street numbering system in China are two features of the country that capture the immediate attention of every tourist that travels there. They may also be a source of great confusion if one does not understand either the logic or the basis of the system itself. Indeed, a street name may change as many as sixteen times within a large city, and the numbering will begin again with each new name. This superficial complexity, however, has a profoundly logical basis.

Reading

We can find out more through the optional reading: "China: Compass-based street addressing." Available in the Virtual Library.

During the feverish urbanization of recent decades, the main issue has been not so much changing the names of streets as assigning them names at all. In rapidly growing cities, the majority of streets go nameless for a long period of time because attributing a name is usually controversial.

All experiences underscore the impossibility of broadly assigning street names right from the outset, as street naming causes too much controversy to implement quickly. Resorting to legal measures is often insufficient, as demonstrated by the case of Cameroon, where a presidential decree on street naming has remained unheeded for years.

Reading

We can find out more through the optional reading: "Cameroon: Naming of streets and public squares in cities." Available in the Virtual Library.



2.4 Conclusion

The only recourse therefore is to adopt a more neutral street numbering system, which can be implemented quickly and which can serve as a springboard to the subsequent decision on a street name.

Although this numbering system adapts well to a regular street layout (cities in the United States, old colonial cities in Latin America or West Africa), it is obviously more difficult to implement when the layout is less uniform.

3. Street Addressing Guidelines

3.1 How should streets be identified?

The manner in which a city or neighbourhood is planned or has developed often dictates the framework for street identification.

a. Naming streets

Naming streets is the most vivid way of identifying them, and the most commonly used historically because of its suitability for any street layout. Name selection, however, can pose many problems that lengthen the implementation process. This solution works well only when a city evolves slowly enough to allow municipal authorities to devote some time to naming decisions. It is therefore not recommended as a first step in most cases today.

b. Numbering streets in cities with a “checkerboard” or grid layout

Numbering streets in cities with a “checkerboard” or grid layout is a more “neutral” system that is easier for people to understand because the streets are arranged in numerical or alphabetical order. Later on we will see some historical examples of this solution as applied in Puebla, Mannheim and Washington DC. When a grid layout is used in new neighbourhoods, this is the preferred solution.

c. Numbering streets in cities with an irregular layout

Numbering streets in cities with an irregular layout is the system often used in anticipation of gradual street naming. One way to simplify the process of establishing street coordinates is to group the streets into neighbourhoods or zones, which can then be assigned a sequential number with a prefix. This is the recommended approach in most cases. Most of the street addressing initiatives that will be referred to during the course have adopted such a system.

**d. Unidentified streets**

Developing country cities are not the only setting where street addressing initiatives aim to remedy the problem of unidentified streets. High-density housing projects and other residential developments also contribute to the information gap when they ignore surrounding street layouts, add private streets, and identify buildings by numbers or letters rather than by street coordinates.

Reading

We can find out more through the mandatory reading: “Developing cities.” Available in the Virtual Library.

3.2 How should buildings be identified?

The practice of continuous numbering (1, 2, 3, 4, 5 and so on) of buildings or plots along one side of the street or in a neighbourhood should be abandoned. This solution was adopted in Paris during the Revolution and resulted in great confusion. Regardless of the type of solution adopted for identifying streets, a system of alternate numbering—even numbers on one side of the street, odd numbers on the other—should be used to identify buildings or plots.² The following modalities can be used:

a. Sequential numbering

Odd (1, 3, 5 and so on) and even (2, 4, 6 and so forth) numbers are assigned sequentially to buildings on opposite sides of the street. Structures that are built between existing buildings after numbers have been assigned will use the suffix *bis* or *ter* (5, 5 *bis*, 5 *ter*).

b. Metric numbering

Structures are assigned even or odd numbers corresponding to the distance between the building entrance and the beginning of the street. This avoids the problem of using *bis* or *ter*, as new numbers can be assigned to new structures based on their distance from the beginning of the street.

c. Decametric numbering

Even and odd numbers are assigned sequentially as in the first two solutions, but according to ten-meter-long sections of street. This compromise between the first two solutions has advantages, but is infrequently used (see details on page 148 of the book “Street Addressing and the Management of Cities” found in the virtual library, under “Other resources”).

² Merruau Report. 1862.



Reading

We can find out more through the optional reading: “Early street addressing systems in sub-Saharan Africa.” Available in the Virtual Library.

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Module 02 Street Addressing Applications



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Introduction

Street addressing has many potential applications. The first and most general application involves the connection between street addressing and civic identity. Other more practical applications explore links between street addressing and urban information systems, support for municipal services, tax systems, land tenure, upgrading of informal neighbourhoods, support for concessionary services and economic development. During this module, we will discuss these applications in more detail.

1. Street Addressing and Civic Identity

An individual without an address has no civic identity. A citizen, however, can communicate with fellow citizens, but having an address is essential for this exchange to occur. A citizen is not an anonymous entity lost in the urban jungle and known only by his relatives and co-workers; he has an established identity. He can reach and be reached by associations and government agencies, and he can interface with fellow citizens outside the traditional networks, all by dint of residence in the same city.

Early urban projects came almost entirely under the urban umbrella in view of their technical and economic focus. The results achieved by such projects were not insignificant, but they suffered from certain limitations, which can be overcome by embracing the notion of citizenship—in other words, introducing the idea of civic involvement to address problem areas and design intervention methods.

In developing country cities, and particularly in sub-Saharan Africa, the urbanization process often takes place informally, resulting in unnamed streets and unnumbered houses. Some will say that things are fine as they are and that people can find one another. This is true if one assumes that “find” is understood only in terms of traditional relationships in the context of extended families, neighbours living in close proximity, family lineage and long-standing business relationships.

Street addressing systems in informal neighbourhoods are often the first and most important urban infrastructure system. They help residents and visitors locate dwellings, public facilities and private businesses. They facilitate the provision of public services, such as mail, water and electricity, sewerage and garbage collection, as well as emergency medical and fire prevention services. Street addressing allows local governments to enhance tax assessment and collection and improve the management and planning of urban areas. Perhaps most importantly, they provide residents with a sense of citizenship, that is, of belonging to the city.

Street addressing is therefore the foundation on which civic identity can develop, and a prerequisite for the development of civic institutions.



Although addressing will surely not in and of itself produce institutions, which are in essence a sociopolitical phenomenon, it is a technical requirement for transforming a city from an informal urban space to a civic community.

While street addressing is a necessity, it can also serve as a reference tool for streamlining the technical and financial aspects of city management. City managers are directly affected by street addressing applications. In areas with limited resources, the implementation of urban management tools based on street addressing systems enables gradual progress and ensures technical expertise at the local level.

A gradual pace is a prerequisite for the success of any operation of this nature.

Street addressing needs to be less a technological feat than a tool that local players can use to progressively improve the way municipal business is conducted.

Street addressing generally involves three dimensions:

- a. **Relations between citizens**, which are at the core of any system and can exist only with a street addressing system.
- b. **Relations between citizens and government authorities**, which imply that each individual and economic activity can be located for both fiscal and political purposes.
- c. **Control of urban space** for which street addressing is the first in a series of applications intended to ensure the gradual development of management tools.

The distinctive feature of street addressing is that it creates a common ground on which the concepts of urban space and civic community/identity can come together. It is a prerequisite for undertaking a new approach that will create a lasting connection between *urbs* (city) and *civitas* (citizenship). A city is, first and foremost, a means for coexistence, exchange, communication and integration. Street addressing is just one of the many requirements that will help a city achieve social integration, but it merits special attention because of its crucial role.



2. Street Addressing and Urban Information

Through its surveys and spatial identification of locations, street addressing offers an exceptional opportunity to gather baseline information on a city.

The database and maps created through such an initiative make it possible to evolve into a simplified geographic information system that can be coordinated with other urban management tools. The process of maintaining this reference tool provides an opportunity for progressive updates as new information becomes available.

Address management

In order to make optimal use of the database created through addressing surveys, it is advisable to obtain or write special address management software that incorporates the standard functions of a database (e.g., search, criteria-based retrieval and cross-search) and the functions designed to handle the spatial dimension of the data (e.g., search, retrieval and cross reference by territory).

This software will facilitate the following activities:

- a. **Access of the database by subject.**
 - According to the occupancy type, retrieve data individually or by group for dwelling or type of dwelling, economic use or type of economic use, facilities and urban fixtures (e.g., public standpipes, streetlamps). Data should be retrievable by street or neighbourhood, or for the entire city.
 - According to address, retrieve data associated with the address or with a street, a neighbourhood or a zone to be identified.
 - Drawing on cross-referenced data, show features, such as pharmacies or physicians in a specific neighbourhood, and so forth.
- b. **Store all changes in occupancy for the purpose of creating history files that will make it possible to observe trends.**
- c. **Easily change or retrieve a new address at any time.**
- d. **Add open parameters (data associated with the address) at anytime and in unlimited quantity.**
- e. **Define “territories” (groups of addresses) upon request and as needed.**
- f. **Take into account the distinction between even and odd numbers on doorways for opposite sides of the street.**
- g. **Easily import and export data to/from other applications (e.g., street system, facilities, tax system) or another database.**
- h. **Print data retrieved and/or all data.**



Evolution toward a Geographic Information System (GIS)

Address management software was effectively used in all of the addressing operations discussed in this manual. The software programme was sometimes coordinated with related applications (inventory of streets and/or facilities, for example)¹ or it evolved into a Geographic Information System (GIS) (Yaoundé, Douala, Nouakchott). It is usually preferable not to plan to move over to a GIS until after the teams responsible for number coded mapping and the computerized database have become completely familiarized with their tools. When operational, a GIS is quite compelling as a powerful yet complex tool that combines mapping with a relational database, with each of these elements requiring several years of experience to master.

3. Street Addressing and Support to Municipal Services

Street addressing moves beyond a simple identification task to play a key role in the development of municipal management tools. It can be instrumental in consolidating municipal expertise according to priority subject areas, such as street system management, maintenance of facilities and infrastructure, household waste collection, urban property identification and investment planning.

3.1 Street system management

Street identification is a clear necessity for any intervention programme, but in the absence of specific identifying information, only a rough approximation can be achieved.

Locating and recording street information is not an easy task; yet a street system constitutes a primary asset for municipal governments, requiring significant capital investment and annual maintenance expenditures. Consequently, street identification deserves priority attention and rigorous monitoring by municipal authorities and technical experts.

The first stage in the proper management of such an asset begins with an identification process. Each street is given a name or number and a defined location with beginning and end points, and this initial information is then represented on a map. Without this preliminary step, it would be impossible to organize maintenance work, street rehabilitation and solid waste management.

The second stage calls for recording the features of each street, beginning with those most heavily used (classification, traffic, dimensions and condition of pavement, sidewalks and shoulders; nearby public works and facilities; degree of deterioration; and so on). The data are usually gathered in part during an initial

¹ Cityvia, Infrastructure and Services Programming Inventory



street addressing operation and subsequently completed during specific periodic surveys intended to identify “trouble spots” and emergency repair work.

The municipal unit in charge of the street addressing initiative provides support to the technical departments, and the municipality gains awareness of an area often ignored despite significant allocation of resources. More specifically, the streets are divided into sections or blocks between two crossroads, which are then identified with a number that links them to the street number. Various software programmes analyze the data and calculate expenditure forecasts for street maintenance and rehabilitation according to the amount and type of work to be done (for example, in Douala and Yaoundé in Cameroon). Street addressing data have been used in Conakry, Guinea, to implement annual maintenance programmes for secondary streets and to bring neighbourhoods out of isolation.

This street addressing application thus transcends mere address management. The tasks of the municipal unit in charge of such initiatives can encompass not only recognition of streets, but also gathering data on street features and determining work to be done.

3.2 Solid waste management

Another application of street addressing is for solid waste management, for which Conakry provides an especially eloquent example. The local authorities, with the support of the World Bank-financed Third Urban Project beginning in 1999, decided to tackle an extremely troublesome situation in which garbage littered the streets and sidewalks. This type of application could be incorporated into the broader notion of municipal services and encompass other operations, such as street cleaning or public transportation.

Household waste, Conakry, Guinea

Household waste management in Conakry in the late 1990s was initially the sole responsibility of municipal authorities. Unsanitary conditions led to efforts to clarify and assign the tasks of solid waste collection, transfer and treatment. The responsibility for waste collection was turned over to small- and medium-scale enterprises (SMEs), which could then bill users directly. This system called for a precise delineation of each entity’s coverage area and the establishment of waste transfer points. The task of transferring waste to the existing landfill was handled by the city’s Public Solid Waste Transfer Department (SPTD). The Second Urban Project (UDP 2), financed by the World Bank, had just completed its first street addressing project and had published a street map, which at the time was one of the few such up-to-date documents. The neighbourhood boundaries shown on the map served as a guide for the delineation and distribution of collection zones among the various SMEs. The installation of street signs simplified this process and made it easier to delineate collection zone boundaries and routes and to set up transfer points. The street addressing system thus played a highly positive role in launching an operation that indisputably owed its



success to the concentrated efforts of several authorities, operators and donors focused on a radical transformation of the city's image.

3.3 Inventory of municipal assets

Few municipalities have an awareness of the extent of their assets, or at the very least the property over which they have domain, if not possession. Their infrastructure, buildings and land tend to be poorly identified. An initial inventory can be conducted during the first street addressing survey, which identifies the general layout of national and municipal streets, records street distances as buildings are given a metric numbering system, and notes the use category of each plot (residential, business, utilities, empty lot or other use). If the addressing survey is then supplemented through the identification of urban fixtures (e.g., public standpipes, bus shelters, telephone booths) or specific surveys of street systems or utilities, simple utilization of the address directory will provide the basis for an inventory of assets.

Other information can be added to the inventory, such as the ownership status of the facility or land, property appraisals and estimated cost of upkeep. The value of these assets can be estimated on the basis of unit cost of investment (floor area, for example), while the annual cost of upkeep can be calculated as a percentage of the investment amount.

Additional information on the degree of deterioration of public works will provide the basis for a more accurate assessment of residual values of assets and a more exact estimate of upkeep costs. These simple calculations can be undertaken by the street addressing unit and/or the municipality's technical departments, and have been done by local consultants in the context of urban audits.

3.4 An aid to investment planning

Local governments need information about their city for the purposes of investment planning. Decision making regarding financing priorities requires knowledge of existing conditions based on a needs assessment.

An address directory can provide information on population, infrastructure and facilities in each neighbourhood, thus making it a useful tool for implementing the Infrastructure and Services Programming Inventory (IPIE). This tool is a decision-making aid intended to guide urban interventions and identify priorities. By drawing on indicators and scores, the tool can be easily applied to show the extent of access to public services and to establish a classification system so that neighbourhoods can be ranked according to the priority of intervention and type of service.²

² The Future of African Cities, Chapter 5.



Inventory and valuation of built assets (Senegal and Guinea)

Under the Senegal Urban Development and Decentralization Program (PAC), cofinanced by the World Bank and the Agence Française de Développement (AFD), urban audits were developed for each local government. The goal was to conduct a needs-based evaluation of the city and use the results to decide on a priority action programme to be financed by the PAC. The audits consist of a brief evaluation of all municipal properties for which the municipality has responsibility for upkeep, such as streets and drainage, administrative and recreational facilities, and markets. A simple property census and assessment of conditions can provide an important guideline for scheduling future rehabilitation and maintenance work, and also complements the IPIE drawn up during the audits. This type of research was carried out in Senegal, as well as in Guinea during UDP 3, and in Mauritania, Niger, Cameroon, Rwanda and other countries. In each case, the audits were prepared by local consultants, who performed with overall success.

4. Street Addressing and Tax Systems

Street addressing projects usually state among their objectives a “contribution to improved mobilization of fiscal resources.” The discussion in this module focuses on ways in which such projects can help improve the performance of the existing tax system.

Basing the property taxation system on occupancy rather than on ownership delinks the tax from the tenure status of the property, based on the idea that every resident—whether he owns or rents his home—consumes urban services and should therefore help defray the related municipal costs.

4.1 Improving the performance of the existing tax system

One of the primary benefits of using the address directory is the ability to obtain a list of economic activities that is usually more complete than the one used by the tax department and reveals the size of the population not listed on the tax rolls. The key challenge is to reconcile address data with tax department data.

The World Bank-financed Urban Development and Decentralization Program offers a revealing lesson learned in Senegal (Thiès and Kaolack) with tax registers. The process, managed by the Tax Department, involves reconciling the address directory and information with the taxpayer rolls in order to create a tax register that includes both.³

³ The taxation services use the notion of a “pre-roll that requires validation.”



Using such a reconciliation approach, tax departments can evaluate the results of tax enrolment and tax collection efforts. At the same time, the documents and street identification make it easier to locate potential taxpayers. This is usually accomplished through the use of cadastral maps and subdivision plans that are often imprecise, requiring the involvement of specialized staff. The main problem derives from the lack of spatial identification. Streets may not be identified, and plot references may not correspond to the address or appear on building façades. The use of street addressing information with tax registers therefore constitutes an important step toward determining the tax base and increasing tax revenues

Reading

We can find out more through an example Terms of Reference for tax registers, available in the Virtual Library.

4.2 Problems encountered and lessons learned

These types of solutions for improving the performance of tax systems are difficult to implement.

a. Logistical problems

Tax departments do not have adequate resources, leaving them ill-prepared to work with a broader population segment.

b. Lack of agreement on methods and procedures

Central governments—often backed by the International Monetary Fund—prefer to focus primarily on potentially major taxpayers and exhibit little interest in local taxation compared to national taxation.

c. Legal and institutional issues

Difficulty of fostering cooperation between central tax departments and local governments needed to implement a tax register.

Street addressing is nevertheless an undeniably useful tool for tax departments, although it is advisable to conduct a prior assessment of the potential for technical coordination with their procedural framework. Municipalities must establish a stronger connection with tax departments in order to anticipate the applications that will be needed, even well into the future.

This type of planning will make it possible to:

- strengthen the dialogue with a central government that usually has little contact with the municipality, thereby creating a climate of trust between the two partners (most street addressing initiatives have set up a technical steering committee, which usually serves as an administrative connection between the tax and treasury departments); and



- identify the necessary components for inclusion in the street addressing surveys so that the tax rolls can more easily be reconciled with the address directory. Conducting another tax survey after the street addressing initiative in order to find taxpayers' addresses would be a waste of resources. Such an undertaking is best accomplished by cadastral staff during an addressing operation.⁴

5. Street Addressing and the Land Tenure Issue

What is a cadastre?

A cadastre is a comprehensive and perpetual inventory that describes and assesses the value of landholdings, consisting of a set of documents where the breakdown of landholdings and the name of the owner of each plot are recorded.

This definition gives rise to two possible applications or interpretations.

- a. A fiscal cadastre, which seeks to describe the property tax base and serve as the basis for property valuation; or
- b. A legal cadastre, intended to define the ownership rights attached to each plot. The recorded data accurately define the property boundaries and also serve to ensure ownership and property tax levies.⁵

The cadastral projects financed by the World Bank in Africa during the 1980s were not as successful as anticipated. These projects, which called for a long-term effort, were abandoned as a result of a number of factors, including the complexity and scope of the problem to be solved, the extensive resources to be mobilized, the need for day-to-day monitoring and inadequate local expertise. In other respects, such an approach might be regarded as questionable, in view of the fact that one of the main obstacles to effective property tax management (which the cadastre itself helped to create) was the absence of street addressing.

The customary use of post office boxes for receiving mail has led to a system that is unreliable if, for example, the addressee needs to sign an acknowledgement of receipt of an official letter, particularly in the case of a tax assessment notice.

Under these circumstances, it was understandable that considerable importance would be placed on street addressing projects, which would “begin at the beginning,” produce rapid and noticeable results, be managed by city authorities and easily draw on local expertise, all for a far lower cost than that of a cadastral project.

⁴ In Burkina Faso, the heads of the street addressing units in Ouagadougou and Bobo-Dioulasso established a connection between cadastral references and data in the address directory.

⁵ Countries that have a fiscal cadastre include Belgium, Spain, France and Italy. Countries with a legal cadastre include South Africa, Germany, Hungary, Switzerland and Turkey. The United Kingdom and Ireland have no cadastre.

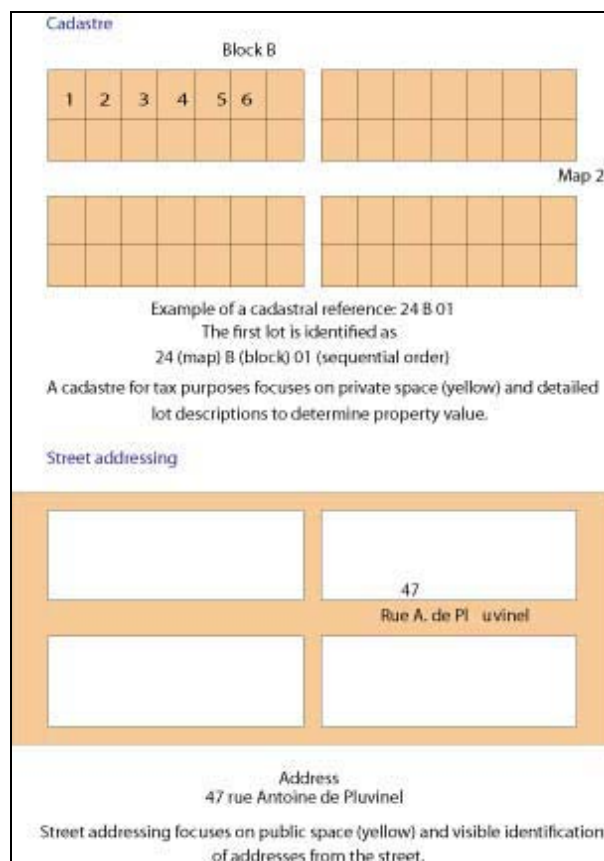


The great enthusiasm demonstrated for such projects sometimes creates the impression that “competition” between cadastres and street addressing exists, when the more appropriate term would be “complementarity” between the two tools. To clear up any possible confusion, we will briefly summarize below the unique characteristics of each tool and suggest ways in which they can be used.

Street Addressing vs. Cadastre

Many types of cadastres and a wide range of experiences with street addressing operations exist. Both of these tools offer illustrative documentation in the form of cadastral maps or addressing maps, and written documentation in the form of registers or directories. Figure 1 offers a simple comparison of street addressing and cadastre.

Figure 1 - Comparison of street addressing and cadastre



Reading

We can find out more about the differences between cadastre and street addressing through the reading (mandatory): “Cadastre and street addressing: a comparison.” We can also find out more about how the application of street addressing techniques can help solve cadastre issues through the reading: “The cadastre and land ownership in Francophone Africa.” Both readings are available in the Virtual Library.



6. Street Addressing and Slum Upgrading

In the context described previously, cadastral registration generally covers less than 10% of the population while urban areas continue to grow in an essentially informal way. Efforts to regularize land tenure (by issuing land titles), which were at the heart of a large number of upgrading programmes for underserved neighbourhoods, have been largely fruitless in the face of such an extensive problem.

Street addressing initiatives in “slums” or informal settlements are an option, although they are difficult to implement in practice for the following reasons:

- In neighbourhoods that are known to be illegal, the authorities fear that street addressing is a pretext for their de facto regularization.
- The street layout is often indistinct or even nonexistent.
- Street addressing in formal neighbourhoods is always viewed as a priority.

Under these circumstances, informal settlements are often overlooked. This hesitation to deal with slums, as understandable as it may be, must be overcome because it contributes to the prolonged exclusion of slum populations from society. Of course it is true that street addressing alone will not significantly change the living conditions of those living in slums, but it may help these settlements to better integrate into the city by strengthening their place in the larger community. Street addressing can thus lead to a kind of collective regularization of the slum which, even if limited in scope, often bears fruit much sooner than difficult and slow-moving land tenure regularization projects.

The specific goal is to gather evidence that the slum population permanently resides in the neighbourhood, while setting out a way for them to move from their precarious and unrecognized status to occupancy rights. The results of this research should not be confined to the address directory; they should be reported in government records to bolster their legitimacy. The idea is not to include them in the cadastre, which would surely be an almost insurmountable obstacle, but rather to create a possible parallel register accessible to eligible persons and located in a decentralized department.

6.1 Two possible scenarios regarding the initiative

Two possible scenarios emerge as to whether the initiative is **a component of an upgrading programme or integrated into a city-wide street addressing project**. Whatever the circumstances, street addressing is an alternative to the formal regularization of property rights, which has largely failed to achieve results in Africa.

**a. Component of an upgrading programme**

Under this scenario, the slum is targeted for improvement or upgrading projects, and street addressing should support and round out the intervention, thereby helping the neighbourhood take its place in the larger community. If street addressing proves difficult to implement, it may be limited initially to the simple installation of street signs on upgraded streets, with the initiative being completed at a later time.

b. Integration into a city-wide street addressing programme

Under this scenario, no upgrading work is scheduled for the neighbourhood, but a street addressing project is prepared for the city. The initiative consists of including the neighbourhood among those targeted by the street addressing project, even if it means adjusting the actions to be taken.

- If the neighbourhood streets are regularly laid out or if the right-of-way for the main routes permits automobile traffic, signs are installed on at least the main access streets.
- If neighbourhood streets are not regularly laid out and main routes are poorly defined, the following steps are taken: (i) in conjunction with residents, the main routes are defined by dividing the neighbourhood into 5-to 10-hectare zones with adequate right-of-way to accommodate service delivery networks and vehicles (carts, ambulances); and (ii) signs on the main routes are installed.

6.2 Where is innovation needed?

No matter which scenario is used, residents must take ownership of the street addressing initiative, which is achieved by their participation in naming the streets. As limited as these interventions may seem, their impact should not be underestimated. They help to relieve the isolation of traditionally neglected neighbourhoods and gradually integrate them into the city.

Some innovation will no doubt be required in implementing the usual street addressing techniques for residents to feel secure in their land tenure status while evidence that they are permanent residents of the neighbourhood is gathered.

- GPS use should make it possible to identify the main routes and dwellings in an unorganized urban milieu.
- The contents of the address directory should be adapted. Paradoxically, more information must be collected than would be required for an organized neighbourhood, i.e., household names, information establishing the presence of a household (electricity bill, receipt for tax payment), or numbers placed on residences by census workers or utility concessionaires.
- Information gathering may also lead to innovation. For example, if emphasizing the vulnerability of certain especially disadvantaged groups appears to be important, it may be more useful to document their situation as a group.



7. Street Addressing and Concessionary Services

It is increasingly common to use street addressing for concessionary and neighbourhood services. Find out more through the optional reading: Street addressing and concessionary services in Mozambique.

When utility concessionaires in urban areas (water and electricity) take part in street addressing, the results are often very positive.

- Concessionaire representatives frequently monitor the conducting of surveys and numbering of buildings. At this time, they establish a table in which the address and meter number are matched up (Chad, Mozambique).
- Concessionaires require that future subscribers provide an address (Burkina Faso, where the publication of the street addressing map was an important step forward in the process).
- A truly cooperative relationship is established between the municipal unit set up to manage the addressing process and water companies, whose directories have used the address as a key account identifier (Mozambique).
- Concessionaires have sometimes “addressed” their equipment (poles, transformers, public standpipes) to facilitate locating and maintaining them.

However, concessionaires may also have concerns.

- They have already set up their own reference system and mapped networks and subscribers (sometimes on a GIS), and worked out a system of “rounds” for paying visits to subscribers, as well as considered the introduction of street addressing to be superfluous.
- They want street addressing initiatives but are sometimes disappointed when the project is completed and is not extended to new neighbourhoods. On their own initiative, they sometimes extend street addressing efforts but do so based on an approach that differs from the existing system (Bamako).
- Any street addressing initiative should be launched only after prior consultation with concessionaires so that they are aware of the issues and challenges that may be of concern to them.

Reading

We can find out more through the reading “Improving neighbourhood services and the case of the post office,” available in the Virtual Library.



8. Street Addressing and Economic Development

Street address information concerns not only municipal managers, but also the many actors that make up the social and economic fabric of a city.

The information is found in maps and databases and makes it easier to use and understand, especially for public and private economic operators who have a particular interest in answering the following questions. What kinds of activities go on in the city? Where do they take place? How are households distributed? In other words, how is the city organized in spatial, economic and social terms?

The address directory provides a very important piece of information: a list of existing formal and informal economic activities. The list is a good barometer of the city's economic potential, as well as the nature and location of activities taking place. In addition, by preserving the history of a location's changing uses, address management software provides a reliable indicator of the economic dynamics at work and can serve to document trends.

Private companies are usually interested in street address databases because they can use them to tailor their individual and joint business strategies. A database makes it easier to understand the competition and to prospect for business by dividing activities into sectors and economic categories and the potential clientele into households and companies. Mapping helps each type of business to identify its own location in the city as well as that of the competition. This leads to a better understanding of clients and potential markets and thus helps define a more effective and targeted business development strategy.

The municipality launches street addressing initiatives and thus plays a key role in making available the information they generate. Various experiences show that it can put this information to good use and thereby keep address systems up-to-date and in place. Indeed, different entities would like to adapt address mapping to their own uses (tourism, concessionaires, chambers of commerce), and the municipality may negotiate some of its rights to the information.

For example, in Mozambique, each address map is copyrighted in the name of the municipality, and its use allows the municipal street addressing unit to earn some revenue. Along the same lines, reconciling economic data with data from the address directory makes it possible to set up an economic database (BDE). Maputo is an example where a BDE was successfully used by the city government, but a BDE can also come about through the initiative of the private sector, professional groups, the Chamber of Commerce and Industry, or the trade council.



Reading

We can find out more through the reading “Economic Database in Maputo.” Available in the Virtual Library.

Possible action items

a. Website

The creation of a street addressing website is one way to allow for public (local community site) or private (Chamber of Commerce, Yellow Pages, etc.) use of the information. This may be achieved with a simplified but precise and user-friendly map. One advantage of a website is the hypertext function, which makes it possible to run the site with a great deal of flexibility (something like a GIS), especially in the area of marketing the information.

b. Street addressing training

It has been noted in cities where street addressing initiatives have been conducted that certain occupations, such as taxi and ambulance drivers, fire fighters and police, have difficulty using address systems. Motivating dispatchers to get training may complement efforts to make the data available to them. This training could be provided by the municipal unit in charge of, among other things: the street addressing initiative; professional associations; women’s, youth, or neighbourhood groups; and NGOs.

c. Sponsorship and advertising

Street addressing initiatives may be sponsored in different ways. One approach is to use signs or posts where the name or brand of the sponsor who provided financing for the initiative is inscribed. Another might make use of published documents, charts and maps, catalogues or even Internet sites. Other avenues, such as television, are also available.

In sum, street addressing initiatives can stimulate a more dynamic relationship between local government and the private sector. The information contained in street address directories often contrasts with that of traditional economic indicators because it reflects all activities, including those of the informal sector, thereby providing a comprehensive overview of economic activities in a city and including a frequently neglected segment of economic life.



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Street Addressing and the Management of Cities

Module 03 Designing a Street Addressing Programme



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1. Introduction

Addressing streets in existing towns and cities is a complex and challenging task—no two towns will be faced with the same problems or issues during the design process. Selecting an appropriate street addressing codification system for a city will largely depend on the layout of the city, the built-up area, time spent on preparation/data collection and budget availability.

Designing and implementing a street addressing programme is comprised of three distinct phases:

- Preparation
- Implementation
- Maintenance

We will examine each of these phases and carry out the necessary activities to develop the needed skills in Modules 3 and 4. These must be studied in the sequence presented.

Three basic assumptions

a. Designating street names at the outset (i.e., giving names to streets that are nameless) is practically impossible. Street naming is usually the prerogative of municipal authorities, and the process is slow, involving a choice of names of individuals, heroic or historical figures, artists or benefactors, and often lengthy negotiations. The recommended solution is to adopt a number identification system initially, which does not involve choices based on emotion and allows streets to be identified immediately. This is considered a temporary solution, until the streets are gradually named, which is often more meaningful to residents. However, a street that has already been numbered is subsequently easier to name because it has already been identified, located and defined by its origin and end point.

b. Street addressing programmes are a municipal undertaking. Some programmes have been implemented as parts of projects begun under ministerial supervision before subsequently coming under the control of local governments. But this approach should be considered an exception to the rule: implementing a street addressing programme is an opportunity to mobilize the community, specifically through the creation of a street addressing unit, which should gradually evolve into an urban data bank unit, an urban observatory or the city's urban planning unit.

c. An address is defined by its relation to a street rather than to a block of houses. The aim is to make the address visible in the public space, i.e., from the street. This comes down to identifying streets (street signs) and the buildings on them (numbers on the building façade). Other systems give priority to identifying the block (private space) on a map, with no special attention given to a particular location. Several cadastral maps work this way, with no street names or numbers, but their users are surveyors and other professionals in the field, who are used to reading maps with an ease that surpasses the abilities of the average citizen.



2. Introduction to the preparation phase

Before launching the street addressing operation, several actions must be taken in the preparation phase. The operation presents several alternatives and requires that choices be made. These choices vary according to the particular town and to the financial resources available.

This phase should help to define approaches to implementing the street addressing programme and setting up the unit charged with coordination, known as the “street addressing unit.”

TASKS: This phase will focus on:

- a. Conducting a feasibility study to determine the codification system for identifying streets and numbering doorways, as well as approaches to implement the programme.
- b. Setting up the street addressing unit responsible for coordinating implementation.

EXPECTED RESULTS: Municipal authorities will approve the feasibility study’s recommendations and render the street addressing unit operational.

ACTORS: The municipality, consultant and street addressing unit.

DURATION AND COST: The preparation phase lasts about 21 weeks, 12 of which are used for the feasibility study. Costs incurred will cover the feasibility study (two person-months) and the hiring of three people to head the unit, in addition to operating and materials acquisition expenses.

SCHEDULING. The preparation phase will be executed in two stages and carry out the following activities:

Stage one: Feasibility study, and

Stage two: Setting up the street addressing unit.

For each stage we will carry out the following set of activities:

Stage one: (1) select a consultant to run the feasibility study; (2) conduct the study, (3) have municipal authorities approve recommendations.

Stage two: (4) set up the unit, (5) collect initial documents (base maps), (6) conduct the first media campaign, (7) train street addressing unit agents in implementing and monitoring the street addressing program.



Download

At this point in the course platform, we can download a flowchart of tasks, and/or a sequencing of tasks, available in the Additional Resources block. The numbers in parentheses in the activities above refer to the sequences in the flowchart.

2.1 Introduction to the feasibility study

a. What is a feasibility study?

Before undertaking a street addressing programme, municipal authorities must have data available for decision making: a feasibility study helps to determine the conditions under which the programme is feasible.

The local conditions and financial resources available are unique to each city, and the design and implementation of a street addressing programme must take this specificity into account. Different approaches to numbering, sign installation and mapping are possible.

b. What should a feasibility study on street addressing encompass?

The feasibility study should offer more than general guidelines; it must offer specific and practical recommendations that make implementation of the programme possible once municipal authorities have approved the study's conclusions. These recommendations should focus on the following points:

- defining the scope of the programme;
- estimating costs and financing; and
- creating a practical codification system for mapping, numbering, surveying and sign installation.

c. How long should a feasibility study take?

The study should take the consultant approximately five weeks. At the end of the third week, an interim report in triplicate is submitted to the Supervisory Committee in which a detailed cost estimate will be provided. The Supervisory Committee will have eight days to respond to the report. The consultant will have one week to prepare his/her final report, of which he/she will submit five identical copies. Time allowance is five person-weeks.

2.2 Defining the scope

The first step of the feasibility study is to define the scope of the street addressing programme. Here, the objective is to define the scope by comparing the resources available with coverage of planned activities. During this step, three issues must be addressed:



- **Priority neighbourhoods to receive addresses.** How can these priorities be set?
- **Coverage of the street addressing programme.** The programme assigns a number to the doorways of buildings (homes, places of business, facilities). Should it be extended to other significant urban fixtures: public standpipes, fire hydrants, waste transfer points, etc.?
- **Definition and location of the pilot operation.** What does the pilot operation entail? Where will it be implemented? Once the scope of the programme is evaluated and approved by the Supervisory Committee during the feasibility study, it is then applied and shaped during the implementation phase.

The following three tasks must be carried out in order to determine the scope:

a. Task 1. Define the zones to be addressed

First, **establish a neighbourhood typology**, which will define homogeneous zones or neighbourhoods (type of housing, population density, street layout) based on which street addressing programme will go forward or be postponed.

Typically, neighbourhood typologies include:

- **Densely populated formal neighbourhoods (old and new):** These are often located in the city centre and are very busy and well-served. Initiating street addressing in these neighbourhoods has a significant impact on the population.
- **Formal neighbourhoods that are becoming more densely populated:** If the neighbourhood is reasonably formal, street addressing can be quickly initiated; if not, it is usually preferable to wait until the neighbourhood has been occupied and the urban development process has run its course or is stabilizing.
- **Squatter settlements and/or irregular neighbourhoods:** The government's attitude on this will provide the basic approach. Technical obstacles usually arise because no street network exists. The solution is to identify the main routes and assign addresses to them.
- **Specific zones (industrial, military).**

b. Task 2. Determine coverage of the programme

Second, list the neighbourhoods to be included in the programme. The typology of the neighbourhoods will determine which should receive priority and which should be assigned addresses at a later time. This list, which must be approved by the municipality, is tested on the basis of the three previously mentioned criteria: cost; timeframes; and technical choices.

Municipalities have to account for several types of urban fixtures, such as public standpipes, fire hydrants, waste transfer points, etc. The technical departments therefore need to assign addresses to such urban fixtures to facilitate maintenance. The issue is whether fixtures should be addressed at the same time as buildings, or if this task should be carried out separately. Once again, cost considerations, timeframes and technical choices will determine this decision.



Obvious efficiencies exist when assigning addresses to buildings and urban fixtures at the same time, and this may increase costs and delay completion. It is often preferable to assign addresses to buildings first and deal with urban fixtures subsequently or during the maintenance phase, when the operation can be conducted with a smaller staff. During the maintenance phase, a Geographic Information System (GIS) may also be put in place to monitor the maintenance of urban fixtures.

c. Task 3. Define and determine the setting for the pilot operation

The pilot operation is an important stage and takes place during the implementation phase, between the training of short-term teams for the street addressing unit and conducting surveys in the field. The goals of the pilot operation are to: test the results of training; and conduct a media campaign that reaches local authorities and the general public. Both objectives are equally important.

During the feasibility study, it is therefore important to define the parameters of the pilot operation, which includes:

- Determining the budget for the pilot operation;
- Setting the timeframe (one or two days, for example);
- Specifying the streets involved; and
- Listing actions to be undertaken for the addressing operation (organizing teams, surveys, numbering of doorways and so on) and for the media campaign (radio, television).

2.3 Estimating costs

Once the scope of the street addressing program is determined, the second step of the feasibility study is to estimate the cost and timeframes, and to design an intervention programme in which costs stay within the projected budget.

The consultant first estimates the costs during the feasibility study, and the results are compared to the projected budget for the programme before being presented to the Supervisory Committee. A framework for calculation (in Activities 5-6) makes it possible to vary the different parameters until costs are brought into line with the budget. The framework details staff, operating and equipment costs for the unit, materials supply and installation costs, costs associated with the media campaign, and printing of the address map and index.

Download

At this point in the course platform, we advise you to download and review the comparison table to analyze the various alternatives, available in the Virtual Library.

Consider alternative options. The specifics of any street addressing operation are a function of the site, and of the financial capacity of the municipality. Generally there are three options:



- **High Option:** Choose this option when ample resources are available, allowing for the use of more elaborate materials and techniques. Cost per habitant is \$5.
- **Low Option:** Choose this option when meager resources are available, enabling a reasonably functioning street addressing system to be undertaken. However, in the long run, improving the system would have to be considered. Cost per habitant is \$0.5.
- **Intermediate Option:** This is a compromise between the high and low options.

We will carry out the following three tasks for estimating costs:

a. Task 1. Collect relevant data

Before any cost simulation is run, it is important to do a preliminary inventory and mapping exercise to gather data on: the number of streets; the number of intersections (anchored or not by buildings); the number of streets that already have addresses, and the kilometres of streets to be assigned an address (to estimate the amount of doorways to be numbered).

b. Task 2. Run necessary cost simulations

Several simulations are usually needed to reconcile estimated costs with the projected programme budget. For example, the “Variations in Cost According to Materials” table below shows that the amount of materials varies (according to hypotheses A, B and C) with the percentage of the population that has not received an address, intersections with signs and intersections with posts. Simulations show a gap of 40% in cost between Scenarios A and C. Other factors may lead to variations in the total cost, such as staff and equipment used, quality of materials, scope of the media campaign or distribution of documents printed.

c. Task 3. Estimate timeframe

To estimate the overall timeframe, a distinction must be drawn between the preparation and implementation phases. The preparation phase lasts about three months, from recruiting the consultant responsible for the feasibility study to setting up the street addressing unit. The timeframe for this phase cannot easily be condensed. Conversely, the time needed for the implementation phase depends on the size of the city, the number of short-term teams mobilized, the amount of materials needed for implementation, and the time needed to analyze the data, for mapping, for production, etc.

The previous framework illustrated in the excel sheet for exercise 2 provides a quick estimate of time needed for the implementation phase, which breaks out the coordinator’s intervention time (fulltime team) and time needed from team leaders (short-term team).



Variations in Cost According to Materials			
City of 100,000 Inhabitants	A (adequate)	B (moderate)	C (low)
% of population without address	10%	20%	40%
% of intersections with signs	100%	80%	50%
% of intersections with posts	40%	20%	10%
Cost *	\$173,000	\$153,000	\$123,000

* Dollar value of the year 2003

2.4 Choosing a codification system

The third step of the feasibility study is to select a codification system, which is the process of labeling streets and numbering doorways. The expected result is improved navigation around the city through visible signage that identifies streets and building entrances. By taking such measures, navigation around the city is improved with easily visible signage that identifies streets and building entrances.

A codification system should fulfil the following principles:

- It should facilitate the rapid codification of all streets until they are named. Streets that are already named should keep their name, but should also receive a number to match the system.
- It should allow for rapid identification (for example, a taxi driver should be able to quickly identify the zone in which the street is located).
- It should be adaptable to different types of towns (either in formal or informal neighbourhoods), and should take into account the rapid development of certain neighbourhoods.
- Finally, it should allow for progressive codification depending on available resources.

For successful implementation, an appropriate codification system is generally developed during the feasibility study phase of the street addressing programme. Once it is approved by the Municipal Supervisory Committee, it is put into practice during the implementation phase.

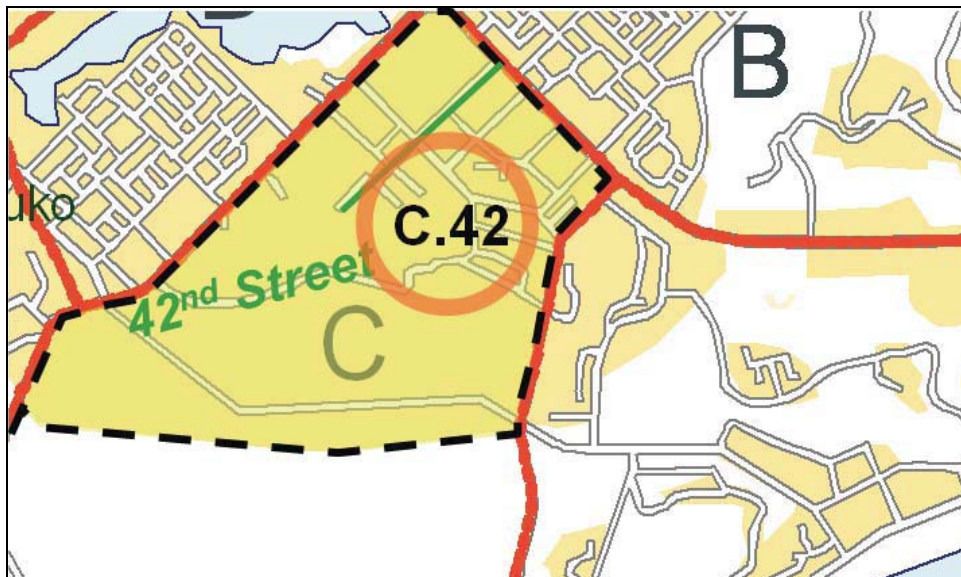
Tasks for developing a codification system

- Task 1: Divide the city into address zones
- Task 2: Decide on a system for identifying streets
- Task 3: Decide on a system for numbering streets
- Task 4: Decide on a system for numbering buildings
- Task 5: Make adjustments for special case



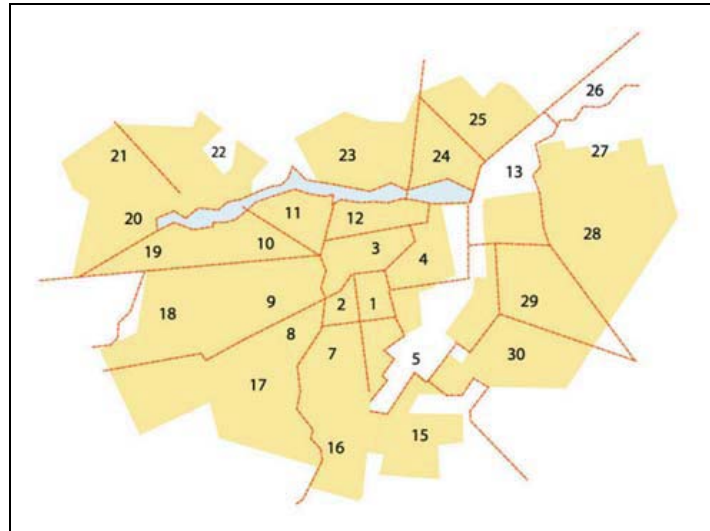
a. Task 1: Divide the city into address zones

The first step of codification is to divide a city into address zones in order to link the numbering system to familiar places, such as neighbourhoods, districts and local place names. The city can be divided into groups of streets in the same zone, which are then given a shared identifier in the form of a prefix or suffix for easy location. For example, if the referenced area is a district, the 42nd Street of the 3rd District will be identified as 3.43; if the reference is “Sector C,” the 42nd Street will be identified as street C.42.



Address zones can be delineated through: municipalities or city districts; neighbourhoods; ad hoc address zones; or grid systems.

- i. Municipalities or city districts** are suitable subdivisions for large metropolitan areas. Under this system, a street is identified according to the number or initials of the municipality, city district or sector. For example, in the city of Conakry, Guinea, the division corresponds to the city’s five municipalities: Kaloum, Dixinn, Matam, Ratoma and Matoto. On the other hand, the city of Ouagadougou in Burkina Faso, which was originally divided into neighbourhoods, was subsequently divided into “30 sectors.” Addressing adhered to the sector division, and has gained acceptance by both citizens and governments.



There are two advantages when delineating streets through municipalities or city districts.

- First, the administrative subdivision is generally familiar to most residents.
- Second, this type of subdivision makes it easier for these entities to reconcile their own statistical data with the addressing information.

However, such a system has some disadvantages.

- Municipalities or city districts are sometimes too spread out to easily locate street coordinates.
- These entities sometimes have more than 1,000 streets, making the identifier long and difficult to read, such as “Street 6.1567.”

ii. **The second type of address zone is the neighbourhood**, where streets are identified according to their surrounding neighbourhood. For example, in the case of the city of Niamey in Niger, the city is divided into 44 neighbourhood groups.

The advantages of neighbourhoods are that:

- Residents can usually identify and find them easily because they are a familiar reference point.
- Since neighbourhoods are more compact in area (often comprised of fewer than 100 streets), they are easy to identify and locate.

However, there are some disadvantages of using neighbourhoods as address zones.

- Neighbourhood boundaries are sometimes ill-defined or poorly understood, and the mapping process requires consultation with local representatives who may not easily reach a consensus.
- Neighbourhoods may simply be local place names encompassing a handful of streets that would need regrouping, again necessitating consultation and agreement between local representatives.



iii. **The third type of division is ad hoc address zones**, which is an appropriate solution where the municipality or neighbourhood systems of address zones are not feasible. For example, in the case of Bamako, Mali, the urban area is divided into nine address zones across three municipalities. Similarly, the city of San Pedro is also divided into address zones A-M.

The advantages of ad hoc address zones are:

- First, a variety of characteristics can be combined, such as homogeneous residential areas, administrative boundaries and natural dividing points.
- Second, if administrative boundaries change, the numbering system is not subject to challenge.

The disadvantages of such an ad hoc address system are:

- The breakdown occurs along unfamiliar boundaries.
- As a result, residents are less likely to understand the street identification system.

iv. **The fourth type of address zone is the grid system.** Under this system, the city is divided into uniform sections in a grid pattern, and each numbered section becomes part of the street identifier. Thus, streets in section 125 would be numbered 125.1, 125.2, 125.3, and so on. Take for example the city of Mannheim in Germany. The checkerboard plan of this citadel city is generally regarded as the prototype for 19th century cities in the United States and Europe. It was the only city in which streets were identified by letters and numbers. The blocks have retained their original numbering system, i.e., the block bounded by streets F and 2 is called F2. Washington DC is also divided into grids in a similar manner.





The advantages of a grid system are:

- First, the sectioning process is not hindered by geographic features or administrative subdivisions.
- Second, sections can be easily georeferenced.
- Third, the street numbering system is appropriately simple when few streets are involved.

Some disadvantages of a grid system are:

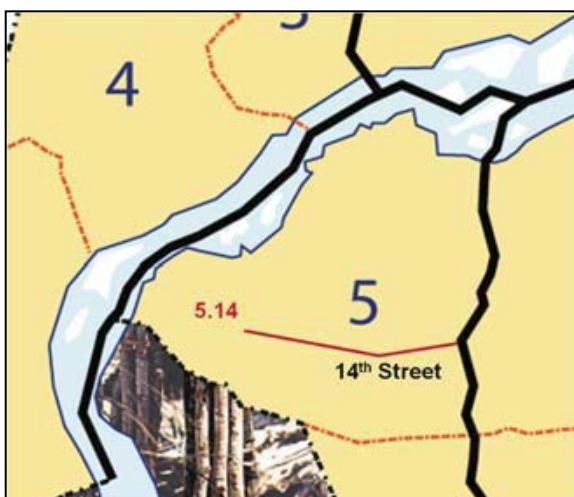
- The grid pattern does not usually follow the general layout of city streets, and the same street may span several sections, thus complicating the numbering system.
- A grid system is a much less meaningful locator than a neighbourhood reference.

We have discussed the four different ways in which address zones can be delineated (through municipalities or city districts, neighbourhoods, ad hoc address zones and grid systems), looking at the advantages and disadvantages of each system.

b. Task 2: Decide on a system for identifying streets

Three principles guide a street identification system. First, the system should be simple and easily understandable. Second, it should allow for rapid codification or naming of all streets, including those in slum neighbourhoods. Third, they should take into account the city's features and the ways in which its residents establish points of reference. Such points of reference can be existing subdivisions, local place or historic names, among others. These can be implemented gradually as financial and human resources become available.

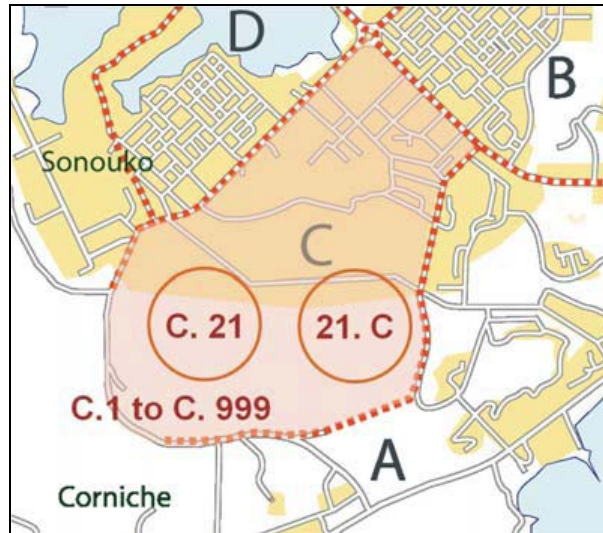
Once the city has been divided into municipalities, city districts, sectors, neighbourhoods or other type of address zones, they can be referenced in the street identifier. An example of a reference could be a prefixed or suffixed number, a name, a letter or an initial. We will examine a few examples of street identification options. First, we will first explore how municipalities are identified, which is usually done by using numbers as identifiers. For example, the streets of a municipality numbered 3, would be numbered from 3.1 to 3.999.



Similarly, in the city of Ouagadougou, the streets are identified by a number composed of two elements. The first is the sector number followed by a sequential number, for example, street 5.14 is the 14th Street in Sector 5.



Another example is how city districts are identified, which can be done by using letters as identifiers. In the case of the city San Pedro, streets in City District C would be numbered C.1 to C.999. For example, in the map below, Street C.21 is one option using a prefix, while alternatively, a suffix can be used, as in Street 21.C.



A third example is how neighbourhoods are identified, which usually involves using their initials. Our map of the city of Niamey, Niger, illustrates this use nicely. The street is identified by a two-letter radical, commonly referred to as neighbourhood codes, followed by a number corresponding to the street number. Thus, “Street GM 12” is the 12th street in the “Grand Marché” neighbourhood.





So far, we have focused on different options for identifying streets. Now, let's turn our attention to some guidelines for ensuring maximum readability. There are five important points to take into consideration:

- Choose Street 3 rather than Street 003 to avoid similarity to a computer-generated number.
- Limit the number of signs, e.g., sequential numbers should not exceed three digits.
- Avoid compound prefixes, such as Street 42037 where 4 refers to the municipality, 2 to the district and 037 to the sequential street number. Such an identification system may be intellectually satisfying, but not as easy to read.
- Test the proposed identification system on model street signs. This precaution is essential if the signs are to be bilingual, as in the Maghreb and other regions.
- Identify streets crossing address zones. For example, a street that crosses Sectors 1 and 2 certainly cannot be assigned only prefix 1 for the whole length of the street. Arbitrary choices of this kind can be governed by alphabetical or numerical order.

Moving on from a number-based to a name-based system, let us look at how to treat named streets. Usually, they will retain their name, but the addressing unit assigns a number to each street as well, in order to facilitate indexing. One example is Avenue du Développement Planifié, Street 1.060.

In a name-based system, we explore two questions:

- Which streets should receive naming priority?
- How do we begin the naming process?

Which streets should receive naming priority?

- Streets that border an address zone, beginning with those that carry the heaviest traffic.
- Streets regarded as major in terms of right-of-way or traffic flow, such as “backbone” streets that span several sectors or neighbourhoods.
- Public squares and main intersections.

How should we begin the naming process?

The city of Ouagadougou provides a notable example, in which city officials created a Toponymy Commission that gathered a list of names documented and classified into categories, such as famous figures, historical references or geographic features. The recommended method consists of the following steps:

- Identify those streets to receive naming priority.
- Choose a list of names.
- When applicable, present the list to residents of the affected streets for their consideration.
- Obtain approval from the municipal authorities.

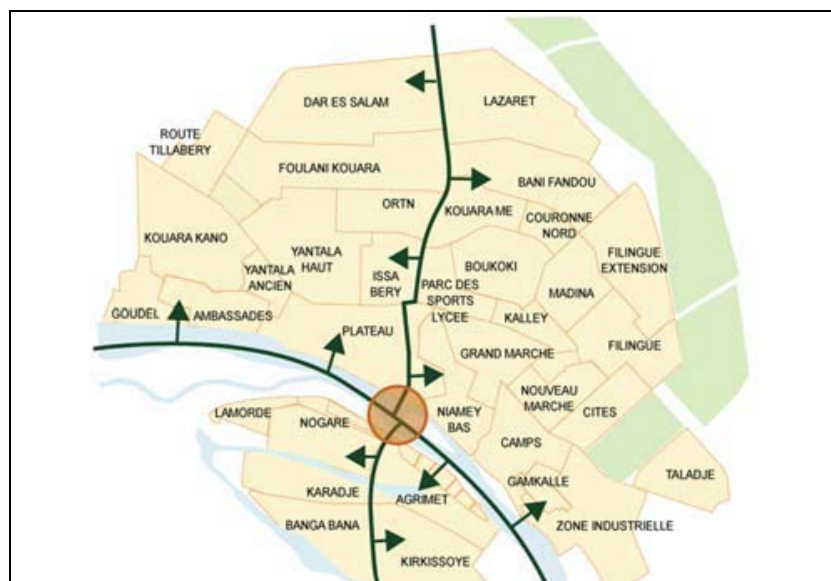


c. Task 3: Decide on a system for numbering streets

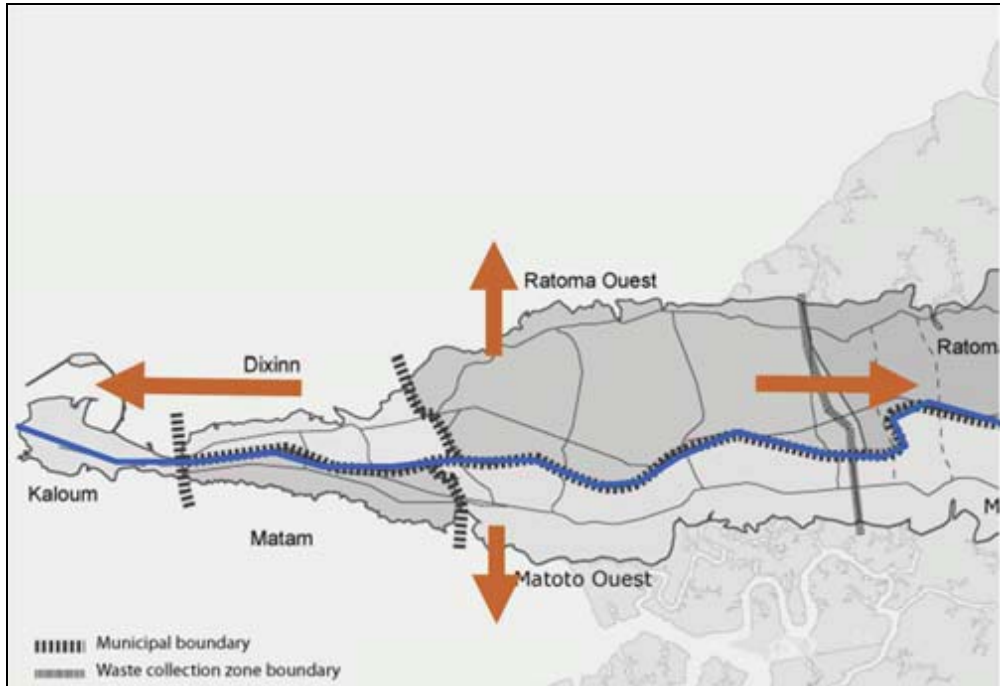
We will discuss how to implement a system for numbering streets and see examples that illustrate how several African cities are using street numbering to improve a vital aspect of urban management. The underlying logic of this task is to simplify and understand the geographical direction of numbering and to distinguish between uneven and even numbering. This enables us to understand the orientation of the street.

To begin, we will explore the logic of street numbering by looking at three examples of cities with different geographic situations.

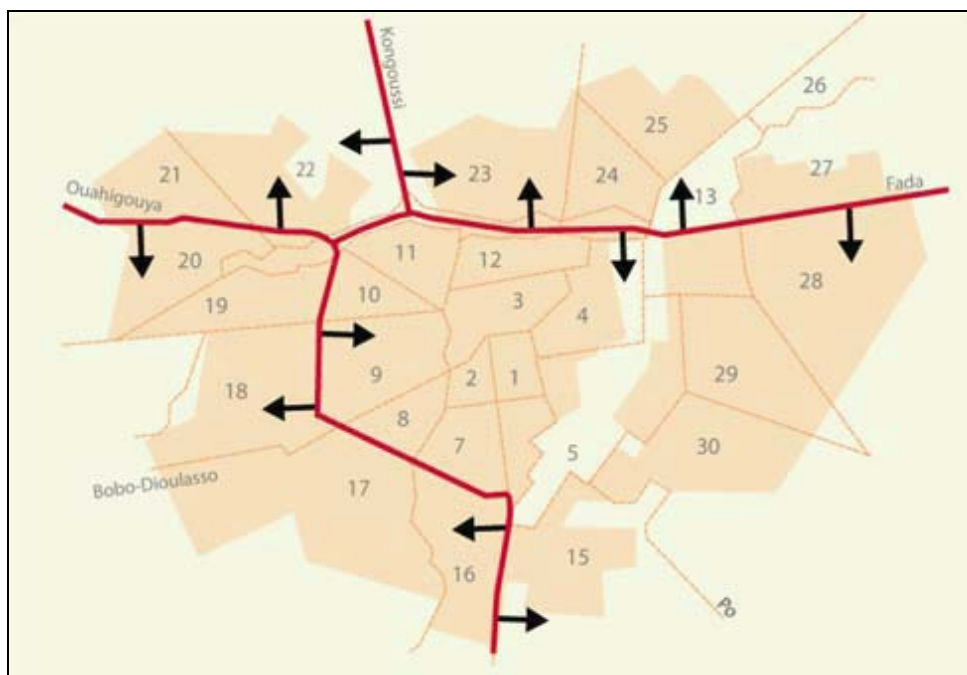
- Cities, such as Niamey, are traversed by a river. In these cases, the river serves as a natural divider for address zones. In each address zone, numbering begins from the banks of the river moving outwards. A main avenue through the city centre serves as a perpendicular axis to the river. Generally, the numbering begins where these two axes meet. This can, of course, vary depending on a city's configuration.



- A second example is a city on the seacoast, such as the city of Conakry. In this case, the numbers increase in a conventional manner from north to south, and from west to east in each address zone.



- A third example is Ouagadougou, a city that grows outward in all directions from the centre. The axes are defined on the basis of characteristic features, such as principal arterial streets in the city centre, a railway, a thalweg or other marker. In these situations, the axes should be consistent with the subdivision boundaries and not cross address zones. In each zone, the numbers increase perpendicularly to the axes.

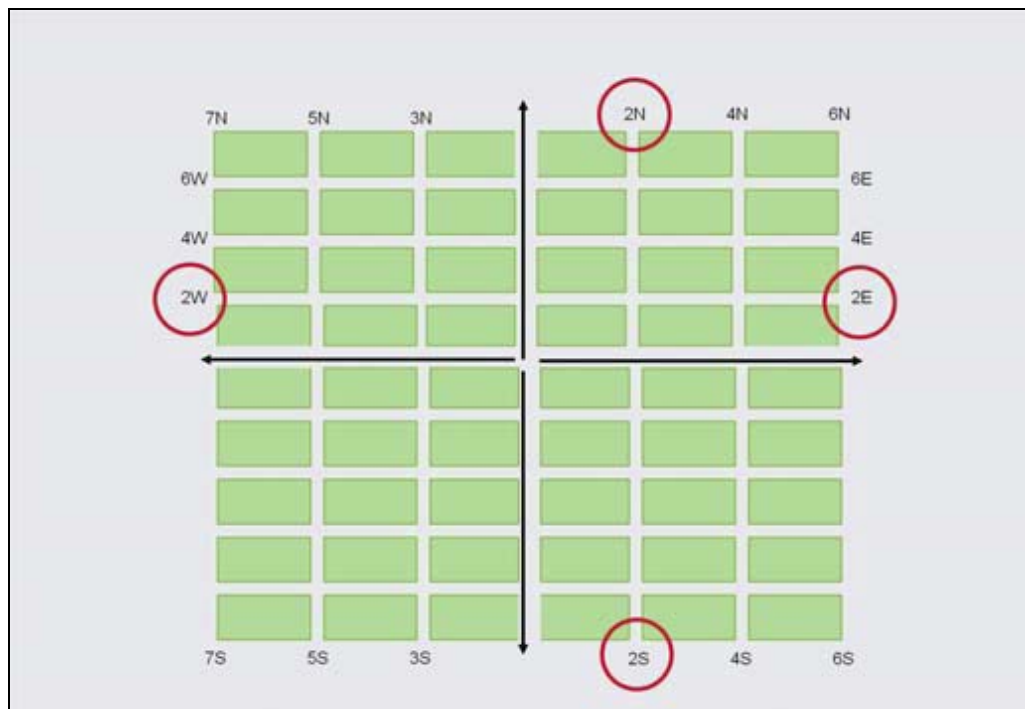




Once an axis has been identified based on the three examples described above, a decision is then made concerning which streets will carry even numbers and which will carry odd numbers. For very large sectors, the numbering system is best applied in successive blocks.

In the city of Puebla de los Angeles, for example, the streets parallel to the north-south axis are numbered evenly to the east of the axis and oddly to the west.

Street numbers increase on each side of the axis. The second street is called 2 North or 2 South, depending on its position relative to the east-west axis. The second street is called 2 East on the east side and 2 West on the west side.

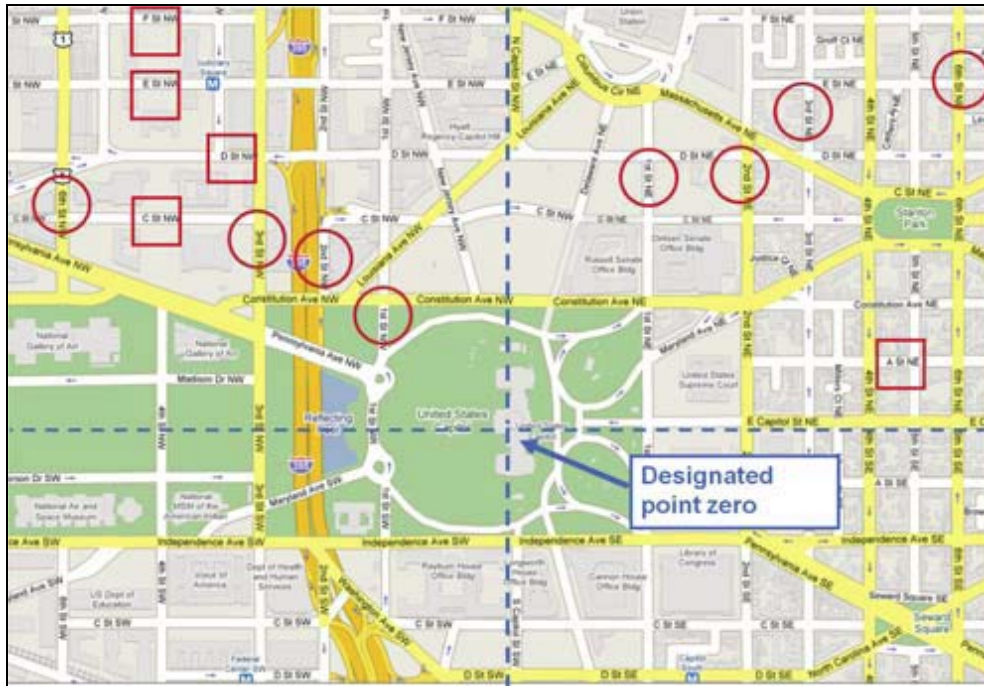


d. Task 4: Decide on a system for numbering buildings

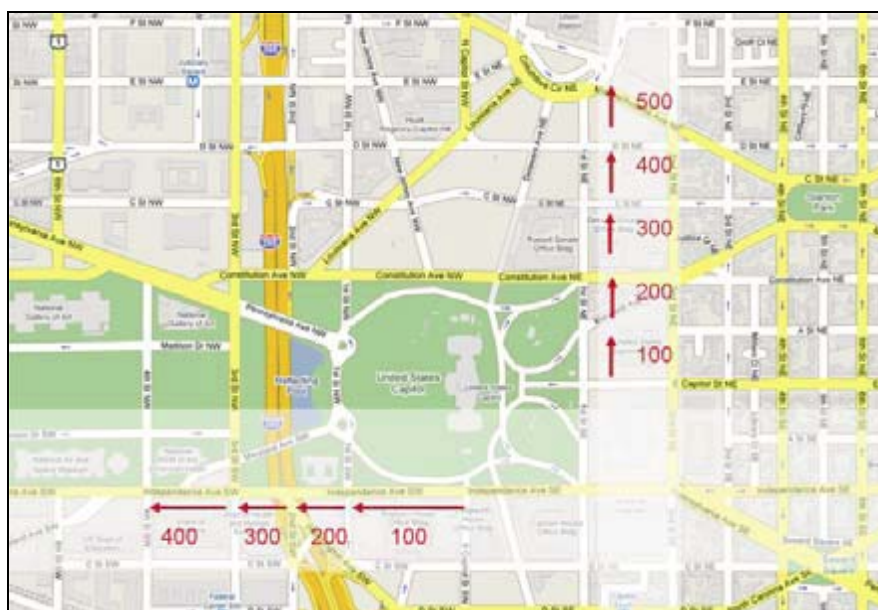
Next, we will focus on the task of developing a system for numbering buildings. The first step is to define the streets on the address map in terms of their beginning and end. The second step is to determine the geographical direction in which numbering will proceed. The numbering progression begins from the designated point zero of each street. By convention, buildings on the left side of the street are assigned uneven numbers, and those on the right receive even numbers, all of which increase in the direction of progression.



Take the example of Washington DC. The Capitol building forms the zero point of the city, at the intersection of North Capitol Street, East Capitol Street, South Capitol Street and the Mall to the West. Streets running east to west are identified with letters, and streets running north to south are given numbers.



On each block moving away from the Capitol, the street segment is numbered in increments of 100, e.g., 100 between A and B Streets, 200 between B and C, 700 between G and H. The same logic applies for the perpendicular streets: 100 between 1st and 2nd Streets; 200 between 2nd and 3rd Streets; and 1800 between 18th and 19th Streets.



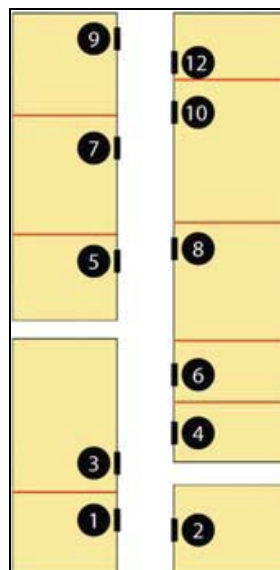


Using this system, the city is divided into four quadrants, which can identify streets by compass directions. For example, there is a C Street NW, but also a C Street NE, C Street SW and C Street SE.



We will now discuss several options for numbering buildings, including sequential, decametric and metric systems.

- i. **Sequential or “classic” numbering system.** In this system, existing doorways are numbered sequentially, with uneven numbers on the left side of the street (1, 3, 5, 7 and 9) and even numbers on the right side (2, 4, 6, 8 and 10).





If a plot is divided into two plots, a prefix “bis” is added to the building number. For example, plot 3 has building number 3 and 3bis. Bis originally comes from the Latin word for “two,” indicating that it is a second parcel of land added onto the first.

In Washington DC, the city is numbered on the sequential system. Any doorway number is made up of two parts. The first digits refer to the street segment, and the remaining digits designate the sequential number, with uneven numbers on the right side and even numbers on the left side in increasing progression. Thus, 1818 H Street NW is located on the 18th block from the Capitol on H Street (see image below).



The sequential numbering system has several advantages.

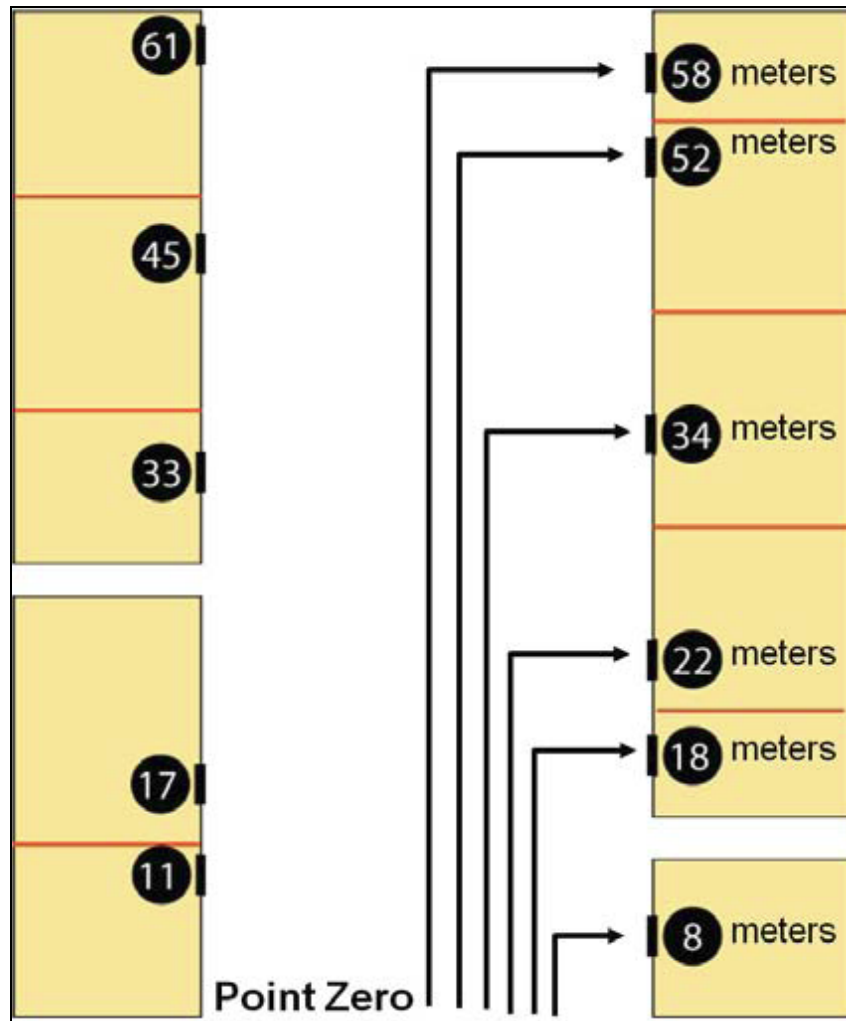
- It is simple, well known and widely used, and is suitable in situations where all buildings are either constructed or have already been planned for future construction

But this numbering system also has several disadvantages.

- First, in cases where structures are built between existing numbered buildings, these structures need additional numbers assigned to them. This can be a particular problem when there is no master plan for city development, leaving empty spaces between buildings for long periods of time.
- Second, when several plots are merged, the numbers of the first and last plot in the series are usually retained.
- Third, whenever a building frontage varies in length, the even and uneven numbers are not directly across the street from each other.
- The fourth and last disadvantage is that buildings in developing neighbourhoods are not constructed in any particular order. As a result, many meters of space can exist between one building and another for long periods of time.



- ii. **Metric numbering system.** Under this system, which was conceived in 1800 by the inventor of the meter, address numbers indicate the distance (in meters) between the street's "point zero," the start of the street and the building entrance.



The metric numbering system has the following advantages:

- First, it is especially suited to areas of rapid urbanization as it allows for numbering of isolated buildings.
- Second, successive even and uneven numbers follow a logical progression, which makes it easy to find addresses.
- Third, unlike in the sequential system, the construction of a new building does not require the use of "bis" or other qualifiers with the address.
- Finally, the recognition of distances in meters simplifies the provision of municipal services, particularly for utility network installation and maintenance.



However, there are two disadvantages to the metric system.

- First, numbers contain three or four digits (in reference to distance in meters) and may be harder to remember than two-digit numbers.
- Second, numbers are not sequential, which can be very confusing to those who are unfamiliar with the system, such as tourists or business travelers.

iii. Decametric numbering. This system, proposed by the architect Huvé, places numbers at equal distances, for example, every ten meters, which also indicates the length of the street. Streets are divided into 10-meter segments, which are numbered successively 1, 3, 5, 7, etc., to the left, and 2, 4, 6, 8, etc., to the right. Distance markers are placed every 100 meters to facilitate numbering. A sequential numbering system is followed for buildings.

The decametric numbering system has the following advantages.

- First, the ease of reading sequential numbers is combined with the possibility of measuring distances through metric numbering.
- Second, it is much easier to assign addresses to isolated buildings in developing neighbourhoods.
- Third, successive even and uneven numbers will be more or less directly across the street and, therefore, can easily be found.
- Lastly, the recognition of distances simplifies the provision of municipal services, particularly for utility network installation and maintenance.

The decametric numbering system also has a number of disadvantages.

- First, it is seldom used. Therefore, there is little practical know-how on which to draw.
- Second, two buildings located in the same segment will require letters to differentiate the addresses, for example, 12A and 12B.
- Lastly, although a master plan for developing neighbourhoods will not be needed, the system will still require segmentation of streets and installation of distance markers to facilitate the numbering of future buildings.

In this section, we looked at several systems for numbering streets. No one system is correct for all situations. Selection of the street numbering system depends largely on the individual urban situation, taking into consideration the various advantages and disadvantages of each system.

e. Task 5: Making adjustments for special cases

Next, we will discuss what needs to be done in a city centre that already had named streets and a sequential numbering system, but decided to adopt a new metric or decametric numbering system. Two main issues need to be considered when making adjustments: streets and doorways.

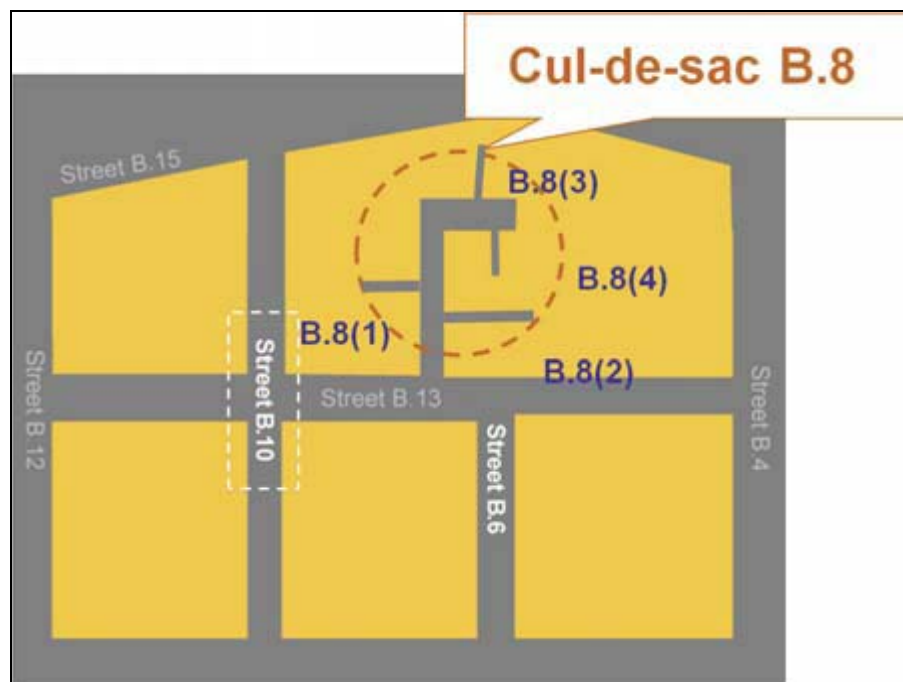


All **streets** in the city centre should be numbered according to the system being implemented **citywide**. However, street signs need not be changed. Street numbers will be included in the street directory, and any replacement signs will include the number written under the street name.

In the case of **doorways**, the following two basic principles should be considered:

- First, if the **majority of buildings** in the city centre are numbered sequentially, avoid drastic changes and allow the city centre to retain its current numbering system.
- Second, if only a **few doorways** in the city centre are numbered sequentially, retain the existing number and place the new number next to it so as to prevent confusion among citizens attached to their old number.

- i. **Cul-de-sacs.** Let us now look at the special case of **cul-de-sacs** and their codification. The simple solution is to identify cul-de-sacs as such, and assign numbers similar to regular streets. For example, Cul-de-sac B.8 would be located between Street B. 6 and Street B.10.



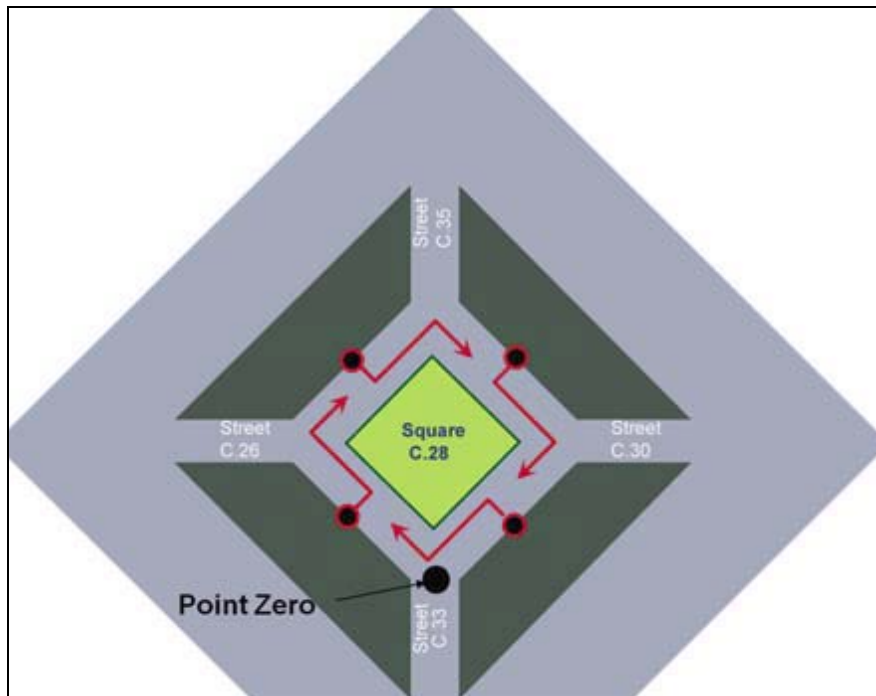
Using a more complex solution, a cul-de-sac can be linked to the street onto which it opens. For example, Street B.10 would lead to Cul-de-sacs B.8(1) and B.8(3) and so on or Cul-de-sacs B.8(2) and B.8(4), depending on their location on the even- or uneven-numbered side of the street.

- ii. **Public squares.** Another special case is the codification of **public squares**, which are codified in the same manner as streets. To avoid confusion, different numbers are assigned to squares and streets, hence, Street C.26, Square C.28, Street C.30, etc.



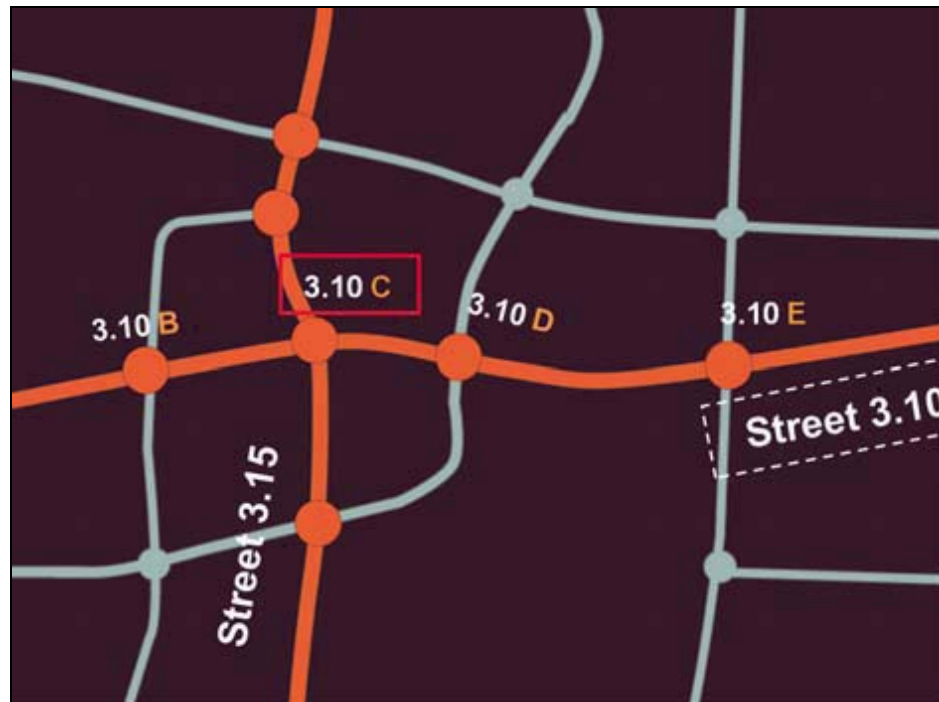
The doorways on a public square are numbered according to the following two-step procedure:

- First, specify a point zero at the place where a principal street converges with the square. Second, assign numbers beginning from point zero and moving clockwise around the square. For example, Squares C28 and E44 may have a zero point located on Street C33 and Street E39, respectively.



- iii. Intersections.** The codification of **intersections** is yet another case that requires special adjustments. A city's technical department may need to identify intersections, particularly when street segments have to be differentiated. In such a case, the solution can be to codify the intersection in reference to one of its component streets. For example, the intersections on Street 3.10 would be coded Intersection 3.10 B, Intersection 3.10 C, and so forth.

Since an intersection involves two or more streets, it will be coded more than once, but only the code of the more important street will be retained. For example, at the intersection of Streets 3.10 and 3.15, the intersection will be coded Intersection 3.10 C because Street 3.10 is more prominent than Street 3.15 (see image below).

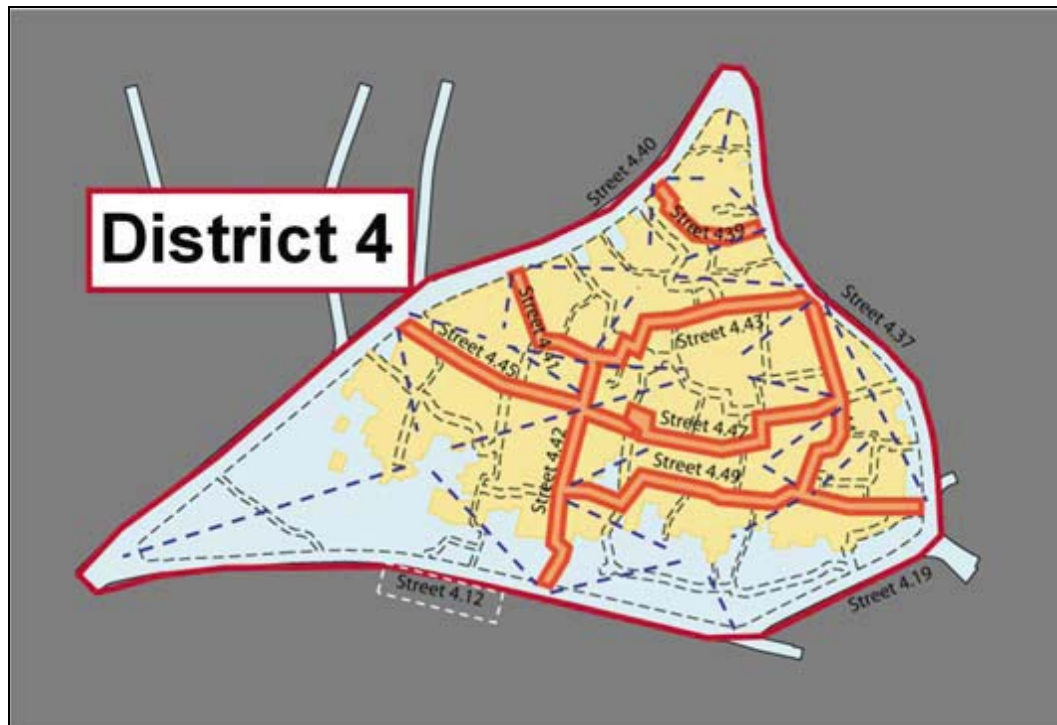


iv. **Informal settlements.** Let us now turn our attention to the codification of **informal settlements**, which are also called squatter settlements or slums, tend to have streets unsuited to motor vehicles and are often regarded as illegal. City authorities may be hesitant to introduce a street addressing system in such areas for fear of legitimizing informal occupancy. In an effort to improve the living conditions of slum residents, however, cities sometimes perform interventions, most notably to facilitate the introduction of water lines, street lighting and other utilities.

One possible method of codifying informal settlements uses the following three steps:

- First, specify or confirm the principal routes through the area. Then assign street numbers as indicated above, for example, Street 4.12 in reference to District 4.
- Continue by establishing appropriate division of space at intersections, for the bisecting routes.
- Lastly, assign a number that links each dwelling to the street.

As an example, along Street 4.43, dwellings would be numbered 43/1, 43/3 or 43/2, 43/4 depending on their location on the even- or uneven-numbered side.



- v. **Combined system.** Next, for documentation purposes, let us briefly look at another codification system known as the **combined system**, which is common in the suburbs of US cities. Here, the street layout is often “landscaped” rather than systematic, as in a city centre. Streets have names, but house numbers often include a prefix, also called a radical, that refers to a neighbourhood-type subdivision.

Using 7809 Moorland Street as an example, 78 is the radical, meaning that the house belongs to the Westover subdivision, and 09 is the sequential number that designates the fifth building from point zero within that subdivision (see image below).



3. Setting up the Street Addressing Unit

3.1 Objective

The objective behind setting up a Street Addressing Unit is to ensure that the implementation of the street addressing programme is maintained at a sustained pace. The Street Addressing Unit may hold different forms of legal status (private, public, integrated or external), but whatever the option, a project execution unit must be identified and should have financial autonomy. The Unit should have its own operating budget.

Although it needs to be autonomous, the Unit represents the municipal authorities, in particular, during the implementation phase. This accountability is indispensable if the Unit is to remain credible in the eyes of the public, which makes its work much easier.

A Street Addressing Unit is established at the time of launching the preparation phase of a street addressing programme. Unit setup generally involves the following three tasks:

a. Task 1. Define the roles and responsibilities of the Unit

Setting up the street addressing unit involves two areas of responsibility: decision making; and implementation.

**i. Decision making**

Municipal authorities are responsible for decision making. They are the main contract managers, and undertake and finance the programme (sometimes with donor support). They make critical decisions identified during the feasibility study related to the budget, codification, scope of the programme, media campaigns, selection of suppliers and other matters. Owing to the broad impact of a street addressing programme, other key utility concessionaires (such as water, electricity and solid waste collection) and administrative entities (such as Ministry of Interior, Ministry of Urban and technical units) should also be involved. Setting up a Supervisory Committee is usually a good approach to broadening participation.

ii. Implementation

Various approaches may be workable, but the idea of setting up an implementation structure as a municipal service is not usually the most appropriate solution for a variety of reasons.

- Municipalities do not usually provide for this type of position, and creating it sometimes leads to considerable delays that interfere with the launching of the programme.
- Technical departments, where this position might be created, are often very busy with day-to-day affairs and are unaccustomed to handling multiple activities (such as mapping, surveys, setting up a database).
- Finally, the implementation phase clearly differs from the maintenance phase in that it is shorter (lasts about one year), calls for a greater number of more diversified activities and is narrowly focused.

For these reasons, in part, experts who are not associated with the municipality have assisted in the implementation phase of several street addressing programmes, before these are taken over during the maintenance phase by one of the municipal departments already in existence or created for this purpose.

In other words, although this implementation structure known as the Street Addressing Unit is placed under the municipal authority, its role may evolve from that of service provider during implementation to a permanent department during the maintenance phase. The Unit may eventually serve as a sort of municipal documentation centre responsible primarily for collecting information related to planning and development.

b. Task 2. Define the specific tasks of members of the Unit

The Unit intervenes in accordance with decisions made upon completion of the feasibility study and recorded in its procedures. Its main tasks are as follows:



i. Tasks during the preparation phase

- **Setting up the Unit.** Preparing the location, setting up the office and computer equipment.
- **Collection of documentation.** The focus here is on maps, city plans and expansions under way, and aerial photographs. The purpose of this collection is to create a base map with an outline of streets and major facilities. The map is at a 1:10,000 scale and should serve as the basis for a street inventory.
- **Training of unit agents** (core unit members).

ii. Tasks during the implementation phase

- **Organizing and supervising public awareness campaigns.**
- **Report to the Supervisory Committee.** Regular reports on progress of the street addressing programme are made to the Supervisory Committee.
- **Codification and mapping.** The focus here is to implement the codification system agreed upon in the preparation phase and to develop the street addressing maps.
- **Recruit and train short term workers** needed for implementation.
- **Installation.** Supervising surveys, street sign installation and doorway numbering.
- **Create a computerized address directory.**

3.2 Composition of the Street Addressing Unit

The Street Addressing Unit is comprised of a set of fulltime core members and teams that are deployed on a short-term basis. The Unit is managed by a coordinator.

Task 3: Training of core unit members

The fulltime core members will be trained in street addressing techniques before the implementation phase begins. Additional computer training in using software for the design and creation of the address directory is sometimes necessary. Short-term teams receive training at the beginning of the implementation phase.

Training is mainly focused on survey techniques, distance measurement, doorway numbering, map reading and organizing of data collected daily. It is completed on the ground during the pilot operation.

4. Media Campaigns: First Phase

It is extremely important to inform the city inhabitants and authorities about the street addressing programme, and its objectives, scope, schedules, etc. This is carried out through different stages of a media campaign, where the public is informed of the reason, substance and schedule of the street addressing programme, as well as its progress. The absence of relevant information could lead to misunderstanding or unfounded resistance to such a programme.



The media campaign should include the following themes:

- The benefits of having an address
- Explanation of how the system will work
- An action plan showing the duration of operations, neighbourhoods involved, actors, costs and other information

During this preparation phase, we need to design a media campaign plan for our street addressing programme and initiate the programme to inform the public.

Reading

For a detailed description of the objectives, responsibility, cost estimate, target audience, choice of media, scheduling and themes of the media campaign, please read the media campaign guidelines (mandatory), available in the Virtual Library.

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Street Addressing and the Management of Cities

Module 04 Implementation and Maintenance of a Street Addressing Programme



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Introduction to the Implementation Phase

This is the phase in which the programme becomes fully operational by definition.

TASKS: This phase will focus on:

- Preparing the address map and the street index (mapping).
- Positioning street signs at the main intersections (installation of signage).
- Numbering doorways, according to the codification system adopted and the survey associated with it.
- Setting up an address directory.
- Conducting a media campaign for the street addressing programme.

EXPECTED RESULTS: Results will hinge on undertaking the tasks above and producing the following documents: address map; street index; address directory; media campaign components; signage map; and list of street signs.

ACTORS: The municipality, street addressing unit, trainer, survey takers and labourers, media campaign specialist, street sign manufacturer and installer, and printer.

DURATION AND COST: The duration of this phase will depend on the size of the city. The estimate is 12 to 18 months. Costs incurred will cover street addressing unit operations (including compensation for survey takers and short-term hires), supply of street signs and materials needed for numbering doorways, and media campaign expenses.

SCHEDULING: Mapping, survey preparation, numbering of doorways, and launching of a request for bids for producing street signs may be undertaken almost simultaneously.

1. **Mapping:** Based on initial preparations during the feasibility study and information gathered during the preparation phase, the street addressing unit creates a base map (8), which depicts the streets and toponymy of the districts. The unit then creates an inventory of streets and intersections, which is essential for verifying the layout of the base map (9). The process of codifying streets begins with indicating their identifiers on the map, their endpoints and the type of subdivision adopted by the street addressing programme. The map and the street index are then finalized before printing (11). After the request for bids is issued (12) and the printer is chosen (13), the printing process begins.
2. **Doorway numbering and surveys: Questionnaires and survey materials are prepared (15) at the beginning of the implementation phase, as soon as the base map is ready. Survey takers must then be recruited and trained (16), and a pilot operation is launched (17), which leads to a second**



media campaign (18). The longest phase of the operation then begins (19): numbering doorways; and conducting surveys of building occupants.

3. **Address directory:** Data are entered daily (20) as surveys are completed. When the programme has been completed, all of the data are processed and distributed to the administrative bodies and departments involved (21).
4. **Installation of street signs:** This is a lengthy step because it includes the manufacture and installation of the street signs. First, a request for bids for manufacturing the signs is issued (23) at the outset of the implementation phase and after an inventory of streets and intersections has been conducted, although a precise list of streets need not be available in order to issue the request for bids. However, the list and signage map (25) should be ready upon selection of the supplier (24) so that production can get under way (26). Once the signs have been produced and before they are delivered (27), a request for bids is issued for placing the signs (28), which will begin after selection of the company (29).
5. **Producing the address map and street index:** The objective is to print and disseminate the address map and its index of streets to government offices and beyond to the general public. This activity dovetails with the media campaign to promote the street addressing programme.
6. **Media campaign:** Awareness raising campaigns will target the population on at least three occasions: at the end of the preparation phase when the street addressing unit has been set up (6); during the pilot operation (17); and when the map and street index have been distributed (22).

1.1 Mapping

Objective and expected results

The objective is to create an address map with a scale along the lines of 1:10,000 that shows streets and neighbourhoods, their toponymy, administrative boundaries and principal buildings. The addition to this document of street sign information will result in the signage map.

Implementation

The street addressing unit's chief cartographer will manage this activity, which consists of the following five tasks, carried out in two phases: mapping preparation phase; and mapping implementation phase.

a. Task 1: Gather the documentation

The first task consists of gathering the existing cartographic documents from sources, including the city's technical departments, the mapping and cadastral units, the minister of urban development,



and the water and electricity concessionaires. The documents may differ considerably in scale, format, support media, creation dates and topographic references. They are classified by order of importance, with priority given to those that are the most topographically accurate and thus able to provide a basis for the base map. The documentation is supplemented, if possible, by fairly recent aerial photographs of the city or a high-resolution satellite image.

Reading

We can find out more through the reading (optional) “Terms of Reference for Aerial Photography,” which is available in the Virtual Library.

The following information should be gathered during the same period:

- a. List and boundaries of neighbourhoods, city districts and municipalities;
- b. List of local place names;
- c. List of streets currently and previously named;
- d. Location of principal paved streets;
- e. Location of streets on which buildings are already numbered; and
- f. Location of notable buildings, such as a ministry, city hall, prefecture, university, market, hospital, major place of worship, train station or airport .

b. Task 2: Confirm the level of staff expertise in cartography

The maps are best prepared using an electronic medium, in which case the chief cartographer should confirm the level of staff expertise when applicable.

The choice of software will depend on two factors:

- ease of use so that the chief cartographer can delegate certain tasks; and
- compatibility with production using a four-colour printing process in view of the broad dissemination of the address map.

It is estimated that the training will take one week.

c. Task 3: Prepare the base map

The base map will provide the basis for the address and signage maps. The selected cartographic documents are converted to the same scale through photocopying or by electronic means after scanning. The base map is prepared on carbon paper or in electronic medium, assisted if applicable by a surveyor, a cartographer and an architect. The base map includes:

- Street layout;
- Boundaries of municipalities, neighbourhoods and city districts;



- Indication of notable buildings;
- Toponymy of neighbourhoods and local place names; and
- Toponymy of previously named streets.

d. Task 4: Draw up the street inventory

It is essential to verify the contents of the base map and conduct a systematic on-site inventory of streets and intersections. This painstaking task can be carried out using a vehicle, preferably with the participation of the coordinator and the chief cartographer and survey manager to increase their familiarity with the city. The information to be gathered is reported on a printout of the base map, which includes:

- The exact street layout;
- Verification of previously named streets;
- The location of existing street signs;
- The location of streets with previously numbered buildings;
- Identification of street condition (paved or unpaved); and
- Verification of the toponymy (neighbourhoods, streets, local place names) and boundaries of municipalities, neighbourhoods and city districts.

e. Task 5: Prepare the address map

The base map is revised according to the gathered information. A printed map is then submitted to the Supervisory Committee and/or neighbourhood representatives for validation of any unclear boundaries of municipalities, city districts or neighbourhoods.

The base map is then ready to become the address map, which will include:

- The boundaries and toponymy of the subdivisions (municipality, sector, city district, neighbourhood);
- The name or number of each street;
- Arrows indicating the beginning and end of each street;
- Doorway numbers at the end of each block (if applicable);
- Major facilities (such as a ministry, city hall, school, hospital, market, stadium, train station, railroad or airport), places of note and applicable toponymy;
- Main waterways and green spaces;
- An alphanumeric grid (1 km x 1 km, for example) to make it easier to locate points of reference; and
- Map legend, north indicator and graphic scales;



Reading

We can find out more through the reading (optional) “Terms of Reference for Aerial Photography,” which is available in the Virtual Library.

1.2 Surveying and numbering doorways

Objective and expected results

The objective is to number the doorways of buildings and, in the process, conduct a survey, the results of which will be recorded in the address directory. This is undoubtedly the most time-consuming and meticulous part of the street addressing programme.

Implementation

Prior to the surveys and doorway numbering, the codification system must be chosen and approved by the Supervisory Committee. Also, the base map must be ready, which will enable teams to find physical coordinates on the ground as they conduct surveys and install street signs. Surveying and numbering doorways consist of a number of tasks, which are outlined below.

a. Task 1: Preparation of questionnaires and other materials

Preparation of questionnaires

Once the general framework for the survey is established during the feasibility study, the questionnaire can be finalized. At this stage, it may seem desirable to conduct a comprehensive survey, but such an approach would involve a considerable expenditure of time. Since the surveys and doorway numbering are to be conducted concurrently, the recommended approach is to conduct a quick, cursory survey, for subsequent completion during the maintenance phase.

In view of these circumstances, the questionnaire should be short, with wording tailored to the working method employed in the survey. For example, the presence of a water company representative during the survey will make it easier to find out the meter number. The following essential data should be obtained during this initial survey:

- **Address.** Name of district, number assigned to each doorway (old number if applicable), and street number and street name if applicable.
- **Land use category.** Residential, institutional facility, business (specify), etc.
- **Type of building.** Single-story, multi-story, detached house, multi-unit, permanent or temporary structure.



Other information may be added as well.

- **Water and electricity meter numbers.** Meters may not be accessible without a utility company representative present.
- **Cadastral references.** Generally added to the questionnaire after the survey.
- **Name of occupant.** This information is sometimes difficult to determine for a number of reasons (e.g., refusal to respond or no point of contact).
- **Environment.** Examples include paved road, sidewalk, drainage canal and street lighting. For this type of information, however, it seems more appropriate to organize a specific survey that would inventory and assign addresses to urban fixtures, such as public standpipes and fire hydrants, waste transfer points, bus shelters, preferably during the maintenance phase.

Once the forms have been prepared, the information can be codified for easier computerized data entry. Forms pertaining to economic activity and type of occupancy are prepared in collaboration with the tax department, if possible. The survey form has space reserved for codification, but the survey taker will make handwritten entries for the type of activity.

Preparation of other materials

Each team should have the following materials:

- Survey forms and locator maps;
- Informational memos signed by the mayor, for distribution during the survey process;
- Odometer (when a metric or decametric numbering system is used) for measuring distances to determine doorway numbers; and
- Chalk, paint, paintbrushes and stencils for numbering.

b. Task 2: Recruitment and training of teams

Each team may consist of up to eight persons, including a team leader, field surveyor, survey takers, painters and labourers. The tasks, though easy to perform, are quite varied, hence the diverse profiles of the team members required. During the recruitment process, special attention should be focused on the potential cohesiveness of the team, whose members will be required to work together throughout the operation. The participation of agents from the utility concessionaires or the tax department during the survey process usually expedites the gathering of data and enables agents to quickly complete their own directories with new address entries. A written agreement may be used to govern the participation of the utility concessionaires.

Reading

We can download a sample: “Memorandum of agreement between the municipality and the utility concessionaire,” available in the Virtual Library.



The training focuses on the team members' mastery of the tasks involved, as well as the organization of the team during and after the survey periods, including: coordination of progress in the field; and organization of collected data at the end of each session and review of materials for the next day's session.

c. Task 3: Pilot operation

The pilot operation has two objectives: to test team training; and to promote the operation through the media. However, the second objective should not eclipse the importance of the first.

- The operation is conducted in a busy, fairly structured neighbourhood marked by permanent buildings and a well-established street system. The locus of the operation is generally the city centre, although streets whose lively activity might interfere with the surveying and numbering tasks should be avoided. The initial strategy is to fine tune the training approach, while gradually preparing the team before it is required to tackle problem cases.
- There is no need to choose an extensive area. The pilot area generally encompasses only a few (i.e., four to five) streets, which should be sufficient for testing all of the teams.

Testing

The testing concentrates on: (a) the team's performance under realistic circumstances; (b) giving survey respondents the mayor's memo with a specific explanation of their new address; (c) conducting the survey; and (d) placing the number on the building.

Media campaign

The pilot operation provides an additional opportunity to make the authorities and the general population aware of the address system. The campaign should emphasize the doorway numbering and sign installation operations. During this period, model street signs can also be designed and possibly installed. In many cases, the signs are made by local craftsmen for temporary use prior to full-scale production. The objective at this stage is to have a prototype of the permanent signs (dimensions, colour, type of inscription).

d. Task 4: Assign numbers to buildings

This task is performed concurrently with the survey, but will be discussed here for ease of presentation. The numbering operation occurs in two phases.

1. The municipality is responsible for the initial numbering phase of a street addressing programme. The number is painted, using a stencil if possible, on the wall or door of the building. The occupant is obliged to keep the number visible; if this is not required by law, a municipal regulation may so stipulate.
2. The occupant subsequently obtains and affixes a more permanent doorway sign.



The acquisition and mounting of doorway signs should not be included in the street addressing budget, in view of the cost and operational constraints. Their procurement involves administrative complications, especially if a metric numbering system is used (since the numbers are non-consecutive), and affixing them often leads to a series of occupant-generated delays.

A few exceptions might be made in the case of public buildings, which the street addressing team could outfit with doorway signs. These could serve as examples to encourage other residents to replace their painted number with such a doorway sign.

Practical procedures

The numbers are usually affixed in two steps during a street addressing operation.

1. The writing is first done in chalk by the marker, using the number indicated by the field surveyor, which corresponds to the distance to the doorway from point zero in the case of a metric numbering system.
2. The painter, proceeding more slowly, then stencils the number; in some cases, a rectangle is painted as a background for the number, preferably on the wall of the building.

Where should the number be placed?

A certain degree of homogeneity is desirable for the stencilled numbers (e.g., position, height, uniform background colour, size of the numbers). As an example, the number might be positioned above and in line with the entrance, or 1.8 meters above the ground and 20 cm to the right of the entrance, in a place that will not be obscured by an open door or shutter.

Standardization offers the advantage of readability. For this reason, address numbers on Parisian buildings are white on an unframed blue background—a colour combination that is particularly easy to see, even at night under dim lighting conditions. A municipal regulation dated September 27, 1982, requires that doorway signs placed over or near the door frame be rectangular in shape and have a standard height of 17 cm, with their width varying depending on the number of digits in the address.



e. Task 5: Conduct the survey

The survey has several goals.

- To present the occupant with his new address and provide a brief explanation of the newly adopted numbering system.
- To write the number on the wall of the building after discussion with the occupant.
- To present a personalized memo containing the address—and if possible the name—of the occupant; the head of the household need not be present for the survey, as the memo should provide all necessary information about the survey.
- To gather the essential data described before under Task 1, including address, type of occupancy, type of building and other information.

Progress check

The tasks of numbering, surveying and affixing doorway signs are sometimes spaced out over long time intervals, therefore necessitating a monthly progress check for each task. A chart, such as the model shown below, should be used.

1.3 Recording addresses

Objective and expected results

This activity has two objectives: (a) to set up an address directory based on the survey findings; and (b) to make it available—using procedures to be determined—to government agencies and utility concessionaires, who will add supplementary information according to their own needs.

The expected results are:

- a computer printout, generally in spreadsheet form, intended to facilitate the dissemination of information; and
- a data analysis document that provides information, such as the number of named or numbered streets, number of doorways per neighbourhood and list of business activities by neighbourhood.

Implementation

The implementation phase begins with the preparation of a data analysis code for the survey and the development or procurement of system software. The data are recorded during the survey process. This phase consists of four tasks.

a. Task 1: Organization and checking

Each day, the documents are organized by the survey staff according to street and neighbourhood, checked by the team leader, and filled in or annotated the same day or the next so that the information is not forgotten. The survey manager oversees this task.

**b. Task 2: Coding**

Some questionnaire responses that are written out during the survey process—for example, type of business activity or use category—must then be coded.

c. Task 3: Data entry***Use of special software***

A software programme specially designed for address directories is recommended for the two reasons described below.

- **Size of the address directory:** The number of lines in the address directory will ultimately equal the number of households. Hence, for a city with a population of one million, the address directory will comprise 100,000 to 400,000 lines. For each line (one line per doorway assigned an address), there will be 10–20 items of data, such as address, use category, type of building and meter number. Consequently, the database can quickly exceed a million data items. Under these circumstances, traditional spreadsheets are greatly outmoded in their data handling capacity.
- **Use:** The address directory will be used by professionals at many levels: technical experts, tax department personnel, data entry staff and others. The situation calls for a specific application that provides fast, easy access for data search and retrieval. To meet these needs, an existing application may be adapted or a new one created (though the possibility of software bugs would have to be taken into account under the latter scenario).

Functions

The street addressing software will need to include functions that enable the following operations:

- **Data entry:** Check for consistency of data entry and for keyboarding errors, change an address, keep a history file (old names).
- **Tailoring the parameters:** Make modifications, particularly for occupancy codes and street or sector names.
- **Search:** Search for any address according to any data item linked to it (such as name, street number, address, use category and so on);
- **Statistics:** Retrieve data and statistics using multiple criteria.
- **Geographic or “territorial” subdivision.** Be able to process data for a specific geographic area to serve the needs of technical or tax departments or utility concessionaires. A “territory” is user-defined and may be stored in memory. It may include: one or more neighbourhoods; one or more streets or sections of streets; or even- or uneven-numbered sides of the street.
- **Data export:** Export data in standard formats (such as txt, xls, dbf).
- **Protection:** Limit access to some or all data through password protection.



Definitions

- **Address:** Each address corresponds to a unique code that makes it possible to locate a single element of the city on a particular street.
- **Type of occupancy:** An address may refer to a dwelling, a business establishment (such as a company, shop, service facility), an institutional facility (such as a school, hospital or government agency) or an urban fixture. Data entry is identical for all types of addresses.
- **Multiple addresses:** A single building may have space devoted to several different use categories.
- **Neighbourhoods and streets:** Names of address zones are entered prior to addresses, so as to build into the database the codes that will enable the software to function, i.e., the neighbourhood code and the street code.

d. Task 4: Analysis and follow-up

Various types of requests are made for data analysis.

- List of streets by neighbourhood (named or numbered streets).
- List of streets by neighbourhood according to feature (right-of-way, type, paved).
- List of addresses by neighbourhood according to occupancy type (residence, business, facility, urban fixture).
- List of addresses by neighbourhood and by street.
- List of businesses by neighbourhood and by street.

Similar lists are provided by “territory,” if applicable.

Back-up. The address directory is backed up daily during the data entry phase.

Follow-up. The survey progress is tracked each day by marking on an address map those streets that have been “processed.”

Training. The staff responsible for keying in and updating the address directory is familiarized with street addressing techniques and is given the appropriate software training.

1.4 Installing street signs

Objective and expected results

The objective is to install signage on street corners to designate each street by name and/or number. The expected result is either the installation of street signs on building façades or posts or the use of more rudimentary solutions. This decision is generally budget-driven.



Implementation

Owing to the diversity of tasks included under this activity, each should be undertaken in an expedited fashion without necessarily waiting until the surveys have been completed. The following tasks are to be performed:

a. Task 1: Define the signage system

Work on this task begins during the feasibility study, in the form of cost estimates and budget preparation—decisions that will undoubtedly influence the choice of signage.

The task extends into the street inventory process at the beginning of the implementation phase. At this stage, the team identifies corners where the building façades do not allow for wall-mounted signs and will therefore necessitate the installation of signposts. Finally, the team estimates the specific needs to be met during the operation, including the number of: sign plates; stencilled signs; and signposts.

The type of signage to be used will be determined by weighing cost against durability.

Reading

We can find out more through the reading (mandatory) “Comparison of solutions for street signs,” available in the Virtual Library.

b. Task 2: Prepare the map and list of street signs

The signage map is generally prepared as a 1:5,000 enlargement of the address map. It contains the same information, as well as: the position, name, type (plate, stencil) and mounting type (i.e., wall- or post-mounted); and doorway numbers at the end of each block.

Reading

We can download an example of a signage map, available in the Virtual Library.

This map is especially useful for determining the number of signs to be installed for each neighbourhood and street. It can also be used for:

- drawing up the list of street signs for procuring plates, panels, posts and stencils; and
- a reference document for the company that installs the panels, plates and posts.

The list of street signs catalogues all signs to be made for installation on walls and posts.

**c. Task 3: Procuring sign materials**

This task involves procuring the street addressing materials, usually by way of requests for bids. This process should be started without delay, in view of the time required for bidding, manufacture and delivery of the materials, weighing cost against durability.

The bidding process can proceed without the list of street signs, subject to the following conditions:

- The feasibility study has established the type of signage and estimated the number of plates and panels needed; and
- At the time of the contract award, the list of street signs must be ready, at least for a partial order if the supplier agrees to a staggered delivery schedule.

Stencils: It is appropriate to consult local craftsmen about making the stencils. Bidders will be required to submit a prototype during the selection process, however, to ensure that the materials meet the users' expectations.

Signs: If durability of materials is essential and the order will be sizeable, it is generally advisable to arrange an international request for bids, which would open the way to dealing with specialized companies that can often work more reliably at a lower cost.

Each bidder will be required to include with the bid a prototype for signs and posts, which will be used as a reference for judging the quality of the materials. The materials delivered must be of at least the same quality as that of the prototypes. The request for bids may suggest that different options be presented for the quantities to be supplied, contingent upon a more definitive indication of the quantity on which bids will be judged.

Reading

We can download a guide for the purchase of supplies and materials for street addressing, available in the Virtual Library.

d. Task 4: Install the signs***Receive, store and deliver the materials***

A specific site is to be provided for receiving, storing and delivering the sign materials. Upon delivery from the supplier, a certificate of completion must be signed by the street addressing unit and the supplier.



If possible, this site should be located near the areas where street addresses are being assigned. There should be sufficient space for systematic storage of the materials (arranged by street) so as to facilitate subsequent installation work. Security services should be provided to prevent theft.

Certificates of completion will be issued for daily deliveries of materials to the installation teams. The materials will be inventoried at least once per week. The street addressing unit will have the responsibility for each of these tasks.

Organize sign installation

The sign installation work includes mounting of signs and posts and stencilling of inscriptions on buildings. Contracts are generally awarded to local companies through a bidding process. If possible, requests for bids are issued separately for supplying the materials and for the installation work. The street addressing unit will supervise the work, which will be performed according to an installation schedule drawn up with the contractor before the work begins. To that effect, a map excerpt will be prepared and given to each team on a daily basis, along with a list of work to be performed and materials to be obtained from the storage facility.

Install the signs

The street signs are placed on walls or enclosures at a height of three meters and a distance of 20 cm from the building corner, though these measurements should be regarded as indicative rather than limitative. The installation of signposts should conform to the country's usual signposting practices and must not disrupt traffic.

On a daily basis, the street addressing unit assesses the work completed and charts the progress on a map, and each week it conducts a field inspection. The sign installation is deemed to be completed upon acceptance of the work. The street addressing unit verifies that the work has been performed in accordance with the signage map and inventory sheets.

1.5 Producing the address map and street index

Objective and expected results

The objective is to print and disseminate the address map and its index of streets to government offices and beyond to the general public. This activity dovetails with the media campaign to promote the street addressing programme.



Implementation

At the beginning of the implementation phase, the street addressing unit prepared or arranged for the preparation of the address map that was to be used for the surveys and sign installation. The remaining tasks are described below.

a. Task 1: Check and complete the address map

The address map is supplemented and revised several times during the course of the surveys and sign installation. A number of final adjustments will therefore be needed before the document is sent to the printer.

Plan ahead for the printing process before producing the map

- If the map is designed on paper, it will be useful to transfer it onto a computer using editing software.
- If the map is already computerized, there is no guarantee that the printer will be able to use it easily. A map designed on editing software can usually be edited in colour with little difficulty. Otherwise, the data will need to be transferable to an editing programme. These issues should be settled prior to beginning work on map production.
- If the map is designed on GIS software, the graphics will need to be easily exportable to an editing programme. Although it is often tempting to use GIS software for street addressing because it combines data processing and map production, this type of software is quite complex; it is not advisable to begin map production with an inexperienced staff. The wise solution is to begin the initial street addressing operation with simple, inexpensive tools (editing software, for instance), and then plan to graduate to a more sophisticated computerized system after the street addressing unit staff has been trained.

Prepare the document for printing

It is customary procedure to convert the computer document into films that will be used for four-colour printing. The chief cartographer will need to determine the constraints of this process at the beginning of the implementation phase in order to gauge its effects on map preparation and, particularly, on the organization of the different layers comprising the address map.

b. Task 2: Prepare the street index

The index can be used to locate streets on the map according to an alphanumeric grid. It is presented in the form of a list printed either on the front or on the reverse side of the address map, or in a booklet containing the list of streets and map excerpts. The booklet is usually produced in a small format that can be easily slipped into a handbag or an automobile glove compartment.

**c. Task 3: Print the map and index**

The job of printing the map and index is contracted out through a bidding process. The production of the films from the electronic document calls for pre-press production techniques that may be beyond the expertise of some printers. All bidders will therefore be required to include with their bid a negative made from a map excerpt so that a qualified printer can be chosen.

Download

At this point in the course platform we can download the “Technical specifications for printing the address map and street index,” available in the Virtual Library.

In order to obtain competitive rates, the map should be approximately 70 x 100 cm, a format widely used in the printing industry. At least 2,000 copies should be printed. In addition to specifications for the map and index, the request for bids can include the provision of about 15 large-format copies printed on high-quality paper using a plotter, for distribution to the municipality and government departments.

d. Task 4: Disseminate the documents

The map and index should be widely disseminated, preferably through sale. Advertising space can be sold to keep costs down and facilitate updates. It would be desirable, however, to broaden dissemination by offering (or selling) a computerized version, particularly for government departments and utility concessionaires.

1.6 Conducting a media campaign: second phase

When our street addressing system has been designed, city inhabitants should be informed about how the system will function, its rationale and their new addresses.

2. Introduction to the Maintenance Phase

Implementing a street addressing programme in a city is necessarily an ongoing operation, especially if the urban area is continually developing. Without maintenance, the system will quickly become obsolete. The objective of this activity is to maintain the system once it has been established. The expected result is the identification of ways in which the street addressing unit in particular can help achieve that objective through its intervention plan after the initial addressing operation.



This phase usually requires fewer resources than those needed for implementation.

TASKS: Tasks will essentially focus on the following issues:

- Updating and completing the numbering process: doorway numbers have disappeared, new doorways have been created and addresses need to be assigned to new districts (31).
- Updating and distributing the address directory.
- Updating and completing street sign installation: street signs have disappeared or have been damaged, new streets must be given signs (32).
- Updating the address map (33).

EXPECTED RESULTS: Results will consist of updated versions of existing documents and possibly the extension of street addressing programmes to neighbourhoods that do not yet have addresses. Once the main street addressing needs have been met, the street addressing unit should expand its role, using the knowledge gained from the programme, and broaden its mandate to become a documentation centre or urban database, for example.

ACTORS: Municipality, street addressing unit.

DURATION AND COST: Maintenance should be conducted annually. Costs incurred will cover the operations of the street addressing unit and possible supply of new street signs and materials for numbering doorways.

2.1 Maintaining and adapting the system

Objective and expected results

Implementing a street addressing programme in a city is necessarily an ongoing operation, especially if the urban area is continually developing. Without maintenance, the system will quickly become obsolete. The objective of this activity is to maintain the system once it has been established. The expected result is the identification of ways in which the street addressing unit, in particular, can help achieve that objective through its intervention plan after the initial addressing operation.

Implementation

The importance of maintaining the system is generally well understood, but the means of achieving this objective are often left unspecified. The street addressing unit is the entity best suited to assume responsibility for system maintenance, yet its suitability for that endeavour requires some justification since it is not a part of the municipal organizational structure. Therefore, an action plan and budget will need to be prepared and approved by the municipal authorities.



This phase consists of two tasks.

a. Task 1: Prepare action plans

The maintenance phase begins after the implementation phase, but it may cover a wide range of activities with three possible approaches that may overlap: maintain, extend or broaden the mandate of the address system.

Maintain the existing address system

The action plan focuses on neighbourhoods already assigned addresses in order to:

- Repair or replace damaged or vandalized signs and posts;
- Replace street number signs with name signs when the names have been selected by the Toponymy Commission;
- Redo faded doorway numbers and number newly constructed doorways; and
- Update the address directory after several changes have occurred, e.g., closure of previously existing doorways or addition of new ones, reassignment of plot or building numbers.

In order to ensure that new addresses or changes of occupants are declared, some countries have instituted an “address certificate,” which utility concessionaires require residents to have when making service requests.

Extend the address system

This approach focuses on completing the work that has already begun.

- **Efforts are focused on neighbourhoods already assigned addresses**, but operations are extended to urban fixtures, at least those under municipal authority or relating to neighbourhood services, such as public standpipes, fire hydrants, public streetlamps, household waste transfer points, telephone booths or centres, and public toilets.
- **Efforts are focused on neighbourhoods not assigned addresses** during the initial operation, either because they had few or no residents, or because they were deemed too difficult to outfit by reason of their informal nature or uncertain legal status. Slum neighbourhoods will require special attention. A street address system could help provide underserved populations with a greater sense of security. There will undoubtedly be a need for innovation using the methods described.

***Broaden street addressing applications***

Once all neighbourhoods have been assigned addresses, the action plan focuses on broadening street addressing applications, primarily by expanding data collection to matters other than street addressing. At this point, the addressing unit will need to expand its role and take an adaptive approach. The objective is to gather additional information about the city, which municipal authorities often need for decision-making purposes.

Many local governments have only sketchy information about the population of certain neighbourhoods or the condition of the infrastructure and facilities under their responsibility. Against this backdrop, a number of street addressing units have gradually evolved into documentation centres, urban databases, urban observatories or urban planning units (Maputo, Yaoundé, Douala). Designations aside, such developments create a tailor-made opportunity for using the knowledge gained during addressing operations to broaden the unit's mandate and answer the need for more information on municipalities.

The action plan can then cover a variety of topics and an inventory of municipal assets can receive priority, particularly as this type of activity is regarded as a continuation of street addressing work.

- **Street inventory.** The data gathering is done by section and in much more detail than was the case in the street addressing survey, encompassing physical features, road condition, and so forth. This type of research may call for the use of specialized software.
- **Inventory of drainage works.** The drainage canals along roads were identified in the preceding inventory, but sometimes the responsibility for main outflow points falls to the municipality by default, and therefore it is advisable to list them.
- **Inventory of public works associated with solid waste management,** such as collection points, pickup routes, placement of trash bins, transfer centres and landfills.
- **Inventory of neighbourhood facilities,** beginning with educational and health facilities (e.g., elementary schools, health posts) whose construction and upkeep fall under the responsibility of the municipality. In these cases, the inventory accounts not only for the physical description but also the operation of the facility, such as the number of students, classrooms and teachers.

Each inventory generates descriptive reports that help officials assess needs, as well as the cost of maintenance, repairs or public works construction. The data can be used to guide municipal investment programmes. In terms of implementation, a qualitative step is still needed to organize the data into an urban information system.



The addressing unit's action plan may encompass additional efforts, such as assistance to a street toponymy commission in order to gradually replace the existing street numbers, neighbourhood population estimates and needs assessment surveys, or a compendium of ongoing studies.

b. Task 2: Evaluate interventions

A simple list or description of possible action plans is insufficient. The street addressing unit will need to quantify needs in terms of staff, materials, cost and time before submitting its proposals to the municipal authorities.

- If the existing address system is to be maintained, the full-time team that carried out the implementation phase will suffice. Its size could be reduced to one or two persons assigned to the municipality's technical departments, for example.
- If the address system is to be extended, the street addressing unit will follow the formula used during the implementation phase to carry out this task, i.e., full-time and short-term teams.
- If the address system is to be broadened, the situation will be different, since the nature of the interventions changes radically. This scenario will require a closer analysis to determine the team composition, whether or not it should be assigned to an existing municipal department, and the operating costs.

The foregoing proposals have been implemented to varying degrees in about 50 cities in some 15 countries over the course of the 1990s. Much work remains to be done, however, so that street addressing can make a more substantial contribution toward improving urban management and encouraging a broader recognition of the civic rights of all citizens. These efforts are only a beginning.

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