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A MODEL FOR MINIMIZING THE COST OF DISTRIBUTING METALLIC COINS
IN MÉXICO

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Resumen

Actualmente los expertos en temas de distribución de efectivo conocen la importancia de basar la toma de decisiones en un modelo de optimización. Distintas empresas e instituciones diseñan sus rutas de distribución en forma empírica, sin utilizar herramientas teóricas de apoyo que minimicen los costos de transporte y maximicen los niveles de satisfacción del cliente. Particularmente, en el caso del Banco de México, la distribución de moneda metálica es un proceso fundamental. Sin embargo, se presentan áreas de oportunidad en la planeación y programación de las rutas de distribución; al no utilizar herramientas robustas teóricas de apoyo se podrían generar: desabasto, retrasos en las entregas a los usuarios finales y altos costos para la institución. El objetivo de esta tesis es proponer el uso de un modelo de optimización para minimizar los costos de distribución de moneda metálica en México, que cuenta con diferentes puntos de entrega a nivel nacional. Se determinan los almacenes de origen requeridos, así como las rutas para cada vehículo minimizando los costos de distribución. Con base en los resultados obtenidos se considera que ésta tesis podría ser utilizada por otras instituciones bancarias y así apoyarse para la toma de decisiones.

Palabras clave: *moneda metálica, rutas de distribución, bancos, optimización, distribución de efectivo*

Abstract

Currently cash distribution experts know the importance of supporting decisions into an optimization model. Different enterprises and institutions design their distribution routes in an empirical way, without using robust theoretical tools that minimize transport costs and maximize levels of customer satisfaction. Particularly, in the case of the Bank of Mexico, the distribution of metallic coins is a fundamental process. However, there are areas of opportunity in planning and scheduling distribution routes, which could lead to coin shortage, delays in deliveries to end users generating high costs for the institution. The objective of this thesis is to propose the use of an optimization model for minimizing the cost of distributing metallic coins in Mexico, which has different delivery points all over the country. The number of the required origin warehouses are determined, as well as the routes for each vehicle, minimizing the distribution costs. Based on the results, this thesis is also considered relevant for other banking institutions to help in their decision making process.

Key words: *metallic coins, routing and distribution, banks, optimization, cash distribution*

Introduction

Cash logistics has gained great attention in the last 10 years, the growth in circulation of currency in the economy has led to the increase in need of cash logistics studies and researches. The principal studies are related to banknotes distribution and Automated Teller Machines (ATM's) replenishment. I consider that other common problematic in this area are metallic coin demand and in consequence the routing decisions to deliver it. Routing is an operational decision that can be dynamically modified many times in a short period of time, this decision are closely related and often influenced by transportation costs and viceversa.

This thesis is composed of the following chapters:

Chapter 1, A theoretical framework about cash, central banks and mints, the situation about the metallic coin distribution in some Central Banks and in the Mexican Central Bank are explained. Also here are presented the problem to solve and the general and specific objectives of the thesis.

Chapter 2, The Capacitated Vehicle Routing Problem with heterogeneous fleet: models and algorithms are reviewed.

Chapter 3, A model for minimizing the cost of distributing metallic coins in Mexico is explained.

Chapter 4, The results of executing the model are explained. Here, the data is validated in comparison with the empirical methodology used.

Chapter 5, In the conclusions I explained that *INDIGO Software* with their insertion methods, large neighbourhood search and constraint programming for solving real-world vehicle routing problems save time and have better results in comparison with the actual method used for routing in the Mexican Central Bank.

The views expressed here are those of the author and do not necessarily reflect the official view of the Mexican Central Bank (Banco de México).

Chapter 1

CENTRAL BANKS AND MINTS

Cash has benefits over other payment systems: it has no record, it does not require a bank account, it can be used in rural areas. In modern economy there are four key functions of money:

- Medium of exchange: money facilitates the sale, purchase or trade of goods between parties.
- Store of value: an asset that can be saved, retrieved and exchanged at a later time, and be predictably useful when retrieved.
- Unit of account: this refers to anything that allows the value of something to be expressed in an understandable way, and in a way that allows the value of items to be compared.
- Standard of deferred payment: this refers to the expressing of the value of a debt.

Cash must be universal, free-to-use, easy-to-use, reliable, difficult to counterfeit and fungible. Government by means of central bank policies must ensure that each citizen can participate in the economy. Until e-money technology will become reliable and universal, cash will still be required. Cash plays an important role considering that it is still the most common way of payment despite the appearance and spread of other payment methods. In the US cash circulation increased by 76% between 1990 and 2005 and according to projections made at the time, by 2010 the stock of cash circulating in the economy would reach 1000 billion USD. In the UK, 66% of household consumption were forecasted to be still paid for in cash in 2011 [Rajamani D., 2005]. Around the world, despite their misgivings, most consumers see the future of money as less cash and more card based. Only 27% think that, in 10 years, people will use a mix of payment types not very different from what we use today. In fact, a third of consumers globally think e-money will be the dominant payment method. But executives have a much more conservative vision. A surprising 40% of business leaders think the payment landscape in 10 years will look a lot like today's and just 5% think cash will be less prevalent three years from now. [OxfordEconomics, 2017] Similarly, in Mexico the payment methods that people use for their daily expenses in 2018 were: 91% uses the cash, 12% uses debit card, 4% uses credit card, and only 3% uses electronic transfers (SPEI) [Banxico, 2018d].

1.1 CENTRAL BANKS

Actually a central bank is a public financial institution, considered the highest monetary authority, which exists in most countries of the world. Generally it is an entity with autonomy and independence to the government in turn.

The definition suggested at: *Moneda, Banca y Mercados Financieros* [Mishkin, 2007] indicates that a central bank is the *government agency that monitors the banking system and is responsible for the amount of credit provided to the economy*. Unlike a commercial bank, central banks do not have people or companies as clients, the client is the state as well as the banks operating in private or public national territory. Also a central bank is the public entity responsible for ensuring that there are enough banknotes and coins in the economy, and in consequence transactions can be carried out.

The functions and objectives of the Central Banks depend on each country [Warjiyo P., 2019]. Among the main objectives are the following:

- **Maintain price stability through inflation control:** Price stability is understood as the lack of significant variations in the prices of an economy. The concept that opposes this is: inflation or deflation. Price stability is one of the basic components of a country's economic stability, in the sense that is the result of a balanced behavior in the economy. To define whether price stability exists, it is necessary to choose a certain price indicator and compare it with its evolution in the past to see if there are important changes or not. This measurement has a relative character, since it will depend on the chosen indicator, the period and the country.
- **Maintain exchange rate stability relative to other currencies:** The exchange rate is the price of one currency in terms of another. It is usually expressed in terms of the number of units of the national currency that must be delivered in exchange for a unit of foreign currency.
- **Achieve positive and sustainable economic growth:** Economic growth is the rate at which the production of goods and services in an economy increases, generally estimated through the movement of gross domestic product (GDP), which is the value at market prices of the final goods and services produced within a country during the reference period.
- **Moderate interest rates:** Bank interest rates are percentages that determine what is paid or what is charged. Loans, credit cards, deposits, are linked to a rate, which according to the product, for the bank is active or passive: the active one is the rate that it charges, and the passive one that pays.
- **Provide money to the national economy:** A central bank is responsible for issuing and circulating money.
- **Being the bank of banks and governments:** A central bank is not a commercial bank with clients, it is a government-dependent body that participates in the regulation of the money supply with various instruments such as rediscounts (loans granted by a central bank to the banks through full endorsement of effects or credit policies depending on the rediscount limit set for each entity), loans to commercial banks, reference interest rates.
- **Regulate and inspect payment systems:** A payment system is a set of instruments, banking procedures and, in general, interbank funds transfer systems that ensure the circulation of money. Payment systems are traditionally classified into two groups, high value and low value. There is a broad consensus for high value payment systems to be settled the same day, and the general practice is that payments are settled as soon as possible. Originally, these systems were developed to liquidate the financial markets, to settle the obligations that are generated

in other payment systems and for the financial intermediaries to liquidate their obligations, so the average amount of payments was very high. However, technological and financial advances have made it possible for financial intermediaries to offer the services of these systems to their clients for lower payments. On the other hand, a large number of payments are settled in systems with deferred settlement schemes, which are low value payment systems. Companies use these systems for commercial payments, to pay payroll and other payments that are not urgent or that can be pre-programmed. The average amount of payments is low.

- ***Design monetary policy:*** Monetary policy is the process by which a country's government, central bank or monetary authority controls the money supply (amount of money in circulation) and interest rates or cost of money (interest rate set by the central bank or monetary authority in the very short term) in order to achieve a set of objectives oriented towards the growth and stability of the economy. Monetary theory was developed in order to offer information on how to design an optimal monetary policy. Monetary policy is based on the relationship between interest rates in an economy, which is the basis for calculating the price at which money is lent by banks, and the amount of money in circulation. Monetary policy uses a variety of tools to control one or both of these, to influence results such as economic growth, inflation, exchange rates with other currencies and unemployment.

1.2 MINTS

Human civilizations have long used metals as a medium of exchange and later prepared the way for the activity of coinage. Coinage was not money yet, it was preceding it. Money shown up some six-seven centuries B.C. in Lydia (Turkey), and much later on, in the Roman Empire [Andrei, 2011]. When the Romans began to extend their empire they reaped the fruits of their conquests, including the achievements of the Greek culture, such as metal coin minting tradition to the whole Europe. Spain, which had already been conquered before by the Greeks continued the tradition and so it was taken to the recently discovered Americas [Banxico, 2018b]. In the American continent, the oldest Mint is the mexican, founded in 1535. The word *Mint* comes from the arabic *sikka* that means currency and die.

The functions and objectives of the Mints depend on each country. Among the main objectives are the following:

- *Design and produce coinage for circulation*
- *Design, produce and commercialize numismatic items*
- *Distribute coins*
- *Disbursing gold and silver for authorized purposes*
- *Safeguarding and controlling the movement of bullion*
- *Coin recycling and alloy recovery class of record*

1.3 MONEY SUPPLY

As in any supply chain, the velocity or frequency of cash handling, the cost of circulating cash, and the quality (fitness) of cash indicate the efficiency, resilience, and robustness of the cash supply chain. The structure of a cash supply chain is largely dictated by the policy of the central bank in that country. Traditionally, central banks are viewed as being responsible for all aspects of cash circulation: produce, issue, move, store, receive, sort, authenticate, and destroy. In response to the increase in Automated Teller Machines (ATM's), the rising demand for fit cash by businesses, and the overall increased use of cash within economies, the central banks of many countries have increased their capacities, and the cost of providing currency services has risen as well. This has led governments to promote various cash supply chain business models. These models are differentiated by the currency services offered by the central bank. Cash circulation is mainly driven by the demand for cash by customers for transaction purposes. The various business models adopted by different countries can be classified in three as shown in Table 1.1. Banks face the usual dilemma when setting their cash inventory level: they must hold a sufficient amount to meet customer demand at all times, but they also want to minimize the amount held, since cash in inventory generates a cost of lost opportunity. The demand for cash varies considerably within a week, within a month, and within a year, as well as varying between branch locations for a particular bank and between main offices of different banks. Some bank branch offices are net cash recipients, while others are net cash suppliers [Rajamani D., 2005].

[Geismar N., 2016] recently published a survey of research on currency supply chains. They classify problems from the perspective of commercial banks (demand-side) and from the perspective of the central bank (supply-side). Most of the demand-side studies develop models to manage commercial banks' inventory and logistics under the U.S. Federal Reserve's (FED) new guidelines, which were designed to encourage banks to be less dependent on the FED to provide currency services [Rajamani D., 2005]. Among the demand side papers, [Geismar N.,] develops a basic model to find optimal actions for large banks, [Mehrotra, 2010] considers how large banks should respond to the more advanced features of the FED's new guidelines, and [Zhu, 2011] analyzes the problem as it applies to medium-sized banks. There are only two works that could be considered supply-side. [Dawande M., 2010] propose coordination mechanisms for the U.S. cash supply chain. [Zhu, 2015] focus on the security concerns of a central bank in a developing country. In contrast, [Huang Y., 2016] addresses the Central Banks supply and logistics network nationwide.

Inventory-location models are another important stream of research related to location selection. Significant papers on this topic include [Nozick, 1998], [Nozick, 2001a], [Nozick, 2001b], [Daskin, 2002], [Shen, 2003], [Yao, 2010] and [Tancrez, 2012]. These analysis is not too deeply because inventory cost is not a concern in the supply of currency. Because all currency belongs to the Central Bank (a non-profit public entity) as it flows through the network and because the Central Bank considers only storage cost (no opportunity cost), the holding cost is constant and, thus, it is not a factor.

Type	Privatized	Semi-privatized	Centralized
Additional services	Production and destruction of currency	Balance sheet relief but no deposit facility	Recirculation, fit-sorting
Countries	Australia, South Africa	Canada, UK, Mexico	Germany, Poland, France

Table 1.1: Three types of Banknote Supply Chains. [Blacketer, 2004].

Different recirculation rules apply to banknotes and to coins as the features of these means of payment and the role they play in payment transactions are significantly different. Coins are made of metal, thus their life cycle is considerably longer than that of banknotes and the risk of counterfeiting is significantly lower due to their small value and their material. Banknotes are printed on special security paper made of cotton, they are much less durable than coins and they are more exposed to counterfeiting because of their high value. Thus the central bank sets considerably tighter rules for the recirculation of banknotes for the actors in the cash cycle. The genuineness and fitness of banknotes may be examined either using a banknote verification machine tested by the competent authority and satisfying legal criteria or through manual checking. Banknote handling machines can verify the genuineness of cash more efficiently than human staff, while the latter can determine compliance with sorting criteria more accurately. Some countries allow only machine-verified banknotes to be reissued through ATMs. Compliance with the banknote recirculation rules is continuously monitored by the central bank.

In this thesis the distribution of coins are studied, because coins have lesser value, the policies and challenges in dealing with them are very different, this distribution can not treated as the banknotes distribution. A coin supply chain also can be viewed as a closed-loop supply chain. I asked some central banks about the way they distribute coins, the questions I made were the following:

- Which distribution scheme do you currently use? (wholesale, retail or outsourced distribution)
- Do you have own transportaron or it is outsourced?
- Is the distribution centralized? or Have you many distribution centers?
- Is the currency distributed by central bank, from mint or from commercial banks?

The Table 1.2 shows some possible combinations of coins supply chain models:

Distribution scheme	Wholesale	Retail	Outsourced
Transportation	Own	Outsourced	Hybrid
Distribution centers	Centralized	Decentralized	Other facilities
Distributed by	Central Bank	Mint	Commercial banks

Table 1.2: Summary of possible combinations of Coins Supply Chain Models. Own elaboration 2019.

1.3.1 THE CASE OF UNITED STATES OF AMERICA

The United States Mint is responsible for producing coins and the Bureau of Engraving and Printing (BEP) produces currency notes. Both institutions must produce coins and currency in quantities sufficient to fulfill the needs of the public. The Federal Reserve's role in coin operations is more limited than its role in currency operations. As the issuing authority for coins, the United States Mint determines annual coin production and transports it from its production facilities in Philadelphia and Denver to all of the Reserve Banks, and from the Reserve Banks (Figure 1.1) to coin terminal locations. The Reserve Banks, however, influence the process by providing the Mint with monthly coin orders and a 12-month rolling coin-order forecast and distribute new and circulated coin to depository institutions to meet the public's demand. While the Reserve Banks store some coin in their vaults, they also contract with coin terminals, which are operated by armored carriers, to store, receive, and distribute coin on behalf of the Reserve Banks.

In a Depository Institution (DI) coin deposits are weighed by electronic scales that are located at Federal Reserve Offices and also at armored carriers facilities throughout the United States. Many Reserve Bank cash offices have entered into legal agreements with local armored carrier companies to serve as Federal Reserve off-site coin terminals to process DI's deposits and maintain inventories of verified coin. Unlike currency, there is no need to sort the coins according to fitness since coins are damaged very rarely. The average life of a coin is estimated to be 30 years. Generally, all coin accepted by the Federal Reserve System is weighed (at a Reserve Bank Office or by armored carriers) and redistributed to DI's when they place orders. The processing of entries for coin deposits and orders is identical to the process for currency. A DI's Federal Reserve account is credited for the amount of the coin deposit and/or debited for the amount of the coin order.

Since most US residents tend to accumulate coin for collection purposes, the Mint continues to produce between 10 and 20 billion coins per year to meet public demand. The U.S. Mint (Off-site) operates four minting facilities; however, only two - Denver, Colorado and Philadelphia, Pennsylvania - create the coins that are distributed by the Federal Reserve System. The two remaining minting facilities include the San Francisco Mint in California and the West Point Mint in New York. Both facilities manufacture various gold, silver and platinum numismatic proof, uncirculated and bullion coins, and annual proof clad and proof silver coin sets of the circulating coins.

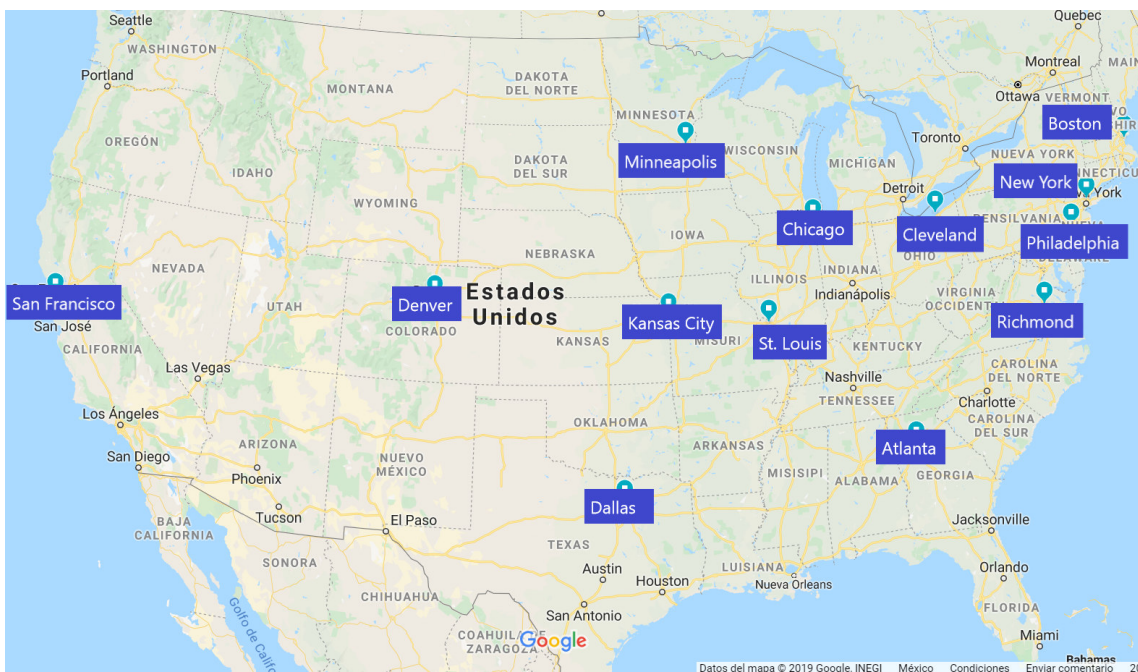


Figure 1.1: Banks of the Federal Reserve and United States Mint. Own elaboration 2019.

To assure smooth and sufficient flow of coins, the United States Mint continually revises its techniques for estimating coinage demands. In planning production and scheduling coin shipments, the United States Mint uses long-range economic indicators and historic seasonal trends such as Christmas to decide how many coins to manufacture. Experience has shown that forecasting coin demand cannot be done with absolute accuracy. This means that estimates must also include an amount sufficient to provide an inventory that would absorb any deviation that might occur. Armored carriers usually transport ten-cent coins, quarter-dollar coins and half-dollar coins, while tractor-trailer trucks transport one-cent coins and five-cent coins.

Federal Reserve banks arrange in advance to received new coin shipments for the coming year. They do this in amounts and on a time schedule to maintain their inventories at the required levels. Under this arrangement, the United States Mint can schedule its production schedule efficiently. Even with advance planning, there are occasions when coin shortages arise. The Federal Reserve banks must follow the advance shipping schedules. Except in an emergency, there are no provisions for obtaining additional coins.

Federal Reserve banks receive coins at face value because they are obligations of the United States Government. The Banks store the coins until they need to fill orders from the commercial banks in their district. The Federal Reserve banks fill these orders from their vault stocks of both new and circulated coins. Also, they fill the orders without regard to date or mint mark. Coin shipments leave the Federal Reserve banks by armored car, registered mail, or express. (Figure 1.2)

If a commercial bank has excess coins on hand, they may return the coins to the Federal Reserve bank. It then sorts the coins for fitness. They return badly worn or bent coins to the United States Mint, which melts them down and makes them into new coins. Also, the banks remove foreign and counterfeit coins from circulation. According to Federal Reserve sources, over 20 billion coins valued at well over \$2 billion pass through their coin processing units each year [UDT, 2019].

Coin terminals (179 across the United States) are owned and operated by 3rd Party Logistics Providers (3PLPs) at no charge to the FED; however, they do charge commercial banks for transporting and wrapping coins. The coin terminals function much like warehouses: they hold coins closer to the banks for easier replenishment. They are used in this supply chain because coins have much lower value density than do banknotes, so transportation costs are more significant relative to holding costs [Geismar and Zhu, 2017].

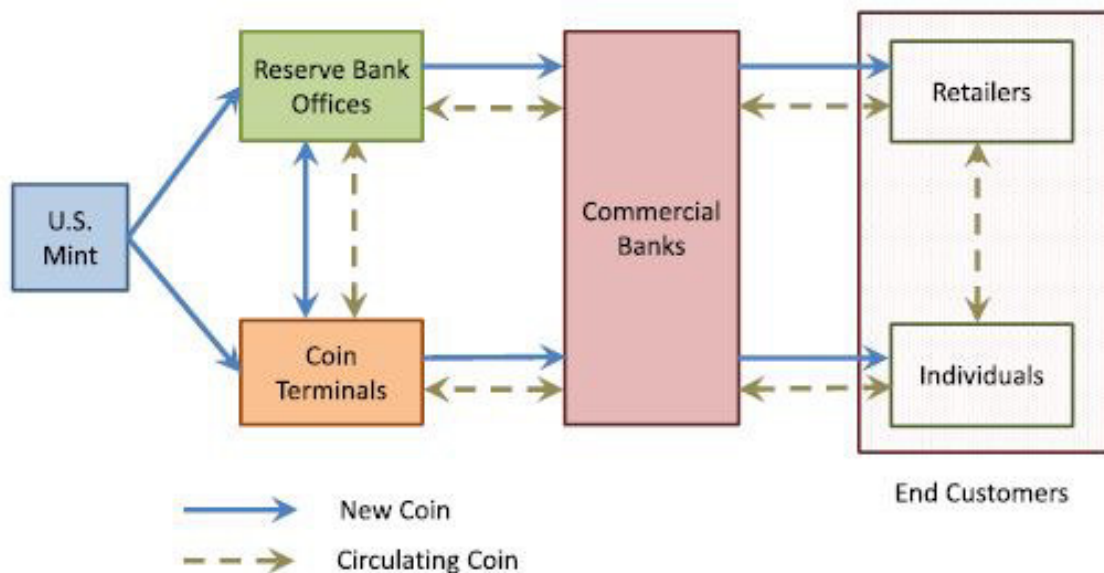


Figure 1.2: U.S. Coin Supply Chain and Flows of Coins. [Geismar and Zhu, 2017].

1.3.2 THE CASE OF CANADA

On January 2nd, 1908, the first national production coin, a fifty-cent coin, was put into production. The Royal Mint of Great Britain had a branch in Ottawa that was officially open to the public. The creation of the Royal Mint coincided with an era of growing gold production in the Yukon and British Columbia regions. A refinery was needed to carry out the complex work of bringing raw gold to coinage standards. The original refinery was completed in 1911, rendered distinguished service to the British Empire in World War I with the production of large amounts of gold bars which were used by Britain to pay its debts to other countries. In 1931, the building and the entire minting company passed into the hands of Canada, so the Mint thereafter is a fully Canadian institution. A new refinery resource, designed to meet any possible demand for many years, was built in 1936 to refine gold from mines and central banks around the world. In 1976, Mint opened a branch in Winnipeg, where current circulation currencies are produced, as well as currencies from other countries. Mint activities include the production and distribution of current currencies, the denominations are: 1c, 5c, 10c, 25c and 50c, as well as \$1 and \$2.

The Royal Canadian Mint (RCM) uses an outsourced distribution model with outsourced transportation. There are 23 distribution coin centres across the country. The RCM distributes to commercial financial institutions, and the financial institutions supply trade and commerce [RCM, 2019].

1.3.3 THE CASE OF CHILE

The Central Bank of Chile is mandated to ensure the normal functioning of internal payments. Thus, since its creation in 1925, the Bank has the exclusive power of issuing banknotes and coins, guaranteeing the timely provision of reliable and secure means of payment, a task that it delivers by delivering banknotes and coins to commercial banks from its facilities in Santiago, who in turn distribute the money within Santiago and to regions.

Thus, within its distribution scheme, the Central Bank of Chile receives the productions from the manufacturer and then enters them to its own distribution centers and then delivers them to Commercial Banks who make the distribution through their branches throughout the country. The cost of this distribution is absorbed by commercial banks. For this, outsourced transportation is used [BCC, 2019].

1.3.4 THE CASE OF PERU

The distribution of currency is carried out mainly through the companies of the financial system (ESF, for its initials in Spanish), which make withdrawals in currencies from their current accounts at the Central Bank and then distribute them through their operations with the public. These withdrawals are paid in boxes with coins. In addition, although it is not very significant in quantity, they exchange coins to the public in their windows. It is worth mentioning that the ESFs are obliged by the Central Bank to exchange bills and coins to the public at no cost. They deliver the coins in their facilities at no cost and the ESF distribute them assuming the cost of transportation and distribution. The transportation is outsourced for when the Central Reserve Bank of Peru take coins to their branches [BCR, 2019].

1.3.5 THE CASE OF INDIA

The currency chests are essentially extension of the Issue Department of the Royal Bank of India (RBI) set up at various places across the country to meet the currency requirements of the public. The Currency chests are storehouses of notes and rupee coins and are established at authorised

branches of public and private sector banks/Regional Rural Banks/Urban Co-op Banks. Though presently no currency chest is allowed to be opened with treasuries/sub-treasuries, there are some currency chests opened earlier with non-banking district treasuries and sub treasuries where the volume of transactions is of a sufficiently high order. The core central banking function of note issue and currency management is performed by the Reserve Bank through its 19 Issue Offices, a currency chest at RBI Kochi and a wide network of 4299 currency chests and 4040 small coin depots with banks [rbi, 2019].

1.3.6 THE CASE OF AUSTRALIA

The Australian distribution model best reflects a wholesale model. The Royal Australian Mint (RAM) have a contract in place for the provision of transport by a 3rd party (3PLP). The distribution is direct from their warehouse to their customers in the eight Australian capital cities: Queensland-Brisbane, New South Wales-Sydney, Australian Capital Territory-Canberra, Victoria-Melbourne, South Australia-Adelaide, Western Australia-Perth, Tasmania-Hobart and Northern Territory-Darwin. The currency is distributed from the Mint located in Canberra to the commercial banks [RAM, 2019].

1.3.7 THE CASE OF HUNGARY

The key processes of network operation is reviewed in [Bodi-Schubert A., 2012] and analyze the points of friction that can be identified between the actors following from the operating logic of the network. In Table 1.3, the actors, activities and resources are shown in a systematic layout.

Actor	Activity	Resource
Central bank	Following from its key network management role: – cash related strategic decision making; – issue of cash, strategic inventory management; – withdrawal and destruction of reject banknotes; – retreat from daily operative logistics: declining level of banknote recirculation and stock consolidation.	– Accumulated specific know-how; – centralized, modern operating infrastructure – Logistics Centre; – human infrastructure: shift towards the use of highly qualified expert resources; – IT system providing real time connection with network actors
Banks, post office	Control of network distribution and banknote recirculation by outsourcing material processes.	– Small number of human staff, primarily experts; – teller systems supporting internal distribution within the network, IT connection to Central Bank and service providers.
Cash logistics service providers	Activities expanding parallel with the shrinking role of the central bank: physical execution of material flow between network actors, banknote processing, recirculation and distribution in the branch and ATM networks of banks and the post office, as well as between corporate (retailer) customers.	– Operative know-how necessary for the performance and control of material flows; – extensive physical infrastructure: banknote and coin processing machines, facilities, security systems, transport equipment; – the majority of human resources work in operations; – IT connections with banks and the Central Bank
Enterprises, households	They “only” use the cash in their payment transactions. Larger retail chains and other retailers have typically outsourced their cash distribution to service providers.	Specifically cash-related resources entail retailers’ cash registers but such actors typically have no resources dedicated for this purpose.

Table 1.3: Actors, activities and resources of the network. [Bodi-Schubert A., 2012].

In the field of coin logistics, it has placed consolidation stocks with cash logistics service providers, which facilitates the equalization of the weekly and monthly seasonal fluctuations of demand for coins. Furthermore, in its business terms and conditions it has specified central bank availability that looks to assure maximum cooperation between the actors as the Central Bank is at the disposal of market actors only if the aggregate volume of their stocks fails to cover the actual demand. Under the market coin model introduced by the Central Bank from 2008 on in several steps, the Central Bank has set maximum and minimum stock levels for each service provider by denomination based on the historical demand figures of recent years. Furthermore, through its real time IT connection to cash logistics service providers, the Central Bank monitors the stock levels of each actor weekly, by denomination. If it finds that the coin withdrawal and/or lodgement demands it receives can be satisfied from the stocks held by market actors, it will reject the transaction and in its website it discloses in advance the availability of each denomination for the week concerned. Thus in practice, the central bank participates only in the balancing stocks between special seasonal periods (outflow before the summer and Christmas, increased back-flow early in the year), and it replaces coins “falling out” of circulation (approx. 50-60 million pieces/year). In any other case, the actors must manage their requirements through transactions among themselves.

1.3.8 THE CASE OF EUROPE

There are eight denominations of euro coins: 1, 2, 5, 10, 20 and 50 cents and 1 and 2 euros. All currencies have a common and a national side, which identifies the issuing country. The countries of the euro area are: Spain, Germany, Andorra, Austria, Belgium, Cyprus, Slovenia, Slovakia, Estonia, Finland, France, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Portugal, San Marino, Vatican City. The Treaty of the European Community grants the European Central Bank (ECB), since January 1st, 1999, the exclusive right to approve the volume of issuance of metallic currency that corresponds to the Member States. Currently 340 million people use the currency and the euro has become a symbol of European integration.

1.3.8.1 THE CASE OF PORTUGAL

All operations with banknotes and coins, from their production to their destruction, constitute the cash life cycle. Different entities are responsible for those operations, seeking to regulate the supply and demand of cash in a rational and efficient way. The main stages of cash life cycle are production, distribution, circulation, recirculation, sorting and destruction [[Sampaio, 2014](#)].

Banco de Portugal (BdP) receives coins from Portuguese mint and distributes them through its branches. Cash In Transit (CIT) companies, mandated by credit institutions (CI) withdraws, by wholesale, the amounts of coins they need and put them into circulation. The general public can also withdraw coins at BdP counters (small quantities).BdP has its own vehicles to do the distribution to its branches. Sometimes, for big transports, they outsource heavy trucks. They distinguish two situations: (i) coins distribution is centralized in their main branch for the CI and (ii) decentralized, in others branches, to the general public. Currency is distributed by the central bank and CI [[BdP, 2019](#)].

1.3.8.2 THE CASE OF SPAIN

In Spain, the manufacture of euro coins is carried out by the National Currency Factory and Timbre-Real Casa de la Moneda (FNMT) and it is the Bank of Spain that, on behalf of the Spanish State, puts into circulation and withdraws the Euro coins.

The number of euro coins with the Spanish national face manufactured for the launch of the euro was 7,085 million [BdE, 2019].

1.3.8.3 THE CASE OF ITALY

The Ministry of Economics issues coins by delivering them to Bank of Italy's local branches, then distributes coins from its local branches to banks, post offices, members of the public. Bank of Italy uses a retail method for distribution of coins to the public: individuals may change small amounts of cash from banknotes to coins and the other way round at Bank of Italy branches. Conversely, Bank of Italy uses a wholesale method for distributing coins to banks and post offices: in this case, coin withdrawals and lodgments are not carried out at the counter but in dedicated areas suited for facilitating loading/unloading operations of coin packages from/to trucks; a typical coin package withdrawn/lodged at Bank of Italy branches includes 180,000 pieces in case of the lowest denomination (0.01 euro) whereas 50,000 pieces in case of the highest denomination (2 euro). Commercial banks are allowed to deposit coins just in three branches located in the North, Center and South of Italy (Piacenza, Roma, Foggia) [BdI, 2019].

1.3.9 THE CASE OF MEXICO

In 1535, at the time the Viceroyalty of New Spain was officially established, the Viceroy Don Antonio de Mendoza received the foundation card of the Mint of Mexico (the first in America). The first pieces were stamped in April 1536. In the Mexican currency inscribed with the legend United Mexican States there have been numerous design changes, both in the national shield of the obverse and in the reverse, whose varied iconography continues to invite collectors to keep the national pieces. After the Revolution, the reprimand had to adapt to the new circumstances and needs of the country. In the Mexican people, since the colonial era the use of gold and, mainly, silver coins had taken root. However, because the equivalence between the value of gold and silver was disrupted, the government had the need to adapt the monetary law to new times and a torrent of currencies arose in which industrial metals began to predominate.

One of the aims of Mexican Central Bank is to supply domestic currency to the economy. To fulfill such mandate, in addition to printing banknotes and ordering the minting of coins by Casa de Moneda de México (Mexican Mint), an entity that is subordinate to the Ministry of Finance and Public Credit (SHCP, for its acronym in Spanish), a money supply system must be in place to guarantee the availability of cash (money) wherever and whenever, in the denominations and with the quality required by the general public. Mexican Central Bank, jointly with commercial banks and cash carrier companies, is responsible for the proper functioning of this distribution system. (Figure 1.3)

Coinage distribution begins at the Mexican Mint located in San Luis Potosí, México. From this location, coins are delivered to the Regional Cashiers. Cash carrier companies then transport by land the coins to their destination. It is the lawful duty of Mexican Central Bank to order coinage to the Mexican Mint and pay for this service. Since bank correspondents are not involved in the distribution of coins, coin requirements at the sites that do not have Regional Cashiers are met directly by Mexican Central Bank head offices through cash carrier companies that transport the coins to the requesting local banks. Bank requests are also handled directly by the Regional Cashiers [Banxico, 2018c].

The Central Mexican Bank is responsible for providing the currency in 86 destinations. The distribution is initially taken to 6 destinations, the Regional Cashiers (Figure 1.4): Guadalajara,

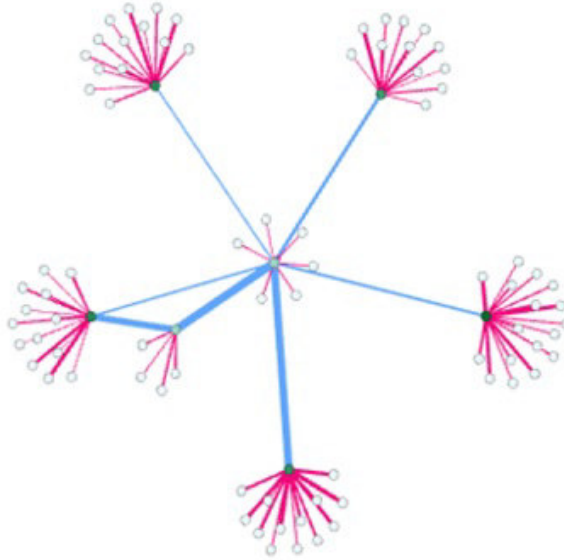


Figure 1.3: Mexican Coin Supply Chain, representation. Own elaboration 2017.

Hermosillo, Monterrey, Mérida, Veracruz and Mexico City. At these locations is where the commercial banks are directly attended, or, taking them the currency where they request it, within the 80 destinations located in all the country (Figure 1.5).

The currency is divided into 8 denominations: 20, 10, 5, 2, 1, 0.50, 0.20 and 0.10; each one has a different demand and behavior. The Credit Institutions that use the cash services: withdrawals and requests for metallic currencies in the Regional Cashiers or places where there are no one (which are detailed in Table 1.4), from the Cash Operations Circular, must first make sure that no credit institution located in the same place has surpluses. For all requests for metallic coins, the applications must be registered in the computer systems provided.

The Central Mexican Bank allocates an important part of its budget in determining the amount of metallic currency that must be minted each year and for distribution. For distribution in 2018, it were payed in total \$54,515,353.28 mexican peso of which \$30,771,540.54 correspond to the distribution services from Casa de Moneda de Mexico to the Regional Cashiers, and \$23,743,812.74 were charged to Credit institutions for their request of metallic coins, it means that when the Credit Institutions request the Mexican Central Bank to deliver metallic coins in places where there are no Regional Cashiers, the costs incurred for transporting and delivering will be payed by them. (Figure 1.6).

The distribution is carried out by adjusting the quantities to be sent depending on various aspects, among which we can mention:

- The seasonal behavior in each region and the variations in its demand.
- Circulation policies established by the central bank.
- Warehouse vault capabilities.
- Limited number of trucks per region.

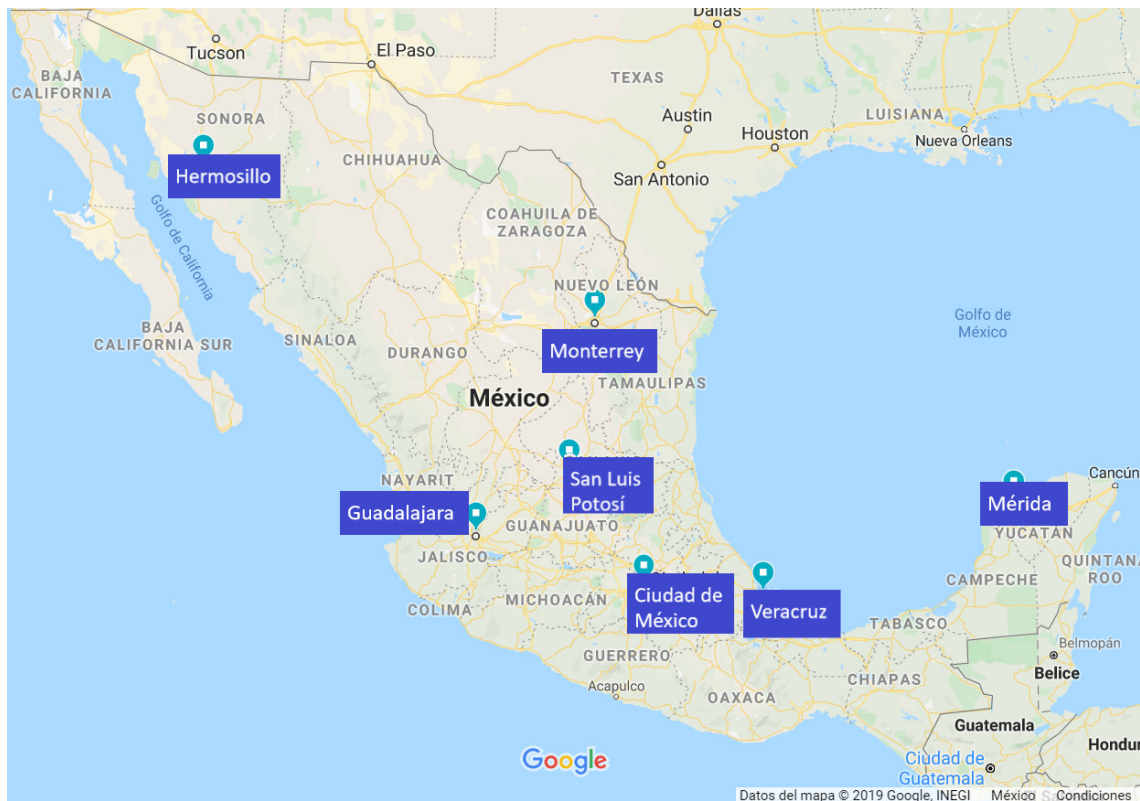


Figure 1.4: Regional Cashiers and Mexican Mint. Own elaboration 2018.

1.4 PROBLEM TO SOLVE

Propose a model for minimizing the cost of distributing metallic coins in Mexico, considering including the point at which it is manufactured (Mint), for the attention of the requests of the banking institutions located in 80 cities in Mexico, to make the distribution scheme more efficient.

1.5 GENERAL OBJECTIVE OF THE THESIS

Minimize the cost of distributing metallic coins, generating the efficient use of the economic and human resources destined for it and satisfying the demand of national currency, with the times and quality required by the society using Constraint Programming (CP), Large Neighbourhood Search (LNS) and Feature-based Insertion.

1.6 SPECIFIC OBJECTIVES OF THE THESIS

- Review of literature about routing models and algorithms.
- Development of the mathematical model to determine a feasible distribution routes between Regional Cashiers and the locations of the Commercial Banks where they need coins.
- Solve the model for minimizing the cost of distributing metallic coins using the *INDIGO* solver.
- Implement the model and perform an analysis of the results.



Figure 1.5: Peer-to-peer and banking places where the Mexican Central Bank directly deliver the needs of metallic coins. [Banxico, 2018a].

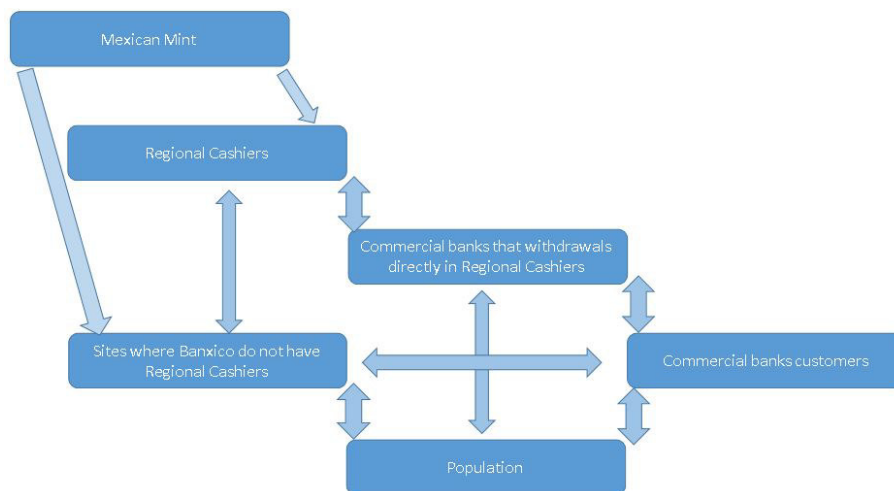


Figure 1.6: Transfer flow of metallic coins in Mexico. Own elaboration 2018.

Acapulco	Mazatlán
Aguascalientes	Mexicali
Apatzingán	Minatitlán
Campeche	Monclova
Cananea	Morelia
Cancún	Nogales
Celaya	Nuevo Laredo
Chetumal	Oaxaca
Chihuahua	Orizaba
Ciudad Acuña	Pachuca
Ciudad del Carmen	Parral
Ciudad Delicias	Piedras Negras
Ciudad Guzmán	Poza Rica
Ciudad Ixtepec	Puebla
Ciudad Juárez	Puerto Vallarta
Ciudad Mante	Querétaro
Ciudad Obregón	Reynosa
Ciudad Valles	Río Bravo
Ciudad Victoria	Sabinas
Coatzacoalcos	Salamanca
Colima	Salina Cruz
Córdoba	Saltillo
Cosamaloapan	San Luis Potosí
Cuernavaca	San Luis Río Colorado
Culiacán	Tampico
Durango	Tapachula
Ensenada	Tepic
Fresnillo	Tezihuitlán
Guamúchil	Tijuana
Guasave	Tlaxcala
Guaymas	Toluca
Iguala	Torreón
Irapuato	Tuxpan
La Paz	Tuxtla Gutiérrez
La Piedad	Uruapan
Lázaro Cárdenas	Villahermosa
León	Xalapa
Los Mochis	Zacatecas
Manzanillo	Zamora
Matamoros	Zihuatanejo

Table 1.4: Peer-to-peer and banking places where the Mexican Central Bank directly deliver the needs of metallic coins. [Banxico, 2018a].

Chapter 2

LITERATURE REVIEW

The distribution of goods, from deposits to end users, plays an important role in management logistics systems, so the correct planning can mean considerable savings. These potential savings largely justify the use of Operations Research techniques as facilitators of planning. The Vehicle Routing Problem (VRP) calls for the determination of the optimal set of routes to be performed by a fleet of vehicles to serve a given set of costumers, and it is one of the most important and studied combinatorial optimization problems. It is known to be an NP-hard problem. In 1959, Dantzig and Ramser introduced the problem describing a real-world application concerning the delivery of gasoline to service stations and proposed the first mathematical programming formulation and algorithm approach. A few years later, in 1964, Clarke and Wright proposed an effective greedy heuristic that improved on the Dantzig-Ramser approach. Since then multiple models, algorithms, packages were proposed for the optimal and approximate solution of the different versions of the VRP [Toth P., 2014]. Some real life complexities incorporated are: time dependant travel times, traffic congestion, time windows for pickup and delivery, demand information. As the VRP is an NP-hard problem, exact algorithms are only efficient for small problem instances. Heuristics and metaheuristics are often more suitable for practical applications, because real life problems are considerably larger in scale.

The success of the utilization of optimization techniques is due not only to the power of the current computer systems and to the full integration of the information systems into the operations and commercial processes, but it can also be attributed to the development of rigorous mathematical models, which are able to take into account almost all the characteristics of the VRP arising in real world applications.

[Toth P., 2014] propose the following generic verbal definition of the *family of vehicle routing problems*:

Given: A set of *transportation requests* and a *fleet* of vehicles.

The problem is then to find a plan for the following:

Task: Determine a set of *vehicle routes* to *perform* all (or some) transportation requests with the given fleet *at minimum cost*; in particular, decide which *vehicle handles which requests in which sequence* so that all *vehicle routes* can be *feasibly* executed.

The main objectives of the VRP are as follows:

- Minimize costs
- Minimize route length
- Balance (load, number of customers, route time)
- Maximize customer satisfaction
- Minimize the number of vehicles
- Maximize route capacity

2.1 TAXONOMY

The Vehicle Routing Problem and its variants have an important academic relevance. There are many classifications, in this thesis two classifications are cited.

The first classification was adapted by [De Jaegere N., 2013] from the suggested by [Eksioglu B., 2009]. They distinguished five main topics each with its own detailed categories and sub-categories:

1. Type of study
 - (a) Theory
 - (b) Applied methods
 - i. Exact methods
 - ii. Classical Heuristics
 - iii. Metaheuristics
 - iv. Simulation
 - v. Real-time solution methods
 - (c) Implementation documented
 - (d) Survey, review or meta-research
2. Scenario Characteristics
 - (a) Number of stops on route
 - i. Known (deterministic)
 - ii. Partially known, partially probabilistic
 - (b) Load splitting constraint
 - i. Splitting allowed
 - ii. Splitting not allowed
 - (c) Customer service demand quantity
 - i. Deterministic
 - ii. Stochastic
 - iii. Unknown
 - (d) Request times of new customers
 - i. Deterministic

- ii. Stochastic
 - iii. Unknown
 - (e) Onsite service/waiting times
 - i. Deterministic
 - ii. Dependent
 - iii. Stochastic
 - iv. Unknown
 - (f) Time window structure
 - i. Soft time windows
 - ii. Strict time windows
 - iii. Mix of both
 - (g) Time horizon
 - i. Single period
 - ii. Multi period
 - (h) Backhauls
 - i. Nodes request simultaneous pickups and deliveries
 - ii. Nodes request either linehaul or backhaul service, but not both
 - (i) Node/Arc covering constraints
 - i. Precedence and coupling constraints
 - ii. Subset covering constraints
 - iii. Recourse allowed
3. Problem Physical Characteristics
- (a) Transportation network design
 - i. Directed network
 - ii. Undirected network
 - (b) Location of addresses (customers)
 - i. Customer on nodes
 - ii. Arc routing instances
 - (c) Number of points of origin
 - i. Single origin
 - ii. Multiple origin
 - (d) Number of points of loading/unloading facilities (depot)
 - i. Single depot
 - ii. Multiple depots
 - (e) Time window type
 - i. Restriction on customers
 - ii. Restriction on depot/hubs
 - iii. Restriction on drivers/vehicle
 - (f) Number of vehicles
 - i. Exactly vehicles
 - ii. Up to vehicles
 - iii. Unlimited number of vehicles

- (g) Capacity consideration
 - i. Capacitated vehicles
 - ii. Uncapacitated vehicles
 - (h) Vehicle homogeneity (Capacity)
 - i. Similar vehicles
 - ii. Load-specific vehicles
 - iii. Heterogeneous vehicles
 - iv. Customer-specific vehicles
 - (i) Travel time
 - i. Deterministic
 - ii. Function dependent (a function of current time)
 - iii. Stochastic
 - iv. Unknown
 - (j) Objective
 - i. Travel time dependent
 - ii. Distance dependent
 - iii. Vehicle dependent
 - iv. Function of lateness
 - v. Implied hazard/risk related
 - vi. Other
4. Information Characteristics
- (a) Evolution of information
 - i. Static
 - ii. Partially dynamic
 - (b) Quality of information
 - i. Known (Deterministic)
 - ii. Stochastic
 - iii. Forecast
 - iv. Unknown (Real-time)
 - (c) Availability of information
 - i. Local
 - ii. Global
 - (d) Processing of information
 - i. Centralized
 - ii. Decentralized
5. Data Characteristics
- (a) Data used
 - i. Real-world data
 - ii. Synthetic data
 - iii. Both real and synthetic data
 - (b) No data use

The second classification cited is by [Toth P., 2014], their presentation mainly aims at introducing a classification perspective which may help in identifying the specific characteristics of a VRP that one wants to model and solve.

1. *The (road) network structure*: In the Capacitated Vehicle Routing Problem (CVRP), the transportation tasks are related to *points in space*, i.e., locations to which goods have to be delivered. When the points are modeled as vertices of a graph, the corresponding VRP is a so-called *node routing problem*. In contrast, the tasks in *Arc Routing Problems* are services to be performed on *street segments*, also called *connections* or *links*.
2. *The type of transportation requests*:
 - (a) Delivery and collection
 - (b) Simple visits and vehicle scheduling
 - (c) Alternative and indirect services
 - (d) Point-to-point transportation
 - (e) Repeated Supply
 - (f) Non-split and split services
 - (g) Combined shipment and multi-modal service
 - (h) Routing with profits and service selection
 - (i) Dynamic and Stochastic routing
3. *The constraints that affect each route individually*: Common to these so-called *intra-route constraints*, (also called *local constraints*) is that they can be checked once and individual route (the vertex sequence) is known, independently from what the other routes are.
 - (a) Loading
 - (b) Route length
 - (c) Multiple use of vehicles
 - (d) Time windows and scheduling aspects
4. *The fleet composition and location*: The fleet of vehicles are stationed at different depots and vehicles having different characteristics concerning capacity, costs, speed, and the ability to load material and access locations.
 - (a) Multiple Depot VRP
 - (b) Heterogeneous or mixed Fleet VRP
 - (c) Routing of trucks and trailers
5. *The inter-route constraints*: Also are called *global constraints*, where the feasibility of a solution depends on how the routes (and their schedules) are combined.
6. *The optimization objectives such as*:
 - (a) Single objective optimization
 - (b) Hierarchical objectives
 - (c) Multi-criteria optimization

2.2 MODELS

The result of the classification from [De Jaegere N., 2013] shows that in the last years the most used models in literature are:

- CVRP (Capacitated)
- VRPTW (Time Window)
- HVRP (Heterogeneous)
- MDVRP (Multi Depot)
- VRPPB (Backhauls)
- SDVRP (Split Deliveries)
- DVRP (Dynamic)
- PVRP (Periodic)
- VRPSD (Stochastic Demands)
- VRRSPD (Simultaneous Pickup and Delivery)
- OVRP (Open)
- TDVRP (Time Dependent)
- MCVRP (Multi-Compartment)
- CCVRP (Cumulative)

2.2.1 CAPACITATED VEHICLE ROUTING PROBLEM

The classical VRP, also known as the Capacitated VRP (CVRP), designs optimal delivery routes where each vehicle only travels one route, each vehicle has the same characteristics and there is only one central depot. The goal of the CVRP is to find a set of least-cost vehicle routes such that each customer is visited exactly once by one vehicle, each vehicle starts its route from the depot and ends in the depot, and the capacity of the vehicles is not exceeded.

The transportation requests consist of the distribution of goods from a single *depot*, denoted as point 0, to a given set of n other points, typically referred to as *customers*, $N = \{1, 2, 3, \dots, n\}$. The amount that has to be delivered to customer $i \in N$ is the customer's *demand*, which is given by a scalar $q_i \geq 0$. The *fleet* $K = \{1, 2, 3, \dots, |K|\}$ is assumed to be *homogeneous*, meaning that $|K|$ vehicles are available at the depot, all have the same capacity $Q > 0$, and are operating at identical costs. A vehicle that services a customer subset $S \subseteq N$ starts at the depot, moves once to each of the customers in S , and finally returns to the depot. A vehicle moving from i to j incurs the *travel cost* c_{ij} .

Also it can be structured using an undirected or directed graph. Let $V = \{0\} \cup N = \{0, 1, \dots, n\}$ be the set of *vertices* (or nodes). It is convenient to define $q_0 = 0$ for the depot. In the symmetric case, i.e., when the cost for moving between i and j does not depend on the direction, i.e., either from i to j or from j to i , the underlying graph $G = (V, E)$ is complete and undirected with edge set $E = \{e = \{i, j\} = \{j, i\} : i, j \in V, i \neq j\}$ and edge costs c_{ij} for $\{i, j\} \in E$. Otherwise, if at least one pair of vertices $i, j \in V$ has asymmetric costs $c_{ij} \neq c_{ji}$ then the underlying graph is a complete digraph $G = (V, A)$ with arc set $A = \{(i, j) \in V \times V : i \neq j\}$ and arc costs c_{ij} for $(i, j) \in A$. Note that $|E| = n(n+1)/2$ and $|A| = n(n+1)$ so that both graphs contain $O(n^2)$ links. Overall, a CVRP instance is uniquely defined by a complete weighted graph $G = (V, E, c_{ij}, q_i)$ or digraph $G = (V, A, c_{ij}, q_i)$ together with the size $|K|$ of the vehicle fleet K and the vehicle capacity Q .

A route (or tour) is a sequence $r = (i_0, i_1, i_2, \dots, i_s, i_{s+1})$ with $i_0 = i_{s+1} = 0$, in which the set $S = \{i_1, \dots, i_s\} \subseteq N$ of customers is visited. The route r has cost $c(r) = \sum_{p=0}^s c_{i_p, i_{p+1}}$. It is *feasible* if the capacity constraint $q(S) := \sum_{i \in S} q_i \leq Q$ holds and no customer is visited more than once, i.e., $i_j \neq i_k$ for all $1 \leq j < k \leq s$. In this case, one says that $S \subseteq N$ is a *feasible cluster*. A solution to a CVRP consists of $|K|$ feasible routes, one for each vehicle $k \in K$. The routes $r_1, r_2, \dots, r_{|K|}$ and corresponding clusters $S_1, S_2, \dots, S_{|K|}$ provide a *feasible solution* to the CVRP if all routes are feasible and the clusters form a partition of N . Concluding, the CVRP consists of two interdependent tasks:

- the partitioning of the customer set N into feasible clusters $S_1, \dots, S_{|K|}$;
- the routing of each vehicle $k \in K$ through $\{0\} \cup S_k$.

The latter task requires the solution of a *Traveling Salesman Problem* (TSP) over $\{0\} \cup S_k$. Both tasks are intertwined because the cost of a cluster depends on the routing, and the routing needs clusters as an input.

Basic notation: Let $S \subseteq V$ be an arbitrary subset of vertices. For undirected graphs, the *cut set* $\delta(S) = \{\{i, j\} \in E : i \in S, j \notin S\}$ (set $E(S) = \{\{i, j\} \in E : i, j \in S\}$) is the set of edges with exactly one (both) endpoint(s) in S . For directed graphs $G = (V, A)$, the *in-arcs* and *out-arcs* of S are defined as $\delta^-(S) = \{(i, j) \in A : i \notin S, j \in S\}$ and $\delta^+(S) = \{(i, j) \in A : i \in S, j \notin S\}$, respectively. It has become a standard to define $\delta(i) := \delta(\{i\})$ for singleton sets $S = \{i\}$ (similarly, $\delta^+(i)$ and $\delta^-(i)$). Moreover, $A(S) = \{(i, j) \in A : i, j \in S\}$ is the set of all arcs connecting vertices in S .

The model for directed CVRP, was introduced by Laporte, Mercure, and Norbert [Laporte G., 1986]. This is the model for directed graphs in the traditional notation:

$$\min \sum_{(i,j) \in A} c_{ij} x_{ij} \tag{2.1}$$

$$\text{s.t.} \quad \begin{aligned} \sum_{j \in \delta^+(i)} x_{ij} &= 1 \quad \forall i \in N, \\ \sum_{i \in \delta^-(j)} x_{ij} &= 1 \quad \forall j \in N, \end{aligned} \tag{2.2}$$

$$\sum_{j \in \delta^+(0)} x_{0j} = |K|, \tag{2.3}$$

$$\sum_{(i,j) \in \delta^+(S)} x_{ij} \geq r(S), \quad \forall S \subseteq N, S \neq 0, \tag{2.4}$$

$$x_{ij} \in \{0, 1\} \quad \forall (i, j) \neq A, \tag{2.5}$$

The objective 2.1 is the minimization of the overall routing costs. Constraints 2.2 state that in a route, each customer vertex is connected to two other vertices, which are its *predecessor* and *successor*. Similarly, constraints 2.3 ensure that exactly $|K|$ routes are constructed. Therefore, the depot has $|K|$ successor vertices and is connected to $2|K|$ customer vertices. If more vehicles than needed are available (i.e., $|K| > r(N)$), one can replace the equalities 2.3 with inequalities of type " \leq ". Note that a solution with $|K| = r(N)$ may have larger routing cost than one where more routes are allowed. In fact, fleet size minimization and routing cost minimization are conflicting objectives. However, by adding fixed costs for routes (altering the cost coefficients c_{0i}), both objectives can be integrated. Constraints 2.4 serve at the same time as *capacity constraints* and *Subtour Elimination Constraints* (SECs).

2.2.2 HETEROGENEOUS OR MIXED FLEET VEHICLE ROUTING PROBLEM (HFVRP)

In this variant of the VRP a *heterogeneous fleet* of vehicles are considered, each having a possibly different capacity and cost. The problem has been known since the early VRP literature, and it was first studied in detail by Golden et al. [Golden B., 1984]. An extensive survey on HFVRP, covering the main results until 2007, is given by Baldacci, Battarra, and Vigo [Baldacci R., 2008], also includes additional constraints such as time windows and multiple depots.

In the HFVRP, we have a set of n customers, each with a demand q_i and a fleet of vehicles made up of $|P|$ different vehicle types; i.e., the fleet K is partitioned into subsets of homogeneous vehicles $K = K^1 \cup K^2 \cup \dots \cup K^{|P|}$. Each vehicle type $p = 1, \dots, |P|$ has capacity Q^p , and may also have a fixed cost FC^p and a specific traveling cost c_{ij}^p along each arc of the graph modeling the road network. The following characteristics vary across different problems:

- The vehicle fleet may be either *limited*, i.e., at most $|K^p|$ vehicles of type p may be used, or *unlimited*, i.e., $|K^p| \geq n$ for all $p = 1, \dots, |P|$;
- The *fixed costs* FC^p of the vehicles may be either considered or ignored, i.e., $FC^p = 0$ for all $p = 1, \dots, |P|$;
- The routing costs on arcs may be *vehicle-dependent*, i.e., possibly different for each vehicle type, or *vehicle-independent*, i.e., $c_{ij}^{p_1} = c_{ij}^{p_2} = c_{ij}$ for all $p_1 \neq p_2$ and for all $(i, j) \in A$, or *site-dependent* when for each customer i , only a limited subset of vehicle types may be used, i.e., c_{ij}^p are equal to $+\infty$ for some $p = 1, \dots, |P|$.

The Table 2.1 summarize the different problem variants that are considered in actual literature. The variants with time windows are denoted by adding TW to the end of the acronym of the specific problem, those with multiple depot by adding MD at the beginning of the acronym, and those with backhauls by adding B at the end. All the problems described in the table are NP-hard, as they are generalizations of the *Capacitated VRP* (CVRP), which arises when only one vehicle type is present.

2.2.3 MULTIPLE DEPOT VEHICLE ROUTING PROBLEM (MDVRP)

This problem occur when the fleet of vehicles is homogeneous, but vehicles start and end their routes at different depots. Vehicle specific locations for beginning and terminating a route can easily be incorporated, in principle every vehicle $k \in K$ may have its own starting and end locations. However, in the MDVRP groups of vehicles are assigned to a smaller number of depots. Depots may have a limited capacity and host a limited or an unlimited subfleet.

Acronym	Problem Name	Fleet Size	Fixed Costs	Routing Costs
HVRPFD	Heterogeneous VRP with Fixed Costs and Vehicle-Dependent Routing Costs	Limited	Considered	Dependent
HVRPD	Heterogeneous VRP with Vehicle-Dependent Routing Costs	Limited	Ignored	Dependent
FSMFD	Fleet Size and Mix VRP with Fixed Costs and Vehicle-Dependent Routing Costs	Unlimited	Considered	Dependent
FSMD	Fleet Size and Mix VRP with Vehicle-Dependent Routing Costs	Unlimited	Ignored	Dependent
FSMF	Fleet Size and Mix VRP with Fixed Costs	Unlimited	Considered	Independent

Table 2.1: Summary of Heterogeneous VRP variants presented in the literature. [Toth P., 2014].

2.3 ALGORITHMS

The result of the classification from [De Jaegere N., 2013] shows that in the last years the most used algorithms (first the most used) in literature are:

- Metaheuristics
- Classical Heuristics
- Exact Methods
- Simulation
- Real-time solution methods

2.3.1 METAHEURISTICS

Current metaheuristics for the VRP can broadly be classified into local search methods and population-based heuristics. Local search methods explore the solution space by moving at each iteration from a solution to another solution in its neighborhood [Toth P., 2014]. These include:

- *Local Search Algorithms*: Start from an initial solution x_1 and move at each iteration t from the current solution x_t to another solution x_{t+1} in its neighborhood $N(x_t)$. If $f(x)$ denotes the cost of x , then $f(x_{t+1})$ is not necessarily less than $f(x_t)$. Care must therefore be taken to avoid cycling, examples of these algorithms are:
 1. Simulated annealing (SA)
 2. Deterministic annealing (DA)
 3. Tabu search (TS)
 4. Iterated local search (ILS)
 5. Variable neighborhood search (VNS)
- *Population-Based Algorithms*: These algorithms take their inspiration from natural concepts, implement a high-level guidance strategy based on different memory structures, such as neural networks, pools of solutions represented as chromosomes, or pheromone matrices. Most of the population-based methods in the VRP literature are thus inherently hybrid.
 1. Ant Colony Optimization (ACO)
 2. Genetic Algorithms (GA)
 3. Scatter Search (SS) and Path Relinking (PR)

4. Neural Networks

- *Hybridizations*: Because of recent research progresses [Toth P., 2014] propose the following:
 1. Population-Based Search and Local Search
 2. Meta-Meta Hybridizations
 3. Hybridizations with Large Neighborhoods
 4. Hybridizations with Mathematical Programming Solvers
 5. Paralell Algorithms
 6. Decompositions or Coarsening Phases
 7. Diversification vs. Intensification
- *Unified Algorithms*: This are proposed because of the large number of new vehicle routing variants with additional constraints, objectives, and decision variables, called *attributes* as: fuel consumption optimization, turn penalties, time-dependent or flexible travel times, multiple compartments, and consistency.

2.3.2 HEURISTICS

The history of VRP heuristics is as old as the problem itself, the evolution of VRP heuristics over the past 10 years has taken place, almost exclusively, within the context of metaheuristics. Some of the principal are:

1. The Clarke and Wright Savings Heuristic: The Clarke and Wright savings algorithm is the first and the most well known heuristic for the VRP problem. It was first presented in [Clarke G., 1964] and it has since been successfully applied to the case where one tries to minimize the number of vehicles used. It is based on the notion of *savings*. Initially, the solution consists of n back and forth routes between the depot and each customer. Then during every iteration, two routes (d, \dots, c_i, d) and (d, \dots, c_j, d) are merged into a single route (d, \dots, c_i, c_j, d) whenever that is feasible. This merge then generates a saving of $s_{ij} = c_{dj} - c_{ij}$.
2. Petal Algorithms
3. $\lambda - OPT$ exchanges
4. Relocate
5. Swap
6. Adaptative Large Neighborhood Search (ALNS)

2.3.3 EXACT ALGORITHMS

The CVRP is an extension of the well-known *Traveling Salesman Problem*, *TSP*, calling for the determination of a Hamiltonian circuit with minimum cost visiting exactly once a given set of points. Therefore, the foundation of many exact approaches for the CVRP were derived from the extensive and successful work done for the exact solution of the TSP. However, even it is tremendous progress has been made with respect to the firsts algorithms, the CVRP is still far from being satisfactorily solved. The main approaches used are:

1. Branch-and-Bound Algorithms
2. Early Set Partitioning Algorithms
3. Branch-and-Cut Algorithms

2.3.4 CONSTRAINT PROGRAMMING

Constraint optimization, or constraint programming (CP), is the name given to identifying feasible solutions out of a very large set of candidates, where the problem can be modeled in terms of arbitrary constraints. CP problems arise in many scientific and engineering disciplines. Here, "programming" refers to the arrangement of a plan, rather than programming in a computer language.

CP is based on feasibility (finding a feasible solution) rather than optimization (finding an optimal solution) and focuses on the constraints and variables rather than the objective function. In fact, a CP problem may not even have an objective function, the goal may simply be to narrow down a very large set of possible solutions to a more manageable subset by adding constraints to the problem. CP is a relatively new field, but has a widespread and very active community around the world with dedicated scientific journals, conferences, and an arsenal of different solving techniques. CP has been successfully applied in planning, scheduling, and numerous other domains with heterogeneous constraints.

CP offers a language for representing problems (decision variables and constraints on variables). Also offers techniques for solving the problems (systematic search and heuristic search). Variables are represented by their domain, constraints link variables. Propagators enforce constraints.

Advantages:

1. Expressive language for formulating constraints
2. Each constraint encapsulated
3. Constraints interact naturally
4. CP is declarative therefore description of a problem to be solved can be concentrated upon without supposing the specific method to solve a problem.
5. CP can become the frame for constructing the system that can use various solutions appropriately.

Disadvantages:

1. Can be slower: The approach with searching in a wide area makes the efficient search by solving constraint, but the cost of time and space for getting a solution may be too great.
2. Difficulty in representation: what CP is declarative means that the operation cannot be expected only by seeing a program. CP cannot operate after writing like Procedure-oriented Language does. Furthermore declaratively writing is not easy to write at any time.

Chapter 3

PROPOSAL DEVELOPEMENT

The model proposed to solve the mentioned problem in Chapter 1 is *Capacitated Multi Depot Vehicle Routing Problem with Heterogeneous Fleet* based on the papers: [Ropke S., 2006] and [Kilby P., 2011] because this heuristic can be extended to solve a variety of vehicle routing problems in real life.

3.1 THE DISTRIBUTION PROBLEM

We want to supply coins to n commercial banks (customers). Each customer i specifies the location for service l_i , and the quantity of coins required q_i . A fleet of m vehicles are available to perform deliveries. Each vehicle k has capacity Q_k . We have the cost of travel between each pair of customers c_{ij} . In the most basic form of the problem, we want to find a set of routes, one for each vehicle, such that customer requests are satisfied at minimum total cost, subject to the constraint that the total quantity of deliveries assigned to each truck does not exceed the truck capacity. The problem is NP hard as it contains the traveling salesman problem as a special case. The objective is to use this method for finding good but not necessarily optimal solutions to the problem described above.

3.2 THE VRP MODEL

The VRP model proposed by [NICTA, 2013] to solve the problem heuristically is:

A vehicle routing problem

- n customers (fixed in this model)
- m routes (fixed in this model)
- fixed locations
 - where things happen
 - one for each customer and one for each depot
- c commodities (weight)
 - Known demand from each customer for each commodity
- Known distance between each location pair

- Known cost between each location pair
 - Both obey triangle inequality

We have to consider that:

- A solution is made up of routes (one for each vehicle)
- A route is made up of a sequence of visits
- Some visits serve a customer (customer visit)
- Each route has a “start visit” and an “end visit”
- Start visit is first visit on a route – location is depot
- End visit is last visit on a route – location is depot
- Also have an additional route – the unassigned route (where visits live that cannot be assigned)

Customers

- Each customer has an index in $N = \{1..n\}$
- Customers are ‘named’ in CP by their index

Routes

- Each route has an index in $M = \{1..m\}$
- Unassigned route has index 0
- Routes are ‘named’ in CP by their index

Visits

- Customer visit index same as customer index
- Start visit for route k has index $n + k$; as $start_k$
- End visit for route k has index $n + m + k$; as end_k

Sets

- $N = \{1..n\}$ – customers
- $M = \{1..m\}$ – routes
- $R = M \cup \{0\}$ – includes ‘unassigned’ route
- $S = \{n + 1..n + m\}$ – start visits
- $E = \{n + m + 1..n + 2m\}$ – end visits
- $V = N \cup S \cup E$ – all visits
- $V^S = N \cup S$ – visits that have a sensible successor
- $V^E = N \cup E$ – visits that have a sensible predecessor

Input Data

- V_i The 'value' of customer i
- D_{ik} Demand by customer i for commodity k
- E_i Earliest time to start service at i
- L_i Latest time to start service at i
- Q_{jk} Capacity of vehicle j for commodity k
- T_{ij} Travel time from visit i to visit j
- C_{ij} Cost of travel from i to j

Successor variables: s_i

- s_i gives direct successor of i
- $s_i \in V^E$ for i in V^S $s_i = 0$ for i in E

Predecessor variables p_i

- p_i gives the index of the previous visit in the route
- $p_i \in V^S$ for i in V^E $p_i = 0$ for i in S
- Redundant – but empirical evidence for its use

Route variables r_i

- r_i gives the index of the route (vehicle) that visits i
- $r_i \in R$

Accumulation variables

- q_{ik} Quantity of commodity k after visit i
- c_i Objective cost getting to i

For problems with time constraints

- a_i Arrival time at i
- t_i Start time at i (time service starts)
- d_i Departure time at i

Minimize:

$$\text{Minimize : } \sum_{i \in E} c_i + \sum_{i|r_i=0} v_i \quad (3.1)$$

$$\text{Path } (S, E, \{s_i \mid i \in V\}) \quad (3.2)$$

$$\text{All Different } (\{p_i \mid i \in V^E\}) \quad (3.3)$$

$$\text{Accumulate obj. } c_{S_i} = c_i + C_{i,S_i} \quad \forall i \in V^S \quad (3.4)$$

$$\text{Accumulate time } a_{S_i} = d_i + T_{i,S_i} \quad \forall i \in V^S \quad (3.5)$$

$$\text{Time windows } t_i \geq a_i \quad \forall i \in V \quad (3.6)$$

$$t_i \leq L_i \quad \forall i \in V \quad (3.7)$$

$$t_i \geq E_i \quad \forall i \in V \quad (3.8)$$

$$t_i = 0 \quad \forall i \in S \quad (3.9)$$

$$\text{Load } q_{S_i k} = q_i k + Q_{S_i k} \quad \forall i \in V^S, k \in C \quad (3.10)$$

$$q_i k \leq Q_{r_i k} \quad \forall i \in V, k \in C \quad (3.11)$$

$$q_i k \geq 0 \quad \forall i \in V, k \in C \quad (3.12)$$

$$q_i k = 0 \quad \forall i \in S, k \in C \quad (3.13)$$

$$\text{consistency } S_{p_i} = i \quad \forall i \in V^S \quad (3.14)$$

$$p_{S_i} = i \quad \forall i \in V^E \quad (3.15)$$

$$r_i = r_{S_i} \quad \forall i \in V^S \quad (3.16)$$

$$r_{n+k} = k \quad \forall k \in M \quad (3.17)$$

$$r_{n+m+k} = k \quad \forall k \in M \quad (3.18)$$

3.3 A CP SOLUTION

To solve the problem, I decide to use a software called *INDIGO*, this software is a VRP solver and it was developed at NICTA (National ICT Australia Ltd, Australia’s Information and Communications Technology Research Centre of Excellence).

3.3.1 THE INDIGO SOLVER

INDIGO builds the solution in two phases. During phase one, a feasible solution is constructed using the Clarke’s Savings Method and during phase two a Local Search Algorithm is used to improve on the solution. The improvement phase uses the Large Neighborhood Search (LNS) metaheuristic and insertion methods that build a solution by inserting one visit at a time into an emerging route set. INDIGO internally uses a Constraint Programming (CP) framework to model the problem as a variable assignment problem. Combining this CP representation allows INDIGO to effectively prune large sections of the unfeasible search space. Using CP as the underlying model allows INDIGO to be very flexible in modeling the side constraints of the classical VRP. One can easily extend INDIGO to handle much more expressive VRP variants.

Constraint programming can introduce an expensive overhead to handle some constraints. For instance, if a capacity constraint is tied to the variable which indicates the route to which the visit is assigned, then each time that variable is altered, or any time the load changes on any route which is within the domain of that variable, then the capacity constraint will be re-checked. This will ensure correct operation, but can lead to much redundant checking.

For this reason, the *INDIGO* solver has two “classes” of constraint. The first class of constraints (called “native” in this context) include all the constraints of the General Vehicle Routing Problem [Goel A., 2008]:

- Capacity constraints (across multiple commodities but with fixed capacity for each commodity)
- Usage constraints, that limit the total usage of resources such as time and distance accumulated during each run.
- Time window constraints, specifying earliest and latest start time.
- Pickup-and-Deliver constraints, enforcing precedence and same-route constraints between a pair of visits.
- Request/Request compatibility constraints specify that some pairs of visits cannot be assigned to the same route, or that they must be assigned to the same route and Request/Vehicle compatibility constraints are similar, but they specify that some requests must be carried by a particular vehicle or must not be carried by a particular vehicle.

Native constraints are handled very efficiently by the system with minimal interaction with the Constraint Programming system. Any decision made by the solver is guaranteed to observe all of the native constraints. However, additional side constraints can be specified and handled using the CP system.

INDIGO relies on local search methods to improve an initial solution. Large Neighbourhood Search (LNS) [Shaw, 1997] is a local search procedure where part of a solution is destroyed, and a then a new solution created by finding new values for the freed variables. This method uses exactly the sort of incremental solution building method that can exploit propagation in CP to guide the

solution towards good, feasible solutions. The *INDIGO* solver draws on the work of Ropke and Pisinger [Ropke S., 2006]. Like that work, it uses insertion methods to create an initial solution, and then again to repair the solution in each iteration of LNS.

The LNS algorithm can be given as follows:

1. Create initial solution S
2. Choose a destroy method d
3. Create S' by removing customers from S according to method d
4. Choose an insert method i
5. Create solution S'' from S' by inserting customers according to method i
6. If the acceptance method accepts solution S''
7. Replace S with S''
8. If iterations remain, return to line 2

This method is characterised by:

- The destroy methods available at line 2
- The insert methods available at line 4
- The acceptance methods available at line 6
- The number of iterations available at line 8.

Insertion methods proceed by repeating two stages: First, among all unassigned visits, the best position to insert each is selected. Then, the visit which is to be inserted is chosen. The visit is then inserted in its best position. [Solomon, 1987] seems to be the first to suggest this two score system. The best insert position for each still-unassigned visit is then updated. The method can then iterate until all visits have been assigned a position.

In [Kilby P., 2011] are described several criteria, or “features” which can be used in either choosing where to insert a visit, or choosing the visit to insert. Each criteria is described below. The degree to which a particular feature is present is rated on a score of 0 to 1, with 0 meaning “not present”, and 1, “present”. Along with each feature, the “base” value which is used to normalize the value is also given. If *reversed* is specified, then $(1 - val)$ is returned, rather than val . The following symbols are used in the description below. The visit v is to be inserted between p and s on vehicle k . The cost of insertion is $c' = c(p, v) + c(v, s) - c(p, s)$.

- **Route domain** Favour visits with few feasible routes. Val is number of routes v can be feasibly inserted into. Base is total number of routes. Reversed.
- **Num ins pos** Favour visits with few feasible insert positions. Val is the number of feasible insert positions. Base is number of assigned visits. Reversed
- **Distance to depot** Favour visits far from a depot. Val is distance to the closest route start or end. Base is max dist to route start or end.
- **Value** For use in prize-collecting problems, favours inserting high-value visits first. Value is prize-value of the visit. Base is max prize-value over all visits.
- **Load** Favour largest load first. Value is load. Base is max vehicle capacity

- **Nearest neighbour** Encourages v to be inserted near its neighbours. Val is $\min(c(p, v), c(v, s))$. Base is distance to v 's 10th-nearest neighbour. Reversed. Normalised
- **Min insert cost** Cheapest insert first. Value is c' . Base is twice the average insert cost. Ave insert cost is (Total cost of inserted visits) / (number of inserted visits). Reversed. Normalised
- **Max insert cost** Reverse of above. Calculated same way, but not reversed.
- **Regret, 3-Regret, 4-Regret** Base is same as Minimum insert cost. Normalise
- **Rand** Randomise slightly. Val is a uniform-random number in $[0,1)$.
- **Time Window width** Encourages smallest time window to be inserted first. Val is width of v 's time window. Base is max of time window widths. Reversed.
- **Time Window end** Encourages visit with latest time window to be inserted first. Val is the end time of the last time window. Base is max time window end.
- **Wait time** Encourages vehicles not to arrive at a location before the start time window (as the vehicle must then wait for the time window to open). Val is the time the vehicle must wait at v before service starts. Base is (Last time window) / 10. Reversed.
- **Pickup Late, Deliver early** Encourages vehicle to do deliveries at a location before doing pickups.
- **Lost slack** Encourages spare time to be preserved. Val is how much "spare time" (difference between arrival time and time window end) is lost at s . Base is max time window width. Reversed. Normalised
- **Fill vehicle** Used when problem has a bin-packing flavour, and favours inserts that fill the vehicle. Value is spare capacity after insert. Base is max capacity. Reversed.
- **Balance routes** Encourages routes to have similar length, as measured by difference between shortest and longest route. Penalize adding to longest route, and reward adding to shortest.

CP is "natural" for solving vehicle routing problems because:

- Real problems often have unique constraints
- Easy to change CP model to include new constraints
- New constraints don't change core solve method
- Infrastructure for complete search in subproblems

LNS is "natural" for CP because Insertion leverages propagation

3.4 OTHER SOFTWARE TOOLS

With the progress of computer hardware and optimization software, better algorithms and implementations for the VRP emerge every year. The current computational reach of exact algorithms for the VRP is limited to 200 customers for the most studied basic variants of the VRP, e.g. the column-and-cut generation algorithm of [Baldacci, 2011], and decreases significantly for more realistic variants that include features such as a heterogeneous fleet or distance constraints. On the other hand, state-of-the-art metaheuristic algorithms e.g. Adaptive Large Neighborhood Search [Ropke S., 2006], Iterated Local Search [Subramanian, 2010], and Unified Hybrid Genetic Search [Vidal, 2014] can handle much larger instances and detailed operational constraints but cannot offer a mathematical guarantee of performance. As stated in the introduction, many commercial and free solvers exist for the VRP. A recent survey [Partyka, 2014], based on the answers to a questionnaire by 15 software vendors, have provided a number of characteristics of available VRP software packages. More recent surveys [Braysy, 2014] list a number of commercial and free VRP software packages, the latter including VRP Spreadsheet Solver, and provide features required of VRP software packages. In [Toth P., 2014] there are critical reviews of many variants of the VRP and the associated solution algorithms.

3.4.1 VRP Simulator

To solve Vehicle Routing Problems with Time Windows the current version supports the following heuristics, see 3.1.

- Nearest Neighbor Heuristic [Solomon 1987]
- Nearest Neighbor Heuristic [Gambardella et al. 1999]
- Nearest Neighbor Heuristic [Ellabib et. al. 2002]
- INTRA-EXCHANGE [Taillard et al. 1997]
- CROSS-EXCHANGE [Taillard et al. 1997]
- MACS-VRPTW [Gambardella et al. 1999]

3.4.2 VRP Spreadsheet Solver

The VRP Spreadsheet Solver that overcomes the problems stated above through the familiarity of its interface, ease of use, flexibility, and accessibility. Microsoft Excel is arguably the standard software for small to medium scale quantitative analysis for businesses, many software packages have built-in functionality to exchange information with Excel, which eases the integration of the solver. The code for the solver, developed using Visual Basic for Applications (VBA), is open-source and can be understood and modified by medium-level programmers. VRP Spreadsheet Solver has built-in functions to query a GIS web service, from which the distances, driving times, and maps can be retrieved. The solver is available for download on an academic website at no cost [Erdogan, 2017].

VRP Spreadsheet Solver can solve more than 64 variants of the VRP, based on features related to selective visits to customers, simultaneous pickups and deliveries, time windows, fleet composition, distance constraint, and the final destination of the vehicles. Some of these variants are relevant in practice but have not been formally studied. VRP Spreadsheet Solver can hence provide a starting point and a benchmark result for future studies on such problems.

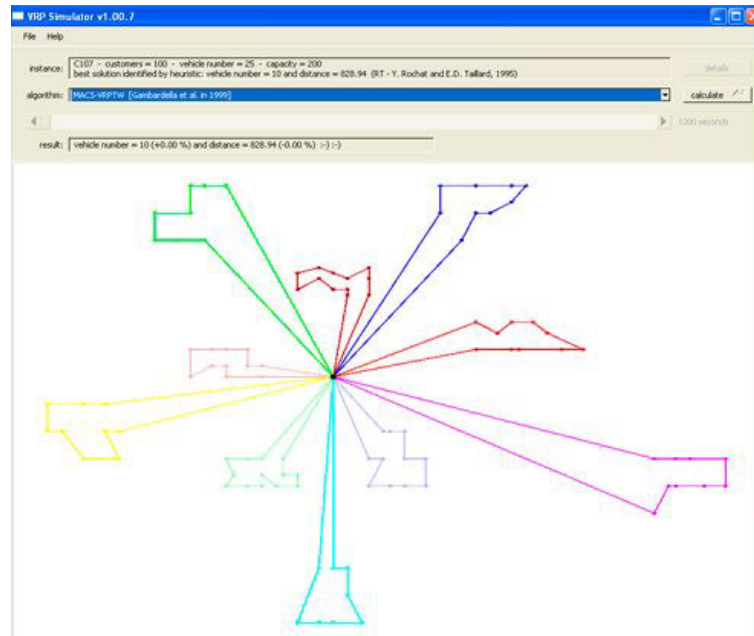


Figure 3.1: VRP Simulator (v1.00.7).

VRP Spreadsheet Solver keeps the data about the elements of a VRP in separate worksheets, and adopts an incremental flow of information. The worksheets are: 1.Locations, 2.Distances, 3.Vehicles, 4.Solution, and 5.Visualization. Figure 3.2 depicts the information flow between the spreadsheets, where the arrows signify the dependence of a worksheet on another worksheet. To guide the user about which cells of a spreadsheet to work on, creators adopted the following color scheme. The cells with a black background are set by the worksheets and should not be modified. The cells with a green background are parameters or decisions to be set by the user. The cells with a yellow background are to be computed by the worksheets, but they can be edited by the user for what-if analysis. The cells with an orange background signal a warning, e.g. a vehicle arriving before the beginning of the time window of a customer. The cells with a red background signal an error, e.g. a vehicle violating the capacity constraint.

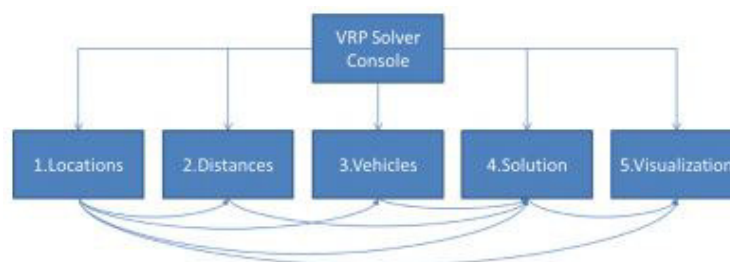


Figure 3.2: Spreadsheet structure of VRP Spreadsheet Solver. [Erdogan, 2017].

3.4.3 Grafos

Grafos is a software for the construction, editing and analysis of graphs. This software aims to be useful for teaching and learning graph theory, and other related disciplines such as industrial organization engineering, logistics and transportation, operational research, network design, etc. Graphs can be used perfectly for modeling and solving real problems of a certain size and complexity. The philosophy of Grafos is the following: "draw, model, solve and analyze". This is intended to give the user absolute freedom to deal with the graph problems. The user have freedom to draw the graph without worrying about the analysis or algorithm you will use later. Grafos will notify you in case of non-feasibility or any other requirement for a particular analysis. Figure 3.3

A graph represents a model of a business reality in the form of a network. This model can be analyzed from different points of view thanks to the algorithms and functions incorporated in the Grafos software. The program allows the construction and edition of graphs in tabular or graphic mode. Export the graph to different graphic and XML file formats. Contemplate minimum, maximum and cost values in the arcs; and cost in the nodes. Directed graphs, with arcs on the same node, etc. In addition, the program has a class structure and .dll libraries with graph theory resolution algorithms: Dijkstra, Bellman-Ford, Kruskal, Prim, Ford-Fulkerson, Floyd-Warshall, transshipment problems, transportation, merchant traveler TSP and m-TSP, allocation problems, route design (VRP), CVRP, etc. to solve problems of: minimum / maximum tree - minimum / maximum path - critical path, minimum path between all pairs of nodes, minimum / maximum total cost tree, maximum flow, maximum flow at minimum cost, allocation and routes, etc.

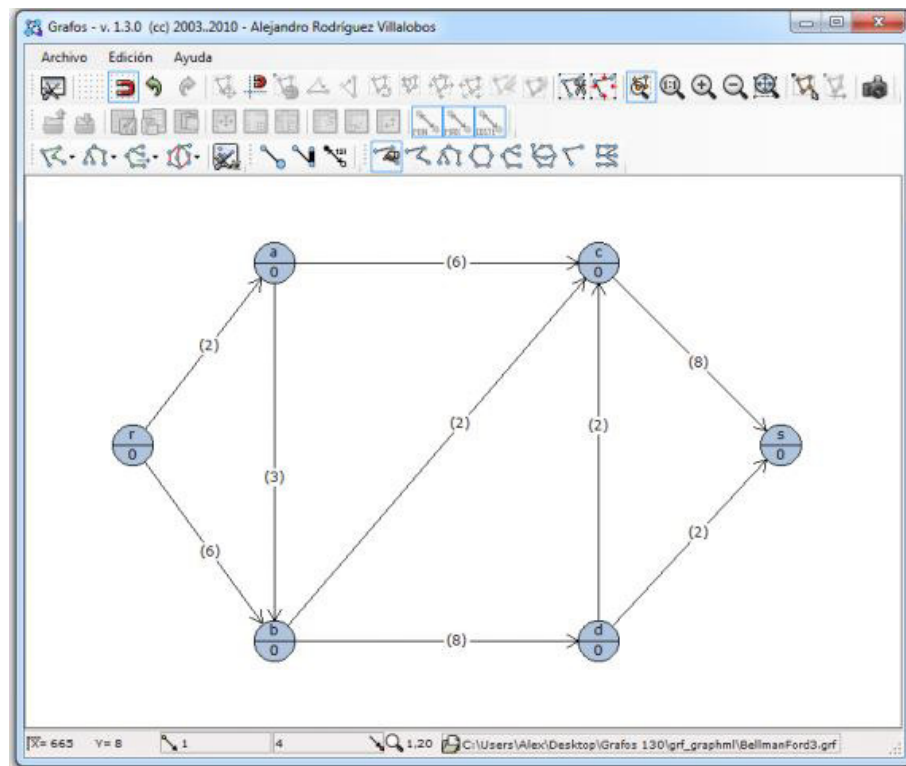
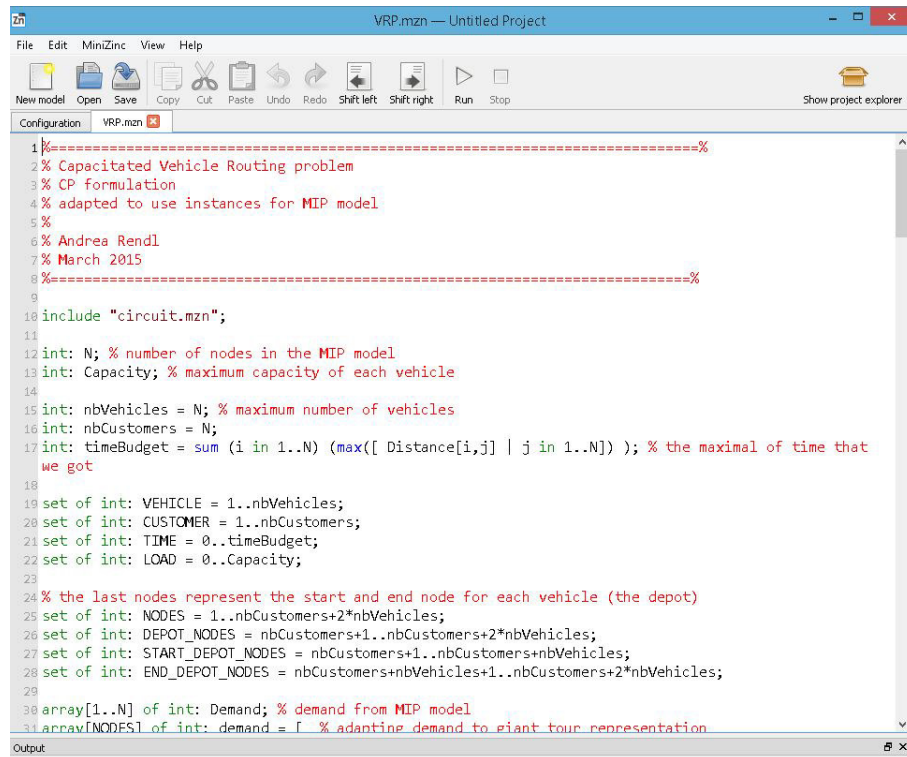


Figure 3.3: Grafos. [Rodríguez, 2010].

3.4.4 MiniZinc

MiniZinc is a free and open-source constraint modeling language. MiniZinc is used to model constraint satisfaction and optimization problems in a high-level, solver-independent way, taking advantage of a large library of pre-defined constraints. The model is then compiled into FlatZinc, a solver input language that is understood by a wide range of solvers. MiniZinc is developed at Monash University in collaboration with Data61 Decision Sciences and the University of Melbourne.

The compiler is the heart of the MiniZinc tool chain. It translates constraint models into FlatZinc, a language that is understood by a wide range of solvers. MiniZinc comes with a simple Integrated Development Environment, the MiniZinc IDE, which makes it easy to develop and run constraint models. MiniZinc is distributed under the Mozilla Public License version 2.0. The MiniZinc IDE is developed using the Qt toolkit, which is available under several licenses including the LGPL. See figure 3.4.



```

1 %=====-%
2 % Capacitated Vehicle Routing problem
3 % CP formulation
4 % adapted to use instances for MIP model
5 %
6 % Andrea Rendl
7 % March 2015
8 %=====-%
9
10 include "circuit.mzn";
11
12 int: N; % number of nodes in the MIP model
13 int: Capacity; % maximum capacity of each vehicle
14
15 int: nbVehicles = N; % maximum number of vehicles
16 int: nbCustomers = N;
17 int: timeBudget = sum (i in 1..N) (max([ Distance[i,j] | j in 1..N] )); % the maximal of time that
we got
18
19 set of int: VEHICLE = 1..nbVehicles;
20 set of int: CUSTOMER = 1..nbCustomers;
21 set of int: TIME = 0..timeBudget;
22 set of int: LOAD = 0..Capacity;
23
24 % the last nodes represent the start and end node for each vehicle (the depot)
25 set of int: NODES = 1..nbCustomers+2*nbVehicles;
26 set of int: DEPOT_NODES = nbCustomers+1..nbCustomers+2*nbVehicles;
27 set of int: START_DEPOT_NODES = nbCustomers+1..nbCustomers+nbVehicles;
28 set of int: END_DEPOT_NODES = nbCustomers+nbVehicles+1..nbCustomers+2*nbVehicles;
29
30 array[1..N] of int: Demand; % demand from MIP model
31 array[NODES] of int: demand = [ % adapting demand to giant tour representation

```

Figure 3.4: MiniZinc. [Min, 2019].

3.4.5 Google OR-Tools

Google OR-Tools can be used with C++, Python (Figure 3.5), Java and C. OR-Tools is an open source software for combinatorial optimization, which seeks to find the best solution to a problem out of a very large set of possible solutions. Here are some examples of problems that OR-Tools solves:

- **Vehicle routing:** Find optimal routes for vehicle fleets that pick up and deliver packages given constraints (e.g., "this truck can't hold more than 20,000 pounds" or "all deliveries must be made within a two-hour window").
- **Scheduling:** Find the optimal schedule for a complex set of tasks, some of which need to be performed before others, on a fixed set of machines, or other resources.
- **Bin packing:** Pack as many objects of various sizes as possible into a fixed number of bins with maximum capacities.

In most cases, problems like these have a vast number of possible solutions—too many for a computer to search them all. To overcome this, OR-Tools uses state-of-the-art algorithms to narrow down the search set, in order to find an optimal (or close to optimal) solution. OR-Tools includes solvers for:

- **Constraint Programming:** A set of techniques for finding feasible solutions to a problem expressed as constraints (e.g., a room can't be used for two events simultaneously, or the distance to the crops must be less than the length of the hose, or no more than five TV shows can be recorded at once).
- **Linear and Mixed-Integer Programming:** The Glop linear optimizer finds the optimal value of a linear objective function, given a set of linear inequalities as constraints (e.g., assigning people to jobs, or finding the best allocation of a set of resources while minimizing cost). Glop and the mixed-integer programming software SCIP are also available via the Google Apps Script Optimization Service.
- **Vehicle Routing:** A specialized library for identifying best vehicle routes given constraints.
- **Graph Algorithms:** Code for finding shortest paths in graphs, min-cost flows, max flows, and linear sum assignments.

```
# Add Capacity constraint.
def demand_callback(from_index):
    """Returns the demand of the node."""
    # Convert from routing variable Index to demands NodeIndex.
    from_node = manager.IndexToNode(from_index)
    return data['demands'][from_node]

demand_callback_index = routing.RegisterUnaryTransitCallback(
    demand_callback)
routing.AddDimensionWithVehicleCapacity(
    demand_callback_index,
    0, # null capacity slack
    data['vehicle_capacities'], # vehicle maximum capacities
    True, # start cumul to zero
    'Capacity')

# Setting first solution heuristic.
search_parameters = pywrapcp.DefaultRoutingSearchParameters()
search_parameters.first_solution_strategy = (
    routing_enums_pb2.FirstSolutionStrategy.PATH_CHEAPEST_ARC)

# Solve the problem.
solution = routing.SolveWithParameters(search_parameters)

# Print solution on console.
if solution:
    print_solution(data, manager, routing, solution)
```

Figure 3.5: Google OR-Tools-Google Developers.

Chapter 4

THE MAIN RESULTS

The source of all data used to develop this chapter were consulted to the Mexican Central Bank. However, for the purposes of this thesis, the data were transformed, specifically the name of commercial banks, because of terms of confidentiality. In this direction, 1,239.3 million pieces of metallic coins were delivered in 2018 from Mexican Central Bank to 9 different commercial banks which were located in 55 cities around the country using 767 trucks. The delivery total cost was \$23,743,812.74 Mexican pesos. In this case, the trucks were assigned in a traditional way using the methodology of the Mexican Central Bank to deliver the coins based on the criteria cluster first-route second; but, the cost in Mexican pesos is not necessarily the minimum. Such methodology was explained in detail in Section 4.2 of this thesis.

In order to minimize the cost of deliver metallic coins in Mexico solving the vehicle routing problem through INDIGO software, I considered only the data from January 2018 as well as 7 different commercial banks named in this thesis as Bank A, Bank B, Bank D, Bank E, Bank F, Bank G, Bank H, respectively in 55 cities (see figure 4.1). It is important to note that in the Bank E were delivered 47.14% of the total followed by the Bank A in which where delivered 30.63%. The Bank with the minimum deliver were the Bank H with less than 1% of the total. The top ten cities with the biggest demand of metallic coins in the period of analysis were: Querétaro followed by Ciudad Juárez, Tijuana, Pachuca, Villahermosa, Cuernavaca, Los Mochis, Acapulco, Torreón, and Mexicali. As we can see, in this case the top ten cities were located around the country so the associated cost for deliver metallic coins from the Regional Cashiers to commercial banks into these cities can increase exponentially. Additionally, the calculation of routes according with the [Banxico, 2018a] is an activity that must be performed monthly and the human error factor can affect it considerably, so the proposed solution is the automation through the optimization model solved by INDIGO solver.

PLACE TO DELIVER	BANK A	BANK B	BANK D	BANK E	BANK F	BANK G	BANK H	TOTAL
QUERETARO	13,867.29	582.82	17,736.20	6,525.99	641.10	4,327.72	-	43,681.10
CD JUAREZ	5,714.38	-	-	-	-	37,675.31	-	43,389.70
TIJUANA	17,028.14	-	-	13,843.73	-	6,361.37	232.51	37,465.75
PACHUCA	10,747.37	-	1,892.60	18,812.86	-	-	-	31,452.83
VILLAHERMOSA	7,914.51	-	2,230.82	21,018.57	-	-	-	31,163.90
CUERNAYACA	6,303.09	-	-	24,860.19	-	-	-	31,163.28
LOS MOCHIS	2,688.70	-	-	11,911.76	-	10,360.48	-	24,960.94
ACAPULCO	7,876.69	-	-	15,024.24	641.10	-	-	23,542.03
TORREON	-	860.27	1,158.19	10,205.47	-	9,287.85	134.85	21,646.64
MEXICALI	6,301.54	-	-	8,191.66	-	6,472.97	-	20,966.17
CANCUN	17,165.78	-	-	1,953.05	500.66	-	-	19,619.50
TUXTLA GUTIERREZ	5,031.75	-	2,948.18	6,154.29	-	-	-	14,134.21
TAMPICO	5,812.97	-	661.25	7,254.20	-	-	186.01	13,914.41
LEON	7,977.13	-	-	5,346.71	536.93	-	-	13,860.78
SAN LUIS POTOSI	5,105.22	-	461.29	6,401.98	-	1,860.05	-	13,828.54
MORELIA	3,667.71	-	4,380.11	5,346.71	-	-	-	13,394.53
CD OBREGON	2,710.09	-	834.54	3,720.10	1,291.49	4,154.11	-	12,710.34
LA PAZ	4,151.01	-	-	2,165.10	645.75	3,968.11	-	10,929.96
COATZACOALCOS	1,259.56	-	-	9,560.35	-	-	-	10,819.91
CHIHUAHUA	297.61	-	-	10,050.47	384.41	-	-	10,732.49
DURANGO	1,433.17	-	-	8,522.75	471.21	-	-	10,427.13
PUEBLA	9,559.42	-	-	-	664.35	-	-	10,223.76
PUERTO VALLARTA	1,227.32	-	3,555.18	5,346.71	-	-	-	10,129.21
ZACATECAS	1,752.48	-	-	5,346.71	536.93	2,157.66	-	9,793.78
TAPACHULA	2,612.13	-	2,570.90	4,123.42	-	-	-	9,306.45
CD DEL CARMEN	-	-	-	8,387.28	-	-	-	8,387.28
JALAPA	8,244.67	-	-	-	-	-	-	8,244.67
CD VICTORIA	-	-	-	8,207.47	-	-	-	8,207.47
ZAMORA	718.91	-	-	5,346.71	-	2,058.46	-	8,124.08
CORDOBA	3,211.69	-	-	4,128.07	664.35	-	-	8,004.11
MAZATLAN	2,725.28	-	564.84	4,209.91	497.25	-	-	7,997.28
AGUASCALIENTES	994.20	-	-	5,346.71	-	1,255.53	-	7,596.44
IGUALA	4,497.91	-	3,074.35	-	-	-	-	7,572.26
OAXACA	7,459.42	-	-	-	-	-	-	7,459.42
URUAPAN	-	-	1,895.08	5,346.71	-	-	-	7,241.79
ZIHUATANEJO	1,659.16	-	-	5,346.71	-	-	-	7,005.88
TEPIC	1,631.57	-	-	5,346.71	-	-	-	6,978.29
CELAYA	418.51	-	-	6,401.98	-	-	-	6,820.49
CIUDAD VALLES	3,322.98	-	-	3,441.09	-	-	-	6,764.07
CAMPECHE	2,496.81	207.71	-	4,005.93	-	-	-	6,710.44
IRAPUATO	-	-	-	6,177.23	-	-	-	6,177.23
REYNOSA	688.22	-	-	4,464.12	-	-	-	5,152.34
COLIMA	1,755.27	-	272.81	2,965.85	-	-	-	4,993.92
CULIACAN	-	-	-	4,209.91	536.93	-	-	4,746.85
TOLUCA	4,550.30	-	-	-	-	-	-	4,550.30
MONCLOVA	-	-	-	4,464.12	-	-	-	4,464.12
CD IXTEPEC	-	-	-	4,123.42	-	-	-	4,123.42
SALTILLO	-	-	-	3,720.10	-	-	-	3,720.10
CHETUMAL	1,781.00	406.11	-	465.01	-	-	-	2,652.12
POZA RICA	2,640.96	-	-	-	-	-	-	2,640.96
MATAMOROS	1,483.08	-	-	-	-	-	-	1,483.08
NOGALES	819.35	-	-	-	-	-	-	819.35
SALINA CRUZ	683.26	-	-	-	-	-	-	683.26
LAZARO CARDEMAS	-	399.91	-	-	-	-	-	399.91
ORIZABA	-	-	-	-	-	-	-	-
TOTAL	199,987.62	2,456.82	44,236.33	307,792.08	8,012.48	89,939.62	553.36	652,978.30
%	30.63%	0.38%	6.77%	47.14%	1.23%	13.77%	0.08%	100.00%

Figure 4.1: January 2018. Banxico, public consultation.

4.1 RESULTS WITH INDIGO

The input for INDIGO solver is a VRX ASCII file format document, which is used for encapsulate the instance of the VRP problem to solve. The VRX ASCII file is an extension of the VRPLIB library used in some VRP benchmarks. The VRX ASCII sintaxis for solving the VRP problem has the following structure:

- VRX- Declares the VRX file
- NAME- Name of instance
- COMMODITIES- Defines all commodities
- METRICS- Defines all metrics
- LOCATIONS- Define locations
- VEHICLES- Define vehicles characteristics. There should be a capacity for each commodity.
- ROUTES- Defines availability for a vehicle - effectively a potential route. Start and end times are required if time is used. Vehicle will be unusable if it does not appear in an avail line.
- REQUESTS- Defines all requests. Quantities are read as floats and rounded to the nearest integer. There should be a quantity for each commodity.
- EDGE WEIGHT- As many metrics as desired can be specified at once, for each pair of locations. If a pair of locations is not specified, travel between those locations is assumed to be illegal. The distances may be specified as a floating-point. The distance is multiplied by the metric-mult (for the appropriate metric) specified in the METRICS section, and then converted to an integer.

The code for the instance used is indicated in the Appendix A INDIGO Code. The code includes the following information:

- Table A.1: Locations, which contains the latitude and longitude data for 55 cities and the 6 warehouses.
- Table A.2: Vehicles, which contains the configuration of transport needed for the period studied.
- Table A.3: Routes, which contains the configuration of routes needed for the period studied.
- Table A.4: Requests, which contains the requests of metallic coins by 7 commercial banks in 55 cities.
- Table A.5: Distances, which contains the distance matrix among the 61 cities. In fact it is the largest (in terms of dimensions) table included in this thesis.

Finding the solution to the VRP model in INDIGO solver using the instances describe before, I obtained the results showed in figures 4.2 and 4.3. First, I observed that several requests were not assigned to available trucks and routes. This means that the truck configuration is not enough and an adjustment must be made. It is important to note that México has an extensive territory, and in consequence the road network is very large. The problem here is that some coverage zones of warehouses for the delivery are overlap (see figures 4.4 and 4.5). Initially, the coverage zones were considered as an ideal circle with a radius but when the coverage zones are overlapping the model present a warning. In order to solve this detail, each time the VRP model is executed it is important

to do some adjustments to the maximum radium allowed for the coverage zones of the warehouses, following the terminology of the VRP. Similarly, I noted that no requests were assigned because the capacity of some of the trucks were exceeded, so also it is necessary to adjust them before executing the model.

```

Solution COIN
      Solver ./indigo Version 2.0 Build 30 08:27 4 Jul 2019 at Fri 13/03/2020 02:44:26
      Run date Fri 13/03/2020 02:44:26
      Reportable cost 5.53381e+06
      Num Unassigned 55
      Profit 2.46619e+06
      Obj Metric 33814
      Penalties 0
      Additional obj terms 0
      Value of assigned reqs 8e+06
      Value of unassigned reqs 5.5e+06
      Vehicle Fixed Costs 0
      Wait time 0
      Total cost 5.53381e+06
      All Penalties 0

Metric totals:
  Dist: 33814
    
```

Figure 4.2: Experiment one. INDIGO 2020.

Unassigned	Loc	LoadKG	Value
BANK A QUERETARO	QUERETARO	13867	100000
BANK D QUERETARO	QUERETARO	17736	100000
BANK E QUERETARO	QUERETARO	6526	100000
BANK G QUERETARO	QUERETARO	4328	100000
BANK G CD JUAREZ	CD JUAREZ	37675	100000
BANK A TIJUANA	TIJUANA	17028	100000
BANK E TIJUANA	TIJUANA	13844	100000
BANK D PACHUCA	PACHUCA	1893	100000
BANK E PACHUCA	PACHUCA	18813	100000
BANK A VILLAHERMOSA	VILLAHERMOSA	7915	100000
BANK E VILLAHERMOSA	VILLAHERMOSA	21019	100000
BANK A CUERNAVACA	CUERNAVACA	6303	100000
BANK E CUERNAVACA	CUERNAVACA	24860	100000
BANK E LOS MOCHIS	LOS MOCHIS	11912	100000
BANK G LOS MOCHIS	LOS MOCHIS	10360	100000
BANK E ACAPULCO	ACAPULCO	15024	100000
BANK A MEXICALI	MEXICALI	6302	100000
BANK G MEXICALI	MEXICALI	6473	100000
BANK A CANCUN	CANCUN	17166	100000
BANK A TUXTLA GUTIERREZ	TUXTLA GUTIERREZ	5032	100000
BANK A LEON	LEON	7977	100000
BANK E LEON	LEON	5347	100000
BANK F LEON	LEON	537	100000
BANK A SAN LUIS POTOSI	SAN LUIS POTOSI	5105	100000
BANK E SAN LUIS POTOSI	SAN LUIS POTOSI	6402	100000
BANK A MORELIA	MORELIA	3668	100000
BANK A CD OBREGON	CD OBREGON	2710	100000
BANK D CD OBREGON	CD OBREGON	835	100000
BANK E CD OBREGON	CD OBREGON	3720	100000
BANK G CD OBREGON	CD OBREGON	4154	100000
BANK G LA PAZ	LA PAZ	3968	100000
BANK E COATZACOALCOS	COATZACOALCOS	9560	100000
BANK E CHIHUAHUA	CHIHUAHUA	10050	100000
BANK A PUEBLA	PUEBLA	9559	100000
BANK D PUERTO VALLARTA	PUERTO VALLARTA	3555	100000
BANK E ZACATECAS	ZACATECAS	5347	100000
BANK A TAPACHULA	TAPACHULA	2612	100000
BANK D TAPACHULA	TAPACHULA	2571	100000
BANK E TAPACHULA	TAPACHULA	4123	100000
BANK E ZAMORA	ZAMORA	5347	100000
BANK G ZAMORA	ZAMORA	2058	100000
BANK A MAZATLAN	MAZATLAN	2725	100000
BANK E AGUASCALIENTES	AGUASCALIENTES	5347	100000
BANK A IGUALA	IGUALA	4498	100000
BANK D IGUALA	IGUALA	3074	100000
BANK D URUAPAN	URUAPAN	1895	100000
BANK E URUAPAN	URUAPAN	5347	100000
BANK A TEPIC	TEPIC	1632	100000
BANK E TEPIC	TEPIC	5347	100000
BANK E CELAYA	CELAYA	6402	100000
BANK A COLIMA	COLIMA	1755	100000
BANK E COLIMA	COLIMA	2966	100000
BANK A TOLUCA	TOLUCA	4550	100000
BANK E CD INTEPEC	CD INTEPEC	4123	100000
BANK A POZA RICA	POZA RICA	2641	100000

Unused routes	Route	Vehicle	Start Loc	End Loc	Cap:	LoadKG
---------------	-------	---------	-----------	---------	------	--------

Figure 4.3: Unassigned in experiment one. INDIGO 2020.

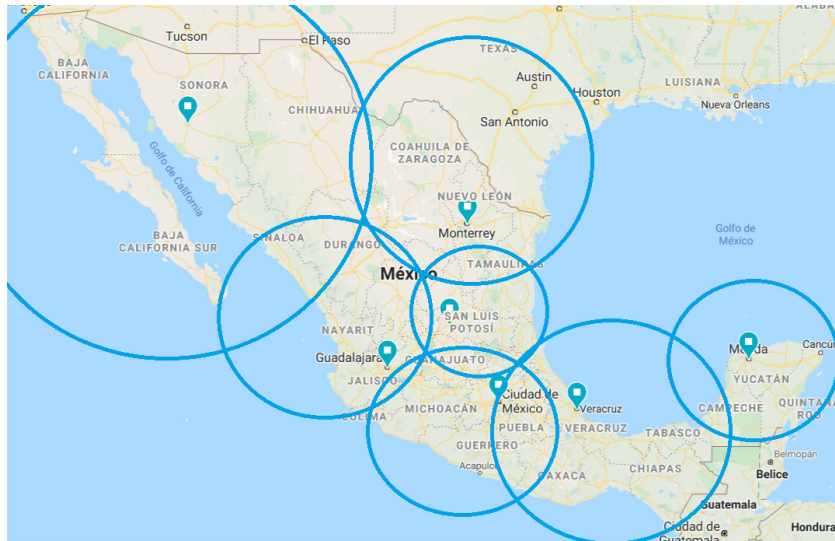


Figure 4.4: Overlap 1. Own creation 2020.

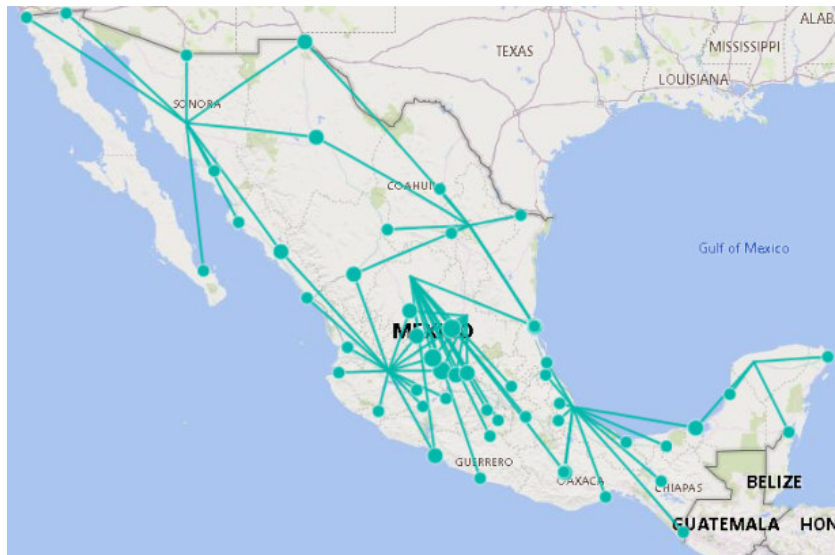


Figure 4.5: Overlap 2. Own creation 2020.

After doing the adjustment on the limits of coverage zones for each warehouse and on the capacity of the trucks, and executing again the VRP model on INDIGO solver, I obtained the results showed in figure 4.6. We can observe that the total distance for delivering the metallic coins requested from warehouses to 55 cities was 65,452 kilometers (See table 4.2) and there are not unassigned.

The table 4.1 presents the empirical plan executed for delivering in January 2018. In contrast, the table 4.2 shows the proposal plan executed for delivering suggested by INDIGO solver. The main differences between the empirical and the proposal delivery plan are as follows:

```

Solution COIN Solver ./indigo Version 2.0 Build 30 08:27 4 Jul 2019 at Mon
29/06/2020 03:02:33 Run date Mon 29/06/2020 03:02:33
Reportable cost 65452
Num Unassigned 0
Profit 1.53345e+07
Obj Metric 65452
Penalties 0
Additional obj terms 0
Value of assigned reqs 1.54e+07
Value of unassigned reqs 0
Vehicle Fixed Costs 0
Wait time 0
Total cost 65452
All Penalties 0

Metric totals:
Dist: 65452
    
```

Figure 4.6: Final experiment

Origin	Truck	Route	Weight	Distance
GUADALAJARA	1	MORELIA	10,315.70	574
GUADALAJARA	2	ZAMORA, MORELIA, LAZARO CARDENAS	9,858.11	1,109
GUADALAJARA	3	COLIMA, URUAPAN	8,577.77	783
GUADALAJARA	4	COLIMA, PUERTO VALLARTA	10,198.68	879
GUADALAJARA	5	TEPIC, MAZATLAN	9,419.24	955
GUADALAJARA	6	MAZATLAN, CULIACAN	8,370.45	1,393
SUBTOTAL GUADALAJARA	6		56,739.95	5,693
HERMOSILLO	1	TIJUANA	5,884.48	1,742
HERMOSILLO	2	LA PAZ	8,364.76	0
HERMOSILLO	3	LOS MOCHIS	9,491.26	966
HERMOSILLO	4	CD.OBREGON, LOS MOCHIS, LA PAZ	6,825.70	0
HERMOSILLO	5	CD.OBREGON	10,057.78	504
HERMOSILLO	6	LOS MOCHIS	10,236.82	966
HERMOSILLO	7	NOGALES, CD.JUAREZ	10,221.35	1,626
HERMOSILLO	8	TIJUANA	5,985.95	1,742
HERMOSILLO	9	TIJUANA	9,931.436	1,742
HERMOSILLO	10	TIJUANA	9,984.672	1,742
HERMOSILLO	11	MEXICALI	10,088.352	1,390
HERMOSILLO	12	MEXICALI	9,503.104	1,390
SUBTOTAL HER- MOSILLO	12		106,575.67	13,810
MERIDA	1	CANCUN	10,297.70	606
MERIDA	2	CANCUN, CHETUMAL	10,249.76	1,070
MERIDA	3	CAMPECHE	5,586.92	354
MERIDA	4	CD.DEL CARMEN	6,670.78	770
SUBTOTAL MERIDA	4		32,805.17	2,800
MONTERREY	1	REYNOSA, MATAMOROS	4,548.26	619.3
MONTERREY	2	TORREON	8,858.75	666
MONTERREY	3	TORREON	9,497.21	666

Continues next page

Origin	Truck	Route	Weight	Distance
MONTERREY	4	SALTILLO, MONCLOVA	5,658.4	522
MONTERREY	5	DURANGO	8,204.6	1,262
MONTERREY	6	TAMPICO, CIUDAD VALLES	8,167.87	1,521
MONTERREY	7	CIUDAD VICTORIA, TAMPICO	7,993.29	1,183
MONTERREY	8	CD.JUAREZ	10,320.72	2,340
MONTERREY	9	CD.JUAREZ	9,902.44	2,340
MONTERREY	10	CD.JUAREZ	10,168.53	2,340
MONTERREY	11	CHIHUAHUA	7,841.509	1,616
SUBTOTAL MON- TERREY	11		91,161.61	15,075.3
MEXICO	1	IGUALA, ACAPULCO	11,699.6	776
MEXICO	2	ACAPULCO	9,826.25	786
MEXICO	3	CUERNAVACA	10,179.72	172.8
MEXICO	4	CUERNAVACA	10,008	172.8
MEXICO	5	CUERNAVACA, ACAPULCO	10,263.99	769.4
MEXICO	6	PACHUCA	9401.3	181.2
MEXICO	7	PACHUCA	10,191.74	181.2
MEXICO	8	PACHUCA	8,900.22	181.2
MEXICO	9	PUEBLA	8,369.17	274
MEXICO	10	IGUALA, ZIHUATANEJO	10,360.95	1,041
MEXICO	11	QUERETARO, CELAYA, IRA- PUATO, LEON, AGUAS- CALIENTES, ZACATECAS, SAN LUIS POTOSI	8,121.37	1,260.3
MEXICO	12	TOLUCA	4,067.97	132.6
SUBTOTAL MEX- ICO	12		111,390.33	5,928.5
SAN LUIS POTOSI	1	CIUDAD VALLES, TAMPICO, CD.VICTORIA	7,938.8	1,774
SAN LUIS POTOSI	2	SAN LUIS POTOSI, ZACATECAS	9,508.2	380
SAN LUIS POTOSI	3	SAN LUIS POTOSI, AGUAS- CALIENTES, ZACATECAS	10,054.2	474
SAN LUIS POTOSI	4	SAN LUIS POTOSI, QUERE- TARO	10,397.6	422
SAN LUIS POTOSI	5	LEON, AGUASCALIENTES, ZA- CATECAS	9,919.8	615
SAN LUIS POTOSI	6	AGUASCALIENTES, LEON, IRA- PUATO, CELAYA	10,071.8	1,113.3
SAN LUIS POTOSI	7	LEON, IRAPUATO, CELAYA, QUERETARO	10,300.8	1,005.3
SAN LUIS POTOSI	8	IRAPUATO, CELAYA, QUERE- TARO	9,600	535.3
SAN LUIS POTOSI	9	IRAPUATO, CELAYA, QUERE- TARO	9,416.4	535.3
SUBTOTAL SAN LUIS POTOSI	9		87,207.6	6,854.2
VERACRUZ	1	COATZACOALCOS	9,235.6	618
VERACRUZ	2	VILLAHERMOSA	10,000	934
VERACRUZ	3	VILLAHERMOSA	9,302.41	934

Continues next page

Origin	Truck	Route	Weight	Distance
VERACRUZ	4	VILLAHERMOSA, TUXTLA GUTIERREZ	10,105.38	1,260
VERACRUZ	5	TUXTLA GUTIERREZ	9,742.56	1,094
VERACRUZ	6	TAPACHULA	8,889.06	1,580
VERACRUZ	7	OAXACA, SALINA CRUZ, CD.IXTEPEC	9,619.92	1,132.5
VERACRUZ	8	XALAPA, POZA RICA	8,528.34	634
VERACRUZ	9	CORDOBA	7,035.99	218
SUBTOTAL VER- ACRUZ	9		82,459.31	8,404.5
TOTAL	63		568,339.65	58,565.5

Table 4.1: Empirical coin deliveries on Jan18

Origin	Truck	Route	Weight	Distance
GUADALAJARA	1	PUERTO VALLARTA	8,902.00	612
GUADALAJARA	2	MORELIA	9,727.00	574
GUADALAJARA	3	COLIMA	4,994.00	392
GUADALAJARA	4	PUERTO VALLARTA-TEPIC	6,574.00	678
GUADALAJARA	5	TEPIC-MAZATLAN	9,629.00	955
GUADALAJARA	6	ZAMORA-URUAPAN-LAZARO CARDENAS	9,700.00	974
GUADALAJARA	7	ZAMORA-MORELIA	9,734.00	597
SUBTOTAL GUADALAJARA	7		59,260	4,782
HERMOSILLO	1	CD OBREGON	5,011.00	504
HERMOSILLO	2	CHIHUAHUA	732.00	1,454
HERMOSILLO	3	CD JUAREZ	10,000.00	1,500
HERMOSILLO	4	CD OBREGON-LOS MOCHIS-LA PAZ	9,476.00	1,456
HERMOSILLO	5	CD JUAREZ	10,000.00	1,500
HERMOSILLO	6	TIJUANA	3,844.00	1,742
HERMOSILLO	7	TIJUANA	10,000.00	1,742
HERMOSILLO	8	CD OBREGON-LOS MOCHIS-LA PAZ	9,960.00	1,456
HERMOSILLO	9	MEXICALI	6,302.00	1,390
HERMOSILLO	10	CHIHUAHUA	10,000.00	1,454
HERMOSILLO	11	CD JUAREZ	5,714.00	1,500
HERMOSILLO	12	LOS MOCHIS	10,000.00	966
HERMOSILLO	13	LOS MOCHIS	10,000.00	966
HERMOSILLO	14	TIJUANA	7,261.00	1,742
HERMOSILLO	15	TIJUANA	10,000.00	1,742
HERMOSILLO	16	NOGALES-CD JUAREZ	8,494.00	1,626
HERMOSILLO	17	CD OBREGON-CULIACAN	8,901.00	1,388
HERMOSILLO	18	MEXICALI	8,192.00	1,390
HERMOSILLO	19	CD JUAREZ	10,000.00	1,500
HERMOSILLO	20	MEXICALI	6,473.00	1,390
HERMOSILLO	21	TIJUANA	6,361.00	1,742

Continues next page

Origin	Truck	Route	Weight	Distance
SUBTOTAL HER- MOSILLO	21		166,721	30,150
MERIDA	1	CANCUN	10,000.00	606
MERIDA	2	CAMPECHE-CD DEL CARMEN	8,595.00	770
MERIDA	3	CAMPECHE-CHETUMAL	9,155.00	820
MERIDA	4	MERIDA	9,620.00	606
SUBTOTAL MERIDA	4		37,370	2,802
MONTERREY	1	TORREON	10,000.00	666
MONTERREY	2	CD VICTORIA	8,207.00	570
MONTERREY	3	TORREON	2,153.00	666
MONTERREY	4	MATAMOROS-REYNOSA	6,635.00	619
MONTERREY	5	SALTILLO-MONCLOVA	8,184.00	522
MONTERREY	6	DURANGO	9,956.00	1262
MONTERREY	7	TORREON-DURANGO	9,964.00	1232
SUBTOTAL MON- TERREY	7		55,099	5,537
MEXICO	1	PACHUCA	10,000.00	182
MEXICO	2	PACHUCA	8,813.00	182
MEXICO	3	CUERNAVACA	10,000.00	172
MEXICO	4	IGUALA-ACAPULCO	9,522.00	776
MEXICO	5	ACAPULCO	10,000.00	786
MEXICO	6	PACHUCA-TOLUCA	6,443.00	309
MEXICO	7	PACHUCA	10,000.00	182
MEXICO	8	ZIHUATANEJO	7,006.00	962
MEXICO	9	CUERNAVACA	11,163.00	172
MEXICO	10	PACHUCA-PUEBLA	10,970.00	373
MEXICO	11	CUERNAVACA	10,000.00	172
MEXICO	12	IGUALA-ACAPULCO	11,592.00	776
SUBTOTAL MEX- ICO	12		115,509	5,044
SAN LUIS POTOSI	1	SAN LUIS POTOSI	6,402.00	0
SAN LUIS POTOSI	2	SAN LUIS POTOSI	5,105.00	0
SAN LUIS POTOSI	3	SAN LUIS POTOSI-IRAPUATO	6,638.00	418
SAN LUIS POTOSI	4	QUERETARO-CELAYA-LEON	9,620.00	576
SAN LUIS POTOSI	5	QUERETARO	10,000.00	422
SAN LUIS POTOSI	6	AGUASCALIENTES-LEON- CELAYA	9,189.00	686
SAN LUIS POTOSI	7	QUERETARO	10,000.00	422
SAN LUIS POTOSI	8	QUERETARO	6,526.00	422
SAN LUIS POTOSI	9	CD VALLES-TAMPICO	9,254.00	856
SAN LUIS POTOSI	10	SAN LUIS POTOSI-TAMPICO	9,961.00	810
SAN LUIS POTOSI	11	QUERETARO-LEON	9,675.00	564
SAN LUIS POTOSI	12	QUERETARO	11,603.00	422
SAN LUIS POTOSI	13	ZACATECAS	9,794.00	380
SAN LUIS POTOSI	14	CD VALLES-AGUASCALIENTES	8,670.00	843
SUBTOTAL SAN LUIS POTOSI	14		122,437	6,821
VERACRUZ	1	JALAPA	8,245.00	206

Continues next page

Origin	Truck	Route	Weight	Distance
VERACRUZ	2	POZA RICA	2,641.00	498
VERACRUZ	3	CORDOBA	3,212.00	218
VERACRUZ	4	COATZACOALCOS	9,560.00	618
VERACRUZ	5	VILLAHERMOSA	10,000.00	934
VERACRUZ	6	CORDOBA-CD IXTEPEC	8,915.00	982
VERACRUZ	7	VILLAHERMOSA	7,915.00	934
VERACRUZ	8	VILLAHERMOSA	10,000.00	934
VERACRUZ	9	OAXACA	7,459.00	742
VERACRUZ	10	TAPACHULA	9,306.00	1,580
VERACRUZ	11	VILLAHERMOSA-TUXTLA GUTIERREZ	9,404.00	1,260
VERACRUZ	12	COATZACOALCOS-SALINA CRUZ-TUXTLA GUTIERREZ	9,923.00	1,410
SUBTOTAL VER- ACRUZ	12		96,580	10,316
TOTAL	77		652,976	65,452

Table 4.2: Suggested coin deliveries from INDIGO for Jan18

The results obtained are different due to the adjustments that must be made to the model and the treatment that is given to the data by hand. In other words, the development is a decision-making support system and therefore the model helps to guide the analyst in new routes, however, due to the way the VRP works, it is not possible to obtain better results only using the software it must be completed with the analyst's experience.

4.2 THE EMPIRICAL DELIVERY PLAN VERSUS THE INDIGO SOLVER DELIVERY PLAN

The methodology used at Mexican Central Bank for delivering the metallic coins is: cluster first-route second. In this direction, firstly, it is necessary to generate groups of clients, also called clusters, that will be on the same route in the final solution. Secondly, for each cluster a route is created that visits all its clients. Additionally, capacity restrictions are considered in the first stage, ensuring that the total demand of each cluster does not exceed the truck's capacity. Therefore, building the delivering routes for each cluster is very similar to the Travel Salesman Problem (TSP), very used in Operations Research. Finally, to create the clusters it is necessary to join all the bank's requests by place of delivery and fill the trucks taking care of the capacity restriction, the rest should be used to make the routes. The tool currently used is excel, it is created by human specialized resources and it takes 8 hours to develop the monthly plan. The big problem with this way of calculation is on the one hand, the probable human error that can be induced, and on the other hand, the human resources learn to generate the groups of clients by expertise, through trial and error technique. The main implication in this way, is that the delivering cost are incremented and the Mexican Central Bank and the commercial banks assume such variability.

To solve this big problem, a VRP model was proposed as a decision support system in order to minimize the deliver cost of metallic coins, generating the efficient use of the economic and human resources destined for it and satisfying the demand of national currency, with the times and quality required by the society using Constraint Programming (CP), Large Neighbourhood Search (LNS) and Feature-based Insertion. The main advantages in using the model proposed area as follows:

- Advantage 1: in terms of time to prepare the distribution plan exists a saving on time and resources.
- Advantage 2: in terms of associated costs, the system allows us to obtain the minimum number of kilometers between cities and warehouses and therefore the cost of the kilometer decreases.
- Advantage 3: in terms of reliability in the system, the elaboration of the distribution plan does not depend on the experience of the analysts.

In contrast, the main disadvantages are listed:

- Disadvantage 1: it is necessary to automate the process of entering data into the model and its subsequent analysis for each of the runs.
- Disadvantage 2: it is necessary to create a flexible interface to interact with the analyst.
- Disadvantage 3: for this thesis the system was executed externally.

Chapter 5

CONCLUSIONS

5.1 GENERAL CONCLUSIONS

The Vehicle Routing Problem is a well studied combinatorial optimization problem with many real practical applications. In this thesis, I addressed the Capacitated Multi Depot Vehicle Routing Problem with Heterogeneous Fleet using Constraint Programming (CP), Large Neighbourhood Search (LNS) and Feature-based Insertion and with this I can verify that solving the problem with this method there was a saving on time and resources. To demonstrate this, data on the current situation were first collected, then experiments were made and finally the comparisons with the current routing method in the Mexican Central Bank.

The main objective of this Master Thesis was to minimize the cost of distributing metallic coins, generating the efficient use of the economic and human resources destined for it and satisfying the demand of national currency, with the times and quality required by the society using CP, LNS and Feature-based Insertion. In order to achieve this objective, a literature review about routing models and algorithms was carry out. Then, was developed the Capacitated Multi Depot Vehicle Routing Problem with Heterogeneous Fleet using CP, LNS and Feature-based Insertion to determine a feasible distribution routes between Regional Cashiers and the locations of the Commercial Banks where they need coins. After that, the model for minimizing the cost of distributing metallic coins using Indigo software was solved and an analysis of the main results was carried out. The model proposed supports decision-making but does not replace it due to its limitations in the way it sets up the routes.

One of the main contributions of this work is to express this task as an optimization problem, and to propose a model to solve it. Different types of models and algorithms have been presented, also were shown other software tools, this tools were not completely compatible with the characteristics of the problem presented, so this is the reason why these programs were not used to solve it. The limitations of this work are that it is necessary to automate the process of entering data into the model and its subsequent analysis for each of the runs, also to create a flexible interface to interact with the analyst.

The usefulness of the model proposed was a saving on time and resources in the delivering planning of metallic coins. Using the model will eliminate the risk of human errors so the results are more accurate and reliable. It is known that computer programs make calculations faster than humans, using it we can process more data and adjust results to new conditions almost instantaneously. The route optimization solution will allow to take the quality of the delivery services to the next level and boost customer satisfaction. To demonstrate this, data on the current situation were first collected, then experiments were made and finally the comparisons with the current routing method in the Mexican Central Bank. The computational time was surprisingly less than one minute ($T_c < 1\text{min}$) so these results can lead to the conclusion that this model can be very convenient in practice and also because there is flexibility for various variants of VRP. So, it could be used as a decision support tool that allows to improve the planning of delivery metallic coins and the allocation of optimal resources. Throughout the development of the model, it was necessary to thoroughly validate each of the input data, parameters, and output data to guarantee a realistic solution, consistent with the routes previously used by the Mexican Central Bank.

In conclusion, the main objective of this Master Thesis was achieved.

5.2 FUTURE WORK

Future work concerns deeper analysis of new proposals to try different methods and algorithms. This thesis has been mainly focused on solving heuristically. There are some ideas that I would liked to try. This could be tested:

- The use of time windows: There are important reasons to use time windows, for example that the banks do not work all day and that the trucks should not circulate at night.
- Clusterize: The idea of clustering as a mean to help reduce the size of the search neighborhood.
- Use a MIP model: Literature say that exact methods for solving VRPs with optimality are based on Mixed Integer Programming (MIP) and are only capable of solving instances with no more than 100 requests because are NP-complete.
- Consider the inventory: In this work in the model it is assumed that all the stock is available in each warehouse.
- Implementation with Mexican Central Bank resources: means to program this model internally so that the databases necessary for the execution of the model interact, since for this work it was tried to execute externally.

Appendix A

Indigo Code

VRX

NAME COIN JAN18

COMMODITIES LoadKG

METRICS

Dist MAT OBJ

END

LOCATIONS

<i>< name ></i>	<i>< latitude ></i>	<i>< longitude ></i>
ACAPULCO	16.8531086	-99.8236533
AGUASCALIENTES	21.8852562	-102.2915677
CAMPECHE	19.8301251	-90.5349087
CANCUN	21.161908	-86.8515279
CD.DEL CARMEN	18.6504879	-91.8074586
CD IXTEPEC	16.5611267	-95.0963141
CD JUAREZ	31.6903638	-106.4245478
CD OBREGON	27.4827729	-109.930367
CD VICTORIA	23.7369164	-99.1411154
CELAYA	20.5279612	-100.8112885
CHETUMAL	18.5001889	-88.296146
CHIHUAHUA	28.6329957	-106.0691004
CIUDAD VALLES	22.0025712	-99.0018424
COATZACOALCOS	18.1344779	-94.4589858
COLIMA	19.2452342	-103.7240868
CORDOBA	18.8838909	-96.9237751
CUERNAVACA	18.9242095	-99.2215659
CULIACAN	24.8090649	-107.3940117
DURANGO	24.0277202	-104.6531759

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<i>< name ></i>	<i>< latitude ></i>	<i>< longitude ></i>
GUADALAJARA	20.676143	-103.346998
HERMOSILLO	29.089415	-110.961238
IGUALA	18.3448477	-99.5397344
IRAPUATO	20.6786652	-101.3544964
JALAPA	19.5437751	-96.9101806
LA PAZ	24.1426408	-110.3127531
LAZARO CARDENAS	17.9567647	-102.1943485
LEON	21.1250077	-101.6859605
LOS MOCHIS	25.7904657	-108.985882
MATAMOROS	25.8690294	-97.5027376
MAZATLAN	23.2494148	-106.4111425
MERIDA	20.967141	-89.6237
MEXICALI	32.6245389	-115.4522623
MEXICO	19.43253	-99.13321
MONCLOVA	26.9080378	-101.4215236
MONTERREY	25.666599	-100.316597
MORELIA	19.7059504	-101.1949825
NOGALES	31.3011855	-110.9381047
OAXACA	17.0542297	-96.7132304
ORIZABA	18.8504744	-97.1036396
PACHUCA	20.1010608	-98.7591311
POZA RICA	20.5270592	-97.4629119
PUEBLA	19.0412967	-98.2061996
PUERTO VALLARTA	20.653407	-105.2253316
QUERETARO	20.5887932	-100.3898881
REYNOSA	26.0508406	-98.2978951
SALINA CRUZ	16.1842839	-95.2087625
SALTILLO	25.4267244	-100.9954254
SAN LUIS POTOSI	22.1564699	-100.9855409
TAMPICO	22.2331041	-97.861099
TAPACHULA	14.9055599	-92.2634206
TEPIC	21.5041651	-104.8945887
TIJUANA	32.5149469	-117.0382471
TOLUCA	19.2826098	-99.6556653
TOPOLOBAMPO	25.6006925	-109.0503685
TORREON	25.5428443	-103.4067861
TUXTLA GUTIERREZ	16.7516009	-93.1029939
URUAPAN	19.4064492	-102.0430476
VERACRUZ	19.20022	-96.138569
VILLAHERMOSA	17.989456	-92.9475061
ZACATECAS	22.7708555	-102.5832426
ZAMORA	19.9901766	-102.2834075
ZIHUATANEJO	17.6416693	-101.5516955

Table A.1: Locations.

END

VEHICLES

<i>< name ></i>	<i>< cap – LoadKG ></i>	<i>< max – Dist ></i>	<i>< cost ></i>
MEXICO10 1	10,000	200	0
MEXICO10 2	10,000	200	0
MEXICO10 3	10,000	200	0
MEXICO10 4	10,000	200	0
MEXICO10 5	10,000	200	0
MEXICO10 6	10,000	700	0
MEXICO10 7	10,000	700	0
MEXICO10 8	10,000	700	0
MEXICO10 9	10,000	900	0
MEXICO10 10	10,000	900	0
MEXICO10 11	10,000	900	0
MEXICO10 12	10,000	900	0
MEXICO10 13	10,000	900	0
MEXICO10 14	10,000	900	0
MEXICO10 15	10,000	1,000	0
MEXICO10 16	10,000	1,000	0
MEXICO12 1	12,000	200	0
MEXICO12 2	12,000	200	0
MEXICO12 3	12,000	700	0
MEXICO12 4	12,000	700	0
MEXICO12 5	12,000	900	0
MEXICO12 6	12,000	900	0
SAN LUIS POTOSI10 1	10,000	200	0
SAN LUIS POTOSI10 2	10,000	200	0
SAN LUIS POTOSI10 3	10,000	200	0
SAN LUIS POTOSI10 4	10,000	200	0
SAN LUIS POTOSI10 5	10,000	200	0
SAN LUIS POTOSI10 6	10,000	700	0
SAN LUIS POTOSI10 7	10,000	700	0
SAN LUIS POTOSI10 8	10,000	700	0
SAN LUIS POTOSI10 9	10,000	700	0
SAN LUIS POTOSI10 10	10,000	700	0
SAN LUIS POTOSI10 11	10,000	900	0
SAN LUIS POTOSI10 12	10,000	900	0
SAN LUIS POTOSI10 13	10,000	900	0
SAN LUIS POTOSI10 14	10,000	900	0
SAN LUIS POTOSI10 15	10,000	900	0
SAN LUIS POTOSI10 16	10,000	900	0
SAN LUIS POTOSI12 1	12,000	200	0
SAN LUIS POTOSI12 2	12,000	200	0
SAN LUIS POTOSI12 3	12,000	700	0
SAN LUIS POTOSI12 4	12,000	700	0
SAN LUIS POTOSI12 5	12,000	900	0
SAN LUIS POTOSI12 6	12,000	900	0
GUADALAJARA10 1	10,000	300	0
GUADALAJARA10 2	10,000	300	0

Continues next page

<i>< name ></i>	<i>< cap – LoadKG ></i>	<i>< max – Dist ></i>	<i>< cost ></i>
GUADALAJARA10 3	10,000	300	0
GUADALAJARA10 4	10,000	300	0
GUADALAJARA10 5	10,000	300	0
GUADALAJARA10 6	10,000	700	0
GUADALAJARA10 7	10,000	700	0
GUADALAJARA10 8	10,000	700	0
GUADALAJARA10 9	10,000	900	0
GUADALAJARA10 10	10,000	900	0
GUADALAJARA10 11	10,000	900	0
GUADALAJARA10 12	10,000	900	0
GUADALAJARA10 13	10,000	1,000	0
GUADALAJARA10 14	10,000	1,000	0
GUADALAJARA10 15	10,000	1,000	0
MONTERREY10 1	10,000	300	0
MONTERREY10 2	10,000	300	0
MONTERREY10 3	10,000	300	0
MONTERREY10 4	10,000	300	0
MONTERREY10 5	10,000	700	0
MONTERREY10 6	10,000	700	0
MONTERREY10 7	10,000	700	0
MONTERREY10 8	10,000	700	0
MONTERREY10 9	10,000	700	0
MONTERREY10 10	10,000	900	0
MONTERREY10 11	10,000	900	0
MONTERREY10 12	10,000	900	0
MONTERREY10 13	10,000	900	0
MONTERREY10 14	10,000	1,300	0
MONTERREY10 15	10,000	1,300	0
MERIDA10 1	10,000	900	0
MERIDA10 2	10,000	900	0
MERIDA10 3	10,000	900	0
MERIDA10 4	10,000	900	0
MERIDA10 5	10,000	900	0
MERIDA10 6	10,000	900	0
MERIDA10 7	10,000	900	0
MERIDA10 8	10,000	900	0
MERIDA10 9	10,000	900	0
MERIDA10 10	10,000	900	0
MERIDA10 11	10,000	900	0
MERIDA10 12	10,000	900	0
MERIDA10 13	10,000	900	0
MERIDA10 14	10,000	900	0
MERIDA10 15	10,000	900	0
VERACRUZ10 1	10,000	300	0
VERACRUZ10 2	10,000	300	0
VERACRUZ10 3	10,000	300	0
VERACRUZ10 4	10,000	700	0
VERACRUZ10 5	10,000	700	0

Continues next page

<i>< name ></i>	<i>< cap – LoadKG ></i>	<i>< max – Dist ></i>	<i>< cost ></i>
VERACRUZ10 6	10,000	700	0
VERACRUZ10 7	10,000	700	0
VERACRUZ10 8	10,000	1,000	0
VERACRUZ10 9	10,000	1,000	0
VERACRUZ10 10	10,000	1,000	0
VERACRUZ10 11	10,000	1,000	0
VERACRUZ10 12	10,000	1,000	0
VERACRUZ10 13	10,000	1,600	0
VERACRUZ10 14	10,000	1,600	0
VERACRUZ10 15	10,000	1,600	0
HERMOSILLO10 1	10,000	600	0
HERMOSILLO10 2	10,000	600	0
HERMOSILLO10 3	10,000	1,500	0
HERMOSILLO10 4	10,000	1,500	0
HERMOSILLO10 5	10,000	1,500	0
HERMOSILLO10 6	10,000	1,800	0
HERMOSILLO10 7	10,000	1,800	0
HERMOSILLO10 8	10,000	1,800	0
HERMOSILLO10 9	10,000	1,800	0
HERMOSILLO10 10	10,000	1,800	0
HERMOSILLO10 11	10,000	1,800	0
HERMOSILLO10 12	10,000	1,800	0
HERMOSILLO10 13	10,000	1,800	0
HERMOSILLO10 14	10,000	1,800	0
HERMOSILLO10 15	10,000	1,800	0
HERMOSILLO10 16	10,000	1,800	0
HERMOSILLO10 17	10,000	1,800	0
HERMOSILLO10 18	10,000	1,800	0
HERMOSILLO10 19	10,000	1,800	0
HERMOSILLO10 20	10,000	1,800	0
HERMOSILLO10 21	10,000	1,800	0
HERMOSILLO10 22	10,000	1,800	0

Table A.2: Vehicles.

END

ROUTES

<i>< name ></i>	<i>< vehicle ></i>	<i>< start – loc ></i>	<i>< end – loc ></i>
MEXICO10 1 1	MEXICO10 1	MEXICO	MEXICO
MEXICO10 2 1	MEXICO10 2	MEXICO	MEXICO
MEXICO10 3 1	MEXICO10 3	MEXICO	MEXICO
MEXICO10 4 1	MEXICO10 4	MEXICO	MEXICO
MEXICO10 5 1	MEXICO10 5	MEXICO	MEXICO
MEXICO10 6 1	MEXICO10 6	MEXICO	MEXICO
MEXICO10 7 1	MEXICO10 7	MEXICO	MEXICO
MEXICO10 8 1	MEXICO10 8	MEXICO	MEXICO
MEXICO10 9 1	MEXICO10 9	MEXICO	MEXICO
MEXICO10 10 1	MEXICO10 10	MEXICO	MEXICO
MEXICO10 11 1	MEXICO10 11	MEXICO	MEXICO
MEXICO10 12 1	MEXICO10 12	MEXICO	MEXICO
MEXICO10 13 1	MEXICO10 13	MEXICO	MEXICO
MEXICO10 14 1	MEXICO10 14	MEXICO	MEXICO
MEXICO10 15 1	MEXICO10 15	MEXICO	MEXICO
MEXICO10 16 1	MEXICO10 16	MEXICO	MEXICO
MEXICO12 1 1	MEXICO12 1	MEXICO	MEXICO
MEXICO12 2 1	MEXICO12 2	MEXICO	MEXICO
MEXICO12 3 1	MEXICO12 3	MEXICO	MEXICO
MEXICO12 4 1	MEXICO12 4	MEXICO	MEXICO
MEXICO12 5 1	MEXICO12 5	MEXICO	MEXICO
MEXICO12 6 1	MEXICO12 6	MEXICO	MEXICO
SAN LUIS POTOSI10 1 1	SAN LUIS POTOSI10 1	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 2 1	SAN LUIS POTOSI10 2	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 3 1	SAN LUIS POTOSI10 3	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 4 1	SAN LUIS POTOSI10 4	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 5 1	SAN LUIS POTOSI10 5	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 6 1	SAN LUIS POTOSI10 6	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 7 1	SAN LUIS POTOSI10 7	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 8 1	SAN LUIS POTOSI10 8	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 9 1	SAN LUIS POTOSI10 9	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 10 1	SAN LUIS POTOSI10 10	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 11 1	SAN LUIS POTOSI10 11	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 12 1	SAN LUIS POTOSI10 12	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 13 1	SAN LUIS POTOSI10 13	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 14 1	SAN LUIS POTOSI10 14	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 15 1	SAN LUIS POTOSI10 15	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI10 16 1	SAN LUIS POTOSI10 16	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI12 1 1	SAN LUIS POTOSI12 1	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI12 2 1	SAN LUIS POTOSI12 2	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI12 3 1	SAN LUIS POTOSI12 3	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI12 4 1	SAN LUIS POTOSI12 4	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI12 5 1	SAN LUIS POTOSI12 5	SAN LUIS POTOSI	SAN LUIS POTOSI
SAN LUIS POTOSI12 6 1	SAN LUIS POTOSI12 6	SAN LUIS POTOSI	SAN LUIS POTOSI
GUADALAJARA10 1 1	GUADALAJARA10 1	GUADALAJARA	GUADALAJARA
GUADALAJARA10 2 1	GUADALAJARA10 2	GUADALAJARA	GUADALAJARA

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<i>< name ></i>	<i>< vehicle ></i>	<i>< start – loc ></i>	<i>< end – loc ></i>
GUADALAJARA10 3 1	GUADALAJARA10 3	GUADALAJARA	GUADALAJARA
GUADALAJARA10 4 1	GUADALAJARA10 4	GUADALAJARA	GUADALAJARA
GUADALAJARA10 5 1	GUADALAJARA10 5	GUADALAJARA	GUADALAJARA
GUADALAJARA10 6 1	GUADALAJARA10 6	GUADALAJARA	GUADALAJARA
GUADALAJARA10 7 1	GUADALAJARA10 7	GUADALAJARA	GUADALAJARA
GUADALAJARA10 8 1	GUADALAJARA10 8	GUADALAJARA	GUADALAJARA
GUADALAJARA10 9 1	GUADALAJARA10 9	GUADALAJARA	GUADALAJARA
GUADALAJARA10 10 1	GUADALAJARA10 10	GUADALAJARA	GUADALAJARA
GUADALAJARA10 11 1	GUADALAJARA10 11	GUADALAJARA	GUADALAJARA
GUADALAJARA10 12 1	GUADALAJARA10 12	GUADALAJARA	GUADALAJARA
GUADALAJARA10 13 1	GUADALAJARA10 13	GUADALAJARA	GUADALAJARA
GUADALAJARA10 14 1	GUADALAJARA10 14	GUADALAJARA	GUADALAJARA
GUADALAJARA10 15 1	GUADALAJARA10 15	GUADALAJARA	GUADALAJARA
MONTERREY10 1 1	MONTERREY10 1	MONTERREY	MONTERREY
MONTERREY10 2 1	MONTERREY10 2	MONTERREY	MONTERREY
MONTERREY10 3 1	MONTERREY10 3	MONTERREY	MONTERREY
MONTERREY10 4 1	MONTERREY10 4	MONTERREY	MONTERREY
MONTERREY10 5 1	MONTERREY10 5	MONTERREY	MONTERREY
MONTERREY10 6 1	MONTERREY10 6	MONTERREY	MONTERREY
MONTERREY10 7 1	MONTERREY10 7	MONTERREY	MONTERREY
MONTERREY10 8 1	MONTERREY10 8	MONTERREY	MONTERREY
MONTERREY10 9 1	MONTERREY10 9	MONTERREY	MONTERREY
MONTERREY10 10 1	MONTERREY10 10	MONTERREY	MONTERREY
MONTERREY10 11 1	MONTERREY10 11	MONTERREY	MONTERREY
MONTERREY10 12 1	MONTERREY10 12	MONTERREY	MONTERREY
MONTERREY10 13 1	MONTERREY10 13	MONTERREY	MONTERREY
MONTERREY10 14 1	MONTERREY10 14	MONTERREY	MONTERREY
MONTERREY10 15 1	MONTERREY10 15	MONTERREY	MONTERREY
MERIDA10 1 1	MERIDA10 1	MERIDA	MERIDA
MERIDA10 2 1	MERIDA10 2	MERIDA	MERIDA
MERIDA10 3 1	MERIDA10 3	MERIDA	MERIDA
MERIDA10 4 1	MERIDA10 4	MERIDA	MERIDA
MERIDA10 5 1	MERIDA10 5	MERIDA	MERIDA
MERIDA10 6 1	MERIDA10 6	MERIDA	MERIDA
MERIDA10 7 1	MERIDA10 7	MERIDA	MERIDA
MERIDA10 8 1	MERIDA10 8	MERIDA	MERIDA
MERIDA10 9 1	MERIDA10 9	MERIDA	MERIDA
MERIDA10 10 1	MERIDA10 10	MERIDA	MERIDA
MERIDA10 11 1	MERIDA10 11	MERIDA	MERIDA
MERIDA10 12 1	MERIDA10 12	MERIDA	MERIDA
MERIDA10 13 1	MERIDA10 13	MERIDA	MERIDA
MERIDA10 14 1	MERIDA10 14	MERIDA	MERIDA
MERIDA10 15 1	MERIDA10 15	MERIDA	MERIDA
VERACRUZ10 1 1	VERACRUZ10 1	VERACRUZ	VERACRUZ
VERACRUZ10 2 1	VERACRUZ10 2	VERACRUZ	VERACRUZ
VERACRUZ10 3 1	VERACRUZ10 3	VERACRUZ	VERACRUZ
VERACRUZ10 4 1	VERACRUZ10 4	VERACRUZ	VERACRUZ
VERACRUZ10 5 1	VERACRUZ10 5	VERACRUZ	VERACRUZ

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<i>< name ></i>	<i>< vehicle ></i>	<i>< start – loc ></i>	<i>< end – loc ></i>
VERACRUZ10 6 1	VERACRUZ10 6	VERACRUZ	VERACRUZ
VERACRUZ10 7 1	VERACRUZ10 7	VERACRUZ	VERACRUZ
VERACRUZ10 8 1	VERACRUZ10 8	VERACRUZ	VERACRUZ
VERACRUZ10 9 1	VERACRUZ10 9	VERACRUZ	VERACRUZ
VERACRUZ10 10 1	VERACRUZ10 10	VERACRUZ	VERACRUZ
VERACRUZ10 11 1	VERACRUZ10 11	VERACRUZ	VERACRUZ
VERACRUZ10 12 1	VERACRUZ10 12	VERACRUZ	VERACRUZ
VERACRUZ10 13 1	VERACRUZ10 13	VERACRUZ	VERACRUZ
VERACRUZ10 14 1	VERACRUZ10 14	VERACRUZ	VERACRUZ
VERACRUZ10 15 1	VERACRUZ10 15	VERACRUZ	VERACRUZ
HERMOSILLO10 1 1	HERMOSILLO10 1	HERMOSILLO	HERMOSILLO
HERMOSILLO10 2 1	HERMOSILLO10 2	HERMOSILLO	HERMOSILLO
HERMOSILLO10 3 1	HERMOSILLO10 3	HERMOSILLO	HERMOSILLO
HERMOSILLO10 4 1	HERMOSILLO10 4	HERMOSILLO	HERMOSILLO
HERMOSILLO10 5 1	HERMOSILLO10 5	HERMOSILLO	HERMOSILLO
HERMOSILLO10 6 1	HERMOSILLO10 6	HERMOSILLO	HERMOSILLO
HERMOSILLO10 7 1	HERMOSILLO10 7	HERMOSILLO	HERMOSILLO
HERMOSILLO10 8 1	HERMOSILLO10 8	HERMOSILLO	HERMOSILLO
HERMOSILLO10 9 1	HERMOSILLO10 9	HERMOSILLO	HERMOSILLO
HERMOSILLO10 10 1	HERMOSILLO10 10	HERMOSILLO	HERMOSILLO
HERMOSILLO10 11 1	HERMOSILLO10 11	HERMOSILLO	HERMOSILLO
HERMOSILLO10 12 1	HERMOSILLO10 12	HERMOSILLO	HERMOSILLO
HERMOSILLO10 13 1	HERMOSILLO10 13	HERMOSILLO	HERMOSILLO
HERMOSILLO10 14 1	HERMOSILLO10 14	HERMOSILLO	HERMOSILLO
HERMOSILLO10 15 1	HERMOSILLO10 15	HERMOSILLO	HERMOSILLO
HERMOSILLO10 16 1	HERMOSILLO10 16	HERMOSILLO	HERMOSILLO
HERMOSILLO10 17 1	HERMOSILLO10 17	HERMOSILLO	HERMOSILLO
HERMOSILLO10 18 1	HERMOSILLO10 18	HERMOSILLO	HERMOSILLO
HERMOSILLO10 19 1	HERMOSILLO10 19	HERMOSILLO	HERMOSILLO
HERMOSILLO10 20 1	HERMOSILLO10 20	HERMOSILLO	HERMOSILLO
HERMOSILLO10 21 1	HERMOSILLO10 21	HERMOSILLO	HERMOSILLO
HERMOSILLO10 22 1	HERMOSILLO10 22	HERMOSILLO	HERMOSILLO

Table A.3: Routes.

END

REQUESTS

<i>< name ></i>	<i>< loc ></i>	<i>< value ></i>	<i>< LoadKG ></i>
BANK A QUERETARO1	QUERETARO	100,000	10,000.00
BANK A QUERETARO2	QUERETARO	100,000	3,867.29
BANK B QUERETARO	QUERETARO	100,000	582.82
BANK D QUERETARO1	QUERETARO	100,000	10,000.00
BANK D QUERETARO2	QUERETARO	100,000	7,736.20
BANK E QUERETARO	QUERETARO	100,000	6,525.99
BANK F QUERETARO	QUERETARO	100,000	641.10
BANK G QUERETARO	QUERETARO	100,000	4,327.72
BANK A CD JUAREZ	CD JUAREZ	100,000	5,714.38
BANK G CD JUAREZ1	CD JUAREZ	100,000	10,000.00
BANK G CD JUAREZ2	CD JUAREZ	100,000	10,000.00
BANK G CD JUAREZ3	CD JUAREZ	100,000	10,000.00
BANK G CD JUAREZ4	CD JUAREZ	100,000	7,675.31
BANK A TIJUANA1	TIJUANA	100,000	10,000.00
BANK A TIJUANA2	TIJUANA	100,000	7,028.14
BANK E TIJUANA1	TIJUANA	100,000	10,000.00
BANK E TIJUANA2	TIJUANA	100,000	3,843.73
BANK G TIJUANA	TIJUANA	100,000	6,361.37
BANK H TIJUANA	TIJUANA	100,000	232.51
BANK A PACHUCA1	PACHUCA	100,000	10,000.00
BANK A PACHUCA2	PACHUCA	100,000	747.37
BANK D PACHUCA	PACHUCA	100,000	1,892.60
BANK E PACHUCA1	PACHUCA	100,000	10,000.00
BANK E PACHUCA2	PACHUCA	100,000	8,812.86
BANK A VILLAHERMOSA	VILLAHERMOSA	100,000	7,914.51
BANK D VILLAHERMOSA	VILLAHERMOSA	100,000	2,230.82
BANK E VILLAHERMOSA1	VILLAHERMOSA	100,000	1,018.57
BANK E VILLAHERMOSA2	VILLAHERMOSA	100,000	10,000.00
BANK E VILLAHERMOSA3	VILLAHERMOSA	100,000	10,000.00
BANK A CUERNAVACA	CUERNAVACA	100,000	6,303.09
BANK E CUERNAVACA1	CUERNAVACA	100,000	4,860.19
BANK E CUERNAVACA2	CUERNAVACA	100,000	10,000.00
BANK E CUERNAVACA3	CUERNAVACA	100,000	10,000.00
BANK A LOS MOCHIS	LOS MOCHIS	100,000	2,688.70
BANK E LOS MOCHIS1	LOS MOCHIS	100,000	1,911.76
BANK E LOS MOCHIS2	LOS MOCHIS	100,000	10,000.00
BANK G LOS MOCHIS1	LOS MOCHIS	100,000	360.48
BANK G LOS MOCHIS2	LOS MOCHIS	100,000	10,000.00
BANK A ACAPULCO	ACAPULCO	100,000	7,876.69
BANK E ACAPULCO1	ACAPULCO	100,000	5,024.24
BANK E ACAPULCO2	ACAPULCO	100,000	10,000.00
BANK F ACAPULCO	ACAPULCO	100,000	641.10
BANK B TORREON	TORREON	100,000	860.27
BANK D TORREON	TORREON	100,000	1,158.19
BANK E TORREON1	TORREON	100,000	205.47
BANK E TORREON2	TORREON	100,000	10,000.00

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< name >	< loc >	< value >	< LoadKG >
BANK G TORREON	TORREON	100,000	9,287.85
BANK H TORREON	TORREON	100,000	134.85
BANK A MEXICALI	MEXICALI	100,000	6,301.54
BANK E MEXICALI	MEXICALI	100,000	8,191.66
BANK G MEXICALI	MEXICALI	100,000	6,472.97
BANK A CANCUN1	CANCUN	100,000	7,165.78
BANK A CANCUN2	CANCUN	100,000	10,000.00
BANK E CANCUN	CANCUN	100,000	1,953.05
BANK F CANCUN	CANCUN	100,000	500.66
BANK A TUXTLA GUTIERREZ	TUXTLA GUTIERREZ	100,000	5,031.75
BANK D TUXTLA GUTIERREZ	TUXTLA GUTIERREZ	100,000	2,948.18
BANK E TUXTLA GUTIERREZ	TUXTLA GUTIERREZ	100,000	6,154.29
BANK A TAMPICO	TAMPICO	100,000	5,812.97
BANK D TAMPICO	TAMPICO	100,000	661.25
BANK E TAMPICO	TAMPICO	100,000	7,254.20
BANK H TAMPICO	TAMPICO	100,000	186.01
BANK A LEON	LEON	100,000	7,977.13
BANK E LEON	LEON	100,000	5,346.71
BANK F LEON	LEON	100,000	536.93
BANK A SAN LUIS POTOSI	SAN LUIS POTOSI	100,000	5,105.22
BANK D SAN LUIS POTOSI	SAN LUIS POTOSI	100,000	461.29
BANK E SAN LUIS POTOSI	SAN LUIS POTOSI	100,000	6,401.98
BANK G SAN LUIS POTOSI	SAN LUIS POTOSI	100,000	1,860.05
BANK A MORELIA	MORELIA	100,000	3667.71
BANK D MORELIA	MORELIA	100,000	4380.11
BANK E MORELIA	MORELIA	100,000	5346.71
BANK A CD OBREGON	CD OBREGON	100,000	2,710.09
BANK D CD OBREGON	CD OBREGON	100,000	834.54
BANK E CD OBREGON	CD OBREGON	100,000	3,720.10
BANK F CD OBREGON	CD OBREGON	100,000	1,291.49
BANK G CD OBREGON	CD OBREGON	100,000	4,154.11
BANK A LA PAZ	LA PAZ	100,000	4,151.01
BANK E LA PAZ	LA PAZ	100,000	2,165.10
BANK F LA PAZ	LA PAZ	100,000	645.75
BANK G LA PAZ	LA PAZ	100,000	3,968.11
BANK A COATZACOALCOS	COATZACOALCOS	100,000	1,259.56
BANK E COATZACOALCOS	COATZACOALCOS	100,000	9,560.35
BANK A CHIHUAHUA	CHIHUAHUA	100,000	297.61
BANK E CHIHUAHUA1	CHIHUAHUA	100,000	50.47
BANK E CHIHUAHUA2	CHIHUAHUA	100,000	10,000.00
BANK F CHIHUAHUA	CHIHUAHUA	100,000	384.41
BANK A DURANGO	DURANGO	100,000	1,433.17
BANK E DURANGO	DURANGO	100,000	8,522.75
BANK F DURANGO	DURANGO	100,000	471.21
BANK A PUEBLA	PUEBLA	100,000	9,559.42
BANK F PUEBLA	PUEBLA	100,000	664.35
BANK A PUERTO VALLARTA	PUERTO VALLARTA	100,000	1,227.32
BANK D PUERTO VALLARTA	PUERTO VALLARTA	100,000	3,555.18

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<i>< name ></i>	<i>< loc ></i>	<i>< value ></i>	<i>< LoadKG ></i>
BANK E PUERTO VALLARTA	PUERTO VALLARTA	100,000	5,346.71
BANK A ZACATECAS	ZACATECAS	100,000	1,752.48
BANK E ZACATECAS	ZACATECAS	100,000	5,346.71
BANK F ZACATECAS	ZACATECAS	100,000	536.93
BANK G ZACATECAS	ZACATECAS	100,000	2,157.66
BANK A TAPACHULA	TAPACHULA	100,000	2,612.13
BANK D TAPACHULA	TAPACHULA	100,000	2,570.90
BANK E TAPACHULA	TAPACHULA	100,000	4,123.42
BANK E CD.DEL CARMEN	CD.DEL CARMEN	100,000	8,387.28
BANK A XALAPA	XALAPA	100,000	8,244.67
BANK E CD VICTORIA	CD VICTORIA	100,000	8,207.47
BANK A ZAMORA	ZAMORA	100,000	718.91
BANK E ZAMORA	ZAMORA	100,000	5,346.71
BANK G ZAMORA	ZAMORA	100,000	2,058.46
BANK A CORDOBA	CORDOBA	100,000	3,211.69
BANK E CORDOBA	CORDOBA	100,000	4,128.07
BANK F CORDOBA	CORDOBA	100,000	664.35
BANK A MAZATLAN	MAZATLAN	100,000	2,725.28
BANK D MAZATLAN	MAZATLAN	100,000	564.84
BANK E MAZATLAN	MAZATLAN	100,000	4,209.91
BANK F MAZATLAN	MAZATLAN	100,000	497.25
BANK A AGUASCALIENTES	AGUASCALIENTES	100,000	994.20
BANK E AGUASCALIENTES	AGUASCALIENTES	100,000	5,346.71
BANK G AGUASCALIENTES	AGUASCALIENTES	100,000	1,255.53
BANK A IGUALA	IGUALA	100,000	4,497.91
BANK D IGUALA	IGUALA	100,000	3,074.35
BANK A OAXACA	OAXACA	100,000	7,459.42
BANK D URUAPAN	URUAPAN	100,000	1,895.08
BANK E URUAPAN	URUAPAN	100,000	5,346.71
BANK A ZIHUATANEJO	ZIHUATANEJO	100,000	1,659.16
BANK E ZIHUATANEJO	ZIHUATANEJO	100,000	5,346.71
BANK A TEPIC	TEPIC	100,000	1,631.57
BANK E TEPIC	TEPIC	100,000	5,346.71
BANK A CELAYA	CELAYA	100,000	418.51
BANK E CELAYA	CELAYA	100,000	6,401.98
BANK A CIUDAD VALLES	CIUDAD VALLES	100,000	3,322.98
BANK E CIUDAD VALLES	CIUDAD VALLES	100,000	3,441.09
BANK A CAMPECHE	CAMPECHE	100,000	2,496.81
BANK B CAMPECHE	CAMPECHE	100,000	207.71
BANK E CAMPECHE	CAMPECHE	100,000	4,005.93
BANK E IRAPUATO	IRAPUATO	100,000	6,177.23
BANK A REYNOSA	REYNOSA	100,000	688.22
BANK E REYNOSA	REYNOSA	100,000	4,464.12
BANK A COLIMA	COLIMA	100,000	1,755.27
BANK D COLIMA	COLIMA	100,000	272.81
BANK E COLIMA	COLIMA	100,000	2,965.85
BANK E CULIACAN	CULIACAN	100,000	4,209.91
BANK F CULIACAN	CULIACAN	100,000	536.93

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<i>< name ></i>	<i>< loc ></i>	<i>< value ></i>	<i>< LoadKG ></i>
BANK A TOLUCA	TOLUCA	100,000	4,550.30
BANK E MONCLOVA	MONCLOVA	100,000	4,464.12
BANK E CD IXTEPEC	CD IXTEPEC	100,000	4,123.42
BANK E SALTILLO	SALTILLO	100,000	3,720.10
BANK A CHETUMAL	CHETUMAL	100,000	1,781.00
BANK B CHETUMAL	CHETUMAL	100,000	406.11
BANK E CHETUMAL	CHETUMAL	100,000	465.01
BANK A POZA RICA	POZA RICA	100,000	2,640.96
BANK A MATAMOROS	MATAMOROS	100,000	1,483.08
BANK A NOGALES	NOGALES	100,000	819.35
BANK A SALINA CRUZ	SALINA CRUZ	100,000	683.26
BANK B LAZARO CARDENAS	LAZARO CARDENAS	100,000	399.91

Table A.4: Requests.

END

EDGE WEIGHT Dist

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
ACAPULCO	ACAPULCO	0
ACAPULCO	AGUASCALIENTES	878
ACAPULCO	CAMPECHE	1,512
ACAPULCO	CANCUN	1,961
ACAPULCO	CD.DEL CARMEN	1,281
ACAPULCO	CD.IXTEPEC	696
ACAPULCO	CD.JUAREZ	2,161
ACAPULCO	CD.OBREGON	1,968
ACAPULCO	CD.VICTORIA	1,101
ACAPULCO	CELAYA	664
ACAPULCO	CHETUMAL	1,681
ACAPULCO	CHIHUAHUA	1,797
ACAPULCO	CIUDAD VALLES	833
ACAPULCO	COATZACOALCOS	947
ACAPULCO	COLIMA	654
ACAPULCO	CORDOBA	660
ACAPULCO	CUERNAVACA	290
ACAPULCO	CULIACAN	1,553
ACAPULCO	DURANGO	1,317
ACAPULCO	GUADALAJARA	790
ACAPULCO	HERMOSILLO	2,219
ACAPULCO	IGUALA	211
ACAPULCO	IRAPUATO	692
ACAPULCO	LA PAZ	100,000
ACAPULCO	LAZARO CARDENAS	331
ACAPULCO	LEON	763
ACAPULCO	LOS MOCHIS	1,745
ACAPULCO	MATAMOROS	1,333

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
ACAPULCO	MAZATLAN	1,444
ACAPULCO	MERIDA	1,665
ACAPULCO	MEXICALI	2,914
ACAPULCO	MEXICO	393
ACAPULCO	MONCLOVA	1,390
ACAPULCO	MONTERREY	1,281
ACAPULCO	MORELIA	633
ACAPULCO	NOGALES	2,497
ACAPULCO	OAXACA	604
ACAPULCO	ORIZABA	636
ACAPULCO	PACHUCA	469
ACAPULCO	POZA RICA	776
ACAPULCO	PUEBLA	448
ACAPULCO	PUERTO VALLARTA	945
ACAPULCO	QUERETARO	588
ACAPULCO	REYNOSA	1,345
ACAPULCO	SALINA CRUZ	649
ACAPULCO	SALTILLO	1,221
ACAPULCO	SAN LUIS POTOSI	788
ACAPULCO	TAMPICO	852
ACAPULCO	TAPACHULA	1,088
ACAPULCO	TEPIC	979
ACAPULCO	TIJUANA	3,090
ACAPULCO	TOLUCA	392
ACAPULCO	TORREON	1,355
ACAPULCO	TUXTLA GUTIERREZ	957
ACAPULCO	URUAPAN	493
ACAPULCO	VERACRUZ	768
ACAPULCO	VILLAHERMOSA	1,154
ACAPULCO	XALAPA	666
ACAPULCO	ZACATECAS	1,017
ACAPULCO	ZAMORA	753
ACAPULCO	ZIHUATANEJO	235
AGUASCALIENTES	ACAPULCO	878
AGUASCALIENTES	AGUASCALIENTES	0
AGUASCALIENTES	CAMPECHE	1,635
AGUASCALIENTES	CANANEA	1,831
AGUASCALIENTES	CANCUN	2,101
AGUASCALIENTES	CD.ACUNA	974
AGUASCALIENTES	CD.DEL CARMEN	1,421
AGUASCALIENTES	CD.DELICIAS	860
AGUASCALIENTES	CD.GUZMAN	344
AGUASCALIENTES	CD.IXTEPEC	1,222
AGUASCALIENTES	CD.JUAREZ	1,306
AGUASCALIENTES	CD.MANTE	486
AGUASCALIENTES	CD.OBREGON	1,283
AGUASCALIENTES	CD.VICTORIA	498
AGUASCALIENTES	CELAYA	252

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
AGUASCALIENTES	CHETUMAL	1,820
AGUASCALIENTES	CHIHUAHUA	906
AGUASCALIENTES	CIUDAD VALLES	419
AGUASCALIENTES	COATZACOALCOS	1,087
AGUASCALIENTES	COLIMA	411
AGUASCALIENTES	CORDOBA	783
AGUASCALIENTES	COSAMALOAPAN	922
AGUASCALIENTES	CUERNAVACA	581
AGUASCALIENTES	CULIACAN	869
AGUASCALIENTES	DURANGO	462
AGUASCALIENTES	ENSENADA	2,483
AGUASCALIENTES	FRESNILLO	172
AGUASCALIENTES	GUADALAJARA	217
AGUASCALIENTES	HERMOSILLO	1,535
AGUASCALIENTES	IGUALA	655
AGUASCALIENTES	IRAPUATO	194
AGUASCALIENTES	LA PAZ	100,000
AGUASCALIENTES	LAZARO CARDENAS	637
AGUASCALIENTES	LEON	127
AGUASCALIENTES	LOS MOCHIS	1,061
AGUASCALIENTES	MATAMOROS	814
AGUASCALIENTES	MAZATLAN	655
AGUASCALIENTES	MERIDA	1,805
AGUASCALIENTES	MEXICALI	2,249
AGUASCALIENTES	MEXICO	501
AGUASCALIENTES	MONCLOVA	676
AGUASCALIENTES	MONTERREY	573
AGUASCALIENTES	MORELIA	322
AGUASCALIENTES	NOGALES	1,813
AGUASCALIENTES	OAXACA	957
AGUASCALIENTES	ORIZABA	759
AGUASCALIENTES	PACHUCA	517
AGUASCALIENTES	POZA RICA	711
AGUASCALIENTES	PUEBLA	626
AGUASCALIENTES	PUERTO VALLARTA	520
AGUASCALIENTES	QUERETARO	296
AGUASCALIENTES	REYNOSA	804
AGUASCALIENTES	SALINA CRUZ	1,220
AGUASCALIENTES	SALTILLO	481
AGUASCALIENTES	SAN LUIS POTOSI	166
AGUASCALIENTES	TAMPICO	568
AGUASCALIENTES	TAPACHULA	1,576
AGUASCALIENTES	TEPIC	419
AGUASCALIENTES	TIJUANA	2,404
AGUASCALIENTES	TOLUCA	493
AGUASCALIENTES	TORREON	501
AGUASCALIENTES	TUXTLA GUTIERREZ	1,324
AGUASCALIENTES	URUAPAN	426

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
AGUASCALIENTES	VERACRUZ	891
AGUASCALIENTES	VILLAHERMOSA	1,243
AGUASCALIENTES	XALAPA	759
AGUASCALIENTES	ZACATECAS	118
AGUASCALIENTES	ZAMORA	326
AGUASCALIENTES	ZIHUATANEJO	673
CAMPECHE	ACAPULCO	1,512
CAMPECHE	AGUASCALIENTES	1,635
CAMPECHE	CAMPECHE	0
CAMPECHE	CANANEA	3,188
CAMPECHE	CANCUN	596
CAMPECHE	CD.ACUNA	2,449
CAMPECHE	CD.DEL CARMEN	208
CAMPECHE	CD.DELICIAS	2,477
CAMPECHE	CD.GUZMAN	1,758
CAMPECHE	CD.IXTEPEC	812
CAMPECHE	CD.JUAREZ	2,922
CAMPECHE	CD.MANTE	1,458
CAMPECHE	CD.OBREGON	2,786
CAMPECHE	CD.VICTORIA	1,574
CAMPECHE	CELAYA	1,400
CAMPECHE	CHETUMAL	257
CAMPECHE	CHIHUAHUA	2,522
CAMPECHE	CIUDAD VALLES	1,397
CAMPECHE	COATZACOALCOS	556
CAMPECHE	COLIMA	1,803
CAMPECHE	CORDOBA	854
CAMPECHE	COSAMALOAPAN	723
CAMPECHE	CUERNAVACA	1,230
CAMPECHE	CULIACAN	1,371
CAMPECHE	DURANGO	2,078
CAMPECHE	ENSENADA	3,974
CAMPECHE	FRESNILLO	1,789
CAMPECHE	GUADALAJARA	1,682
CAMPECHE	HERMOSILLO	3,037
CAMPECHE	IGUALA	1,336
CAMPECHE	IRAPUATO	1,454
CAMPECHE	LA PAZ	100,000
CAMPECHE	LAZARO CARDENAS	1,754
CAMPECHE	LEON	1,524
CAMPECHE	LOS MOCHIS	2,563
CAMPECHE	MATAMOROS	1,831
CAMPECHE	MAZATLAN	2,157
CAMPECHE	MERIDA	177
CAMPECHE	MEXICALI	3,732
CAMPECHE	MEXICO	1,150
CAMPECHE	MONCLOVA	2,051
CAMPECHE	MONTERREY	1,858

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CAMPECHE	MORELIA	1,440
CAMPECHE	NOGALES	3,315
CAMPECHE	OAXACA	993
CAMPECHE	ORIZABA	876
CAMPECHE	PACHUCA	1,164
CAMPECHE	POZA RICA	1,096
CAMPECHE	PUEBLA	1,019
CAMPECHE	PUERTO VALLARTA	1,975
CAMPECHE	QUERETARO	1,340
CAMPECHE	REYNOSA	1,833
CAMPECHE	SALINA CRUZ	848
CAMPECHE	SALTILLO	1,971
CAMPECHE	SAN LUIS POTOSI	1,549
CAMPECHE	TAMPICO	1,339
CAMPECHE	TAPACHULA	763
CAMPECHE	TEPIC	1,884
CAMPECHE	TIJUANA	3,908
CAMPECHE	TOLUCA	1,211
CAMPECHE	TORREON	2,117
CAMPECHE	TUXTLA GUTIERREZ	640
CAMPECHE	URUAPAN	1,549
CAMPECHE	VERACRUZ	859
CAMPECHE	VILLAHERMOSA	393
CAMPECHE	XALAPA	961
CAMPECHE	ZACATECAS	1,734
CAMPECHE	ZAMORA	1,571
CAMPECHE	ZIHUATANEJO	1,628
CANCUN	ACAPULCO	1,961
CANCUN	AGUASCALIENTES	2,101
CANCUN	CAMPECHE	596
CANCUN	CANANEA	3,650
CANCUN	CANCUN	0
CANCUN	CD.ACUNA	2,822
CANCUN	CD.DEL CARMEN	682
CANCUN	CD.DELICIAS	2,943
CANCUN	CD.GUZMAN	2,224
CANCUN	CD.IXTEPEC	1,278
CANCUN	CD.JUAREZ	3,388
CANCUN	CD.MANTE	1,951
CANCUN	CD.OBREGON	3,252
CANCUN	CD.VICTORIA	2,040
CANCUN	CELAYA	1,866
CANCUN	CHETUMAL	381
CANCUN	CHIHUAHUA	2,988
CANCUN	CIUDAD VALLES	1,863
CANCUN	COATZACOALCOS	1,022
CANCUN	COLIMA	2,269
CANCUN	CORDOBA	1,320

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CANCUN	COSAMALOAPAN	1,189
CANCUN	CUERNAVACA	1,697
CANCUN	CULIACAN	2,837
CANCUN	DURANGO	2,484
CANCUN	ENSENADA	4,440
CANCUN	FRESNILLO	2,255
CANCUN	GUADALAJARA	2,148
CANCUN	HERMOSILLO	3,504
CANCUN	IGUALA	1,803
CANCUN	IRAPUATO	1,920
CANCUN	LA PAZ	100,000
CANCUN	LAZARO CARDENAS	2,161
CANCUN	LEON	1,990
CANCUN	LOS MOCHIS	3,029
CANCUN	MATAMOROS	2,297
CANCUN	MAZATLAN	2,623
CANCUN	MERIDA	303
CANCUN	MEXICALI	4,198
CANCUN	MEXICO	1,617
CANCUN	MONCLOVA	2,517
CANCUN	MONTERREY	2,324
CANCUN	MORELIA	1,906
CANCUN	NOGALES	3,781
CANCUN	OAXACA	1,459
CANCUN	ORIZABA	1,343
CANCUN	PACHUCA	1,630
CANCUN	POZA RICA	1,572
CANCUN	PUEBLA	1,495
CANCUN	PUERTO VALLARTA	2,451
CANCUN	QUERETARO	1,816
CANCUN	REYNOSA	2,309
CANCUN	SALINA CRUZ	1,366
CANCUN	SALTILLO	2,449
CANCUN	SAN LUIS POTOSI	2,015
CANCUN	TAMPICO	1,805
CANCUN	TAPACHULA	1,295
CANCUN	TEPIC	2,350
CANCUN	TIJUANA	4,374
CANCUN	TOLUCA	1,677
CANCUN	TORREON	2,583
CANCUN	TUXTLA GUTIERREZ	1,106
CANCUN	URUAPAN	2,016
CANCUN	VERACRUZ	1,325
CANCUN	VILLAHERMOSA	859
CANCUN	XALAPA	1,427
CANCUN	ZACATECAS	2,200
CANCUN	ZAMORA	2,038
CANCUN	ZIHUATANEJO	2,094

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CD.DEL CARMEN	ACAPULCO	1,281
CD.DEL CARMEN	AGUASCALIENTES	1,421
CD.DEL CARMEN	CAMPECHE	208
CD.DEL CARMEN	CANANEA	2,970
CD.DEL CARMEN	CANCUN	682
CD.DEL CARMEN	CD.ACUNA	2,132
CD.DEL CARMEN	CD.DEL CARMEN	0
CD.DEL CARMEN	CD.DELICIAS	2,262
CD.DEL CARMEN	CD.GUZMAN	1,543
CD.DEL CARMEN	CD.IXTEPEC	597
CD.DEL CARMEN	CD.JUAREZ	2,707
CD.DEL CARMEN	CD.MANTE	1,379
CD.DEL CARMEN	CD.OBREGON	2,571
CD.DEL CARMEN	CD.VICTORIA	1,359
CD.DEL CARMEN	CELAYA	1,185
CD.DEL CARMEN	CHETUMAL	438
CD.DEL CARMEN	CHIHUAHUA	2,344
CD.DEL CARMEN	CIUDAD VALLES	1,182
CD.DEL CARMEN	COATZACOALCOS	341
CD.DEL CARMEN	COLIMA	1,588
CD.DEL CARMEN	CORDOBA	639
CD.DEL CARMEN	COSAMALOAPAN	508
CD.DEL CARMEN	CUERNAVACA	1,016
CD.DEL CARMEN	CULIACAN	2,156
CD.DEL CARMEN	DURANGO	1,863
CD.DEL CARMEN	ENSENADA	3,759
CD.DEL CARMEN	FRESNILLO	1,574
CD.DEL CARMEN	GUADALAJARA	1,468
CD.DEL CARMEN	HERMOSILLO	2,823
CD.DEL CARMEN	IGUALA	1,122
CD.DEL CARMEN	IRAPUATO	1,239
CD.DEL CARMEN	LA PAZ	100,000
CD.DEL CARMEN	LAZARO CARDENAS	1,408
CD.DEL CARMEN	LEON	1,309
CD.DEL CARMEN	LOS MOCHIS	2,348
CD.DEL CARMEN	MATAMOROS	1,617
CD.DEL CARMEN	MAZATLAN	1,942
CD.DEL CARMEN	MERIDA	385
CD.DEL CARMEN	MEXICALI	3,517
CD.DEL CARMEN	MEXICO	942
CD.DEL CARMEN	MONCLOVA	1,837
CD.DEL CARMEN	MONTERREY	1,644
CD.DEL CARMEN	MORELIA	1,225
CD.DEL CARMEN	NOGALES	3,100
CD.DEL CARMEN	OAXACA	778
CD.DEL CARMEN	ORIZABA	662
CD.DEL CARMEN	PACHUCA	949
CD.DEL CARMEN	POZA RICA	891

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CD.DEL CARMEN	PUEBLA	814
CD.DEL CARMEN	PUERTO VALLARTA	1,170
CD.DEL CARMEN	QUERETARO	1,135
CD.DEL CARMEN	REYNOSA	1,629
CD.DEL CARMEN	SALINA CRUZ	685
CD.DEL CARMEN	SALTILLO	1,768
CD.DEL CARMEN	SAN LUIS POTOSI	1,335
CD.DEL CARMEN	TAMPICO	1,124
CD.DEL CARMEN	TAPACHULA	745
CD.DEL CARMEN	TEPIC	1,669
CD.DEL CARMEN	TIJUANA	3,693
CD.DEL CARMEN	TOLUCA	996
CD.DEL CARMEN	TORREON	1,902
CD.DEL CARMEN	TUXTLA GUTIERREZ	425
CD.DEL CARMEN	URUAPAN	1,335
CD.DEL CARMEN	VERACRUZ	644
CD.DEL CARMEN	VILLAHERMOSA	178
CD.DEL CARMEN	XALAPA	747
CD.DEL CARMEN	ZACATECAS	1,519
CD.DEL CARMEN	ZAMORA	1,357
CD.DEL CARMEN	ZIHUATANEJO	1,413
CD.IXTEPEC	ACAPULCO	696
CD.IXTEPEC	AGUASCALIENTES	1,222
CD.IXTEPEC	CAMPECHE	812
CD.IXTEPEC	CANCUN	1,278
CD.IXTEPEC	CD.DEL CARMEN	597
CD.IXTEPEC	CD.IXTEPEC	0
CD.IXTEPEC	CD.JUAREZ	2,503
CD.IXTEPEC	CD.MANTE	1,066
CD.IXTEPEC	CD.OBREGON	2,366
CD.IXTEPEC	CD.VICTORIA	1,155
CD.IXTEPEC	CELAYA	980
CD.IXTEPEC	CHETUMAL	990
CD.IXTEPEC	CHIHUAHUA	2,103
CD.IXTEPEC	CIUDAD VALLES	977
CD.IXTEPEC	COATZACOALCOS	257
CD.IXTEPEC	COLIMA	1,383
CD.IXTEPEC	CORDOBA	434
CD.IXTEPEC	COSAMALOAPAN	304
CD.IXTEPEC	CUERNAVACA	713
CD.IXTEPEC	CULIACAN	1,952
CD.IXTEPEC	DURANGO	1,659
CD.IXTEPEC	ENSENADA	3,555
CD.IXTEPEC	FRESNILLO	1,369
CD.IXTEPEC	GUADALAJARA	1,263
CD.IXTEPEC	HERMOSILLO	2,618
CD.IXTEPEC	IGUALA	819
CD.IXTEPEC	IRAPUATO	1,035

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CD.IXTEPEC	LA PAZ	100,000
CD.IXTEPEC	LAZARO CARDENAS	1,035
CD.IXTEPEC	LEON	1,105
CD.IXTEPEC	LOS MOCHIS	2,144
CD.IXTEPEC	MATAMOROS	1,412
CD.IXTEPEC	MAZATLAN	1,738
CD.IXTEPEC	MERIDA	975
CD.IXTEPEC	MEXICALI	3,313
CD.IXTEPEC	MEXICO	737
CD.IXTEPEC	MONCLOVA	1,732
CD.IXTEPEC	MONTERREY	1,439
CD.IXTEPEC	MORELIA	1,020
CD.IXTEPEC	NOGALES	2,896
CD.IXTEPEC	OAXACA	280
CD.IXTEPEC	ORIZABA	457
CD.IXTEPEC	PACHUCA	745
CD.IXTEPEC	POZA RICA	686
CD.IXTEPEC	PUEBLA	609
CD.IXTEPEC	PUERTO VALLARTA	1,565
CD.IXTEPEC	QUERETARO	930
CD.IXTEPEC	REYNOSA	1,424
CD.IXTEPEC	SALINA CRUZ	58.5
CD.IXTEPEC	SALTILLO	1,564
CD.IXTEPEC	SAN LUIS POTOSI	1,130
CD.IXTEPEC	TAMPICO	920
CD.IXTEPEC	TAPACHULA	411
CD.IXTEPEC	TEPIC	1,763
CD.IXTEPEC	TIJUANA	3,489
CD.IXTEPEC	TOLUCA	791
CD.IXTEPEC	TORREON	1,698
CD.IXTEPEC	TUXTLA GUTIERREZ	279
CD.IXTEPEC	URUAPAN	1,130
CD.IXTEPEC	VERACRUZ	439
CD.IXTEPEC	VILLAHERMOSA	413
CD.IXTEPEC	XALAPA	542
CD.IXTEPEC	ZACATECAS	1,315
CD.IXTEPEC	ZAMORA	1,152
CD.IXTEPEC	ZIHUATANEJO	939
CD.JUAREZ	ACAPULCO	2,161
CD.JUAREZ	AGUASCALIENTES	1,306
CD.JUAREZ	CAMPECHE	2,922
CD.JUAREZ	CANANEA	455
CD.JUAREZ	CANCUN	3,388
CD.JUAREZ	CD.ACUNA	686
CD.JUAREZ	CD.DEL CARMEN	2,707
CD.JUAREZ	CD.DELICIAS	449
CD.JUAREZ	CD.GUZMAN	1,603
CD.JUAREZ	CD.IXTEPEC	2,503

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CD.JUAREZ	CD.JUAREZ	0
CD.JUAREZ	CD.MANTE	1,584
CD.JUAREZ	CD.OBREGON	999
CD.JUAREZ	CD.VICTORIA	1,447
CD.JUAREZ	CELAYA	1,561
CD.JUAREZ	CHETUMAL	3,105
CD.JUAREZ	CHIHUAHUA	417
CD.JUAREZ	CIUDAD VALLES	1,636
CD.JUAREZ	COATZACOALCOS	2,371
CD.JUAREZ	COLIMA	1,670
CD.JUAREZ	CORDOBA	2,068
CD.JUAREZ	COSAMALOAPAN	2,206
CD.JUAREZ	CUERNAVACA	1,874
CD.JUAREZ	CULIACAN	1,507
CD.JUAREZ	DURANGO	925
CD.JUAREZ	ENSENADA	1,346
CD.JUAREZ	FRESNILLO	1,136
CD.JUAREZ	GUADALAJARA	1,482
CD.JUAREZ	HERMOSILLO	750
CD.JUAREZ	IGUALA	1,940
CD.JUAREZ	IRAPUATO	1,502
CD.JUAREZ	LA PAZ	100,000
CD.JUAREZ	LAZARO CARDENAS	1,946
CD.JUAREZ	LEON	1,436
CD.JUAREZ	LOS MOCHIS	1,232
CD.JUAREZ	MATAMOROS	1,485
CD.JUAREZ	MAZATLAN	1,237
CD.JUAREZ	MERIDA	3,089
CD.JUAREZ	MEXICALI	1,136
CD.JUAREZ	MEXICO	1,793
CD.JUAREZ	MONCLOVA	1,198
CD.JUAREZ	MONTERREY	1,170
CD.JUAREZ	MORELIA	1,631
CD.JUAREZ	NOGALES	599
CD.JUAREZ	OAXACA	2,242
CD.JUAREZ	ORIZABA	2,043
CD.JUAREZ	PACHUCA	1,801
CD.JUAREZ	POZA RICA	1,904
CD.JUAREZ	PUEBLA	1,910
CD.JUAREZ	PUERTO VALLARTA	1,615
CD.JUAREZ	QUERETARO	1,589
CD.JUAREZ	REYNOSA	1,400
CD.JUAREZ	SALINA CRUZ	2,504
CD.JUAREZ	SALTILLO	1,088
CD.JUAREZ	SAN LUIS POTOSI	1,381
CD.JUAREZ	TAMPICO	1,665
CD.JUAREZ	TAPACHULA	2,861
CD.JUAREZ	TEPIC	1,451

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CD.JUAREZ	TIJUANA	1,297
CD.JUAREZ	TOLUCA	1,777
CD.JUAREZ	TORREON	837
CD.JUAREZ	TUXTLA GUTIERREZ	2,608
CD.JUAREZ	URUAPAN	1,734
CD.JUAREZ	VERACRUZ	2,175
CD.JUAREZ	VILLAHERMOSA	2,528
CD.JUAREZ	XALAPA	2,043
CD.JUAREZ	ZACATECAS	1,195
CD.JUAREZ	ZAMORA	1,635
CD.JUAREZ	ZIHUATANEJO	1,982
CD.OBREGON	ACAPULCO	1,968
CD.OBREGON	AGUASCALIENTES	1,283
CD.OBREGON	CAMPECHE	2,786
CD.OBREGON	CANCUN	3,252
CD.OBREGON	CD.DEL CARMEN	2,571
CD.OBREGON	CD.IXTEPEC	2,366
CD.OBREGON	CD.JUAREZ	999
CD.OBREGON	CD.MANTE	1,670
CD.OBREGON	CD.OBREGON	0
CD.OBREGON	CD.VICTORIA	1,686
CD.OBREGON	CELAYA	1,408
CD.OBREGON	CHETUMAL	2,962
CD.OBREGON	CHIHUAHUA	679
CD.OBREGON	CIUDAD VALLES	1,610
CD.OBREGON	COATZACOALCOS	2,228
CD.OBREGON	COLIMA	1,286
CD.OBREGON	CORDOBA	1,925
CD.OBREGON	COSAMALOAPAN	2,064
CD.OBREGON	CUERNAVACA	1,666
CD.OBREGON	CULIACAN	434
CD.OBREGON	DURANGO	941
CD.OBREGON	ENSENADA	1,189
CD.OBREGON	FRESNILLO	1,110
CD.OBREGON	GUADALAJARA	1,106
CD.OBREGON	HERMOSILLO	252
CD.OBREGON	IGUALA	1,740
CD.OBREGON	IRAPUATO	1,348
CD.OBREGON	LA PAZ	100,000
CD.OBREGON	LAZARO CARDENAS	1,587
CD.OBREGON	LEON	1,323
CD.OBREGON	LOS MOCHIS	230
CD.OBREGON	MATAMOROS	1,751
CD.OBREGON	MAZATLAN	632
CD.OBREGON	MERIDA	2,947
CD.OBREGON	MEXICALI	947
CD.OBREGON	MEXICO	1,640
CD.OBREGON	MONCLOVA	1,465

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CD.OBREGON	MONTERREY	1,463
CD.OBREGON	MORELIA	1,390
CD.OBREGON	NOGALES	529
CD.OBREGON	OAXACA	2,099
CD.OBREGON	ORIZABA	1,901
CD.OBREGON	PACHUCA	1,659
CD.OBREGON	POZA RICA	1,853
CD.OBREGON	PUEBLA	1,768
CD.OBREGON	PUERTO VALLARTA	1,064
CD.OBREGON	QUERETARO	1,451
CD.OBREGON	REYNOSA	1,693
CD.OBREGON	SALINA CRUZ	2,362
CD.OBREGON	SALTILLO	1,354
CD.OBREGON	SAN LUIS POTOSI	1,356
CD.OBREGON	TAMPICO	1,759
CD.OBREGON	TAPACHULA	2,718
CD.OBREGON	TEPIC	901
CD.OBREGON	TIJUANA	1,123
CD.OBREGON	TOLUCA	1,577
CD.OBREGON	TORREON	1,103
CD.OBREGON	TUXTLA GUTIERREZ	2,466
CD.OBREGON	URUAPAN	1,362
CD.OBREGON	VERACRUZ	2,032
CD.OBREGON	VILLAHERMOSA	2,385
CD.OBREGON	XALAPA	1,900
CD.OBREGON	ZACATECAS	1,170
CD.OBREGON	ZAMORA	1,263
CD.OBREGON	ZIHUATANEJO	1,623
CD.VICTORIA	ACAPULCO	1,101
CD.VICTORIA	AGUASCALIENTES	498
CD.VICTORIA	CAMPECHE	1,574
CD.VICTORIA	CANCUN	2,040
CD.VICTORIA	CD.DEL CARMEN	1,359
CD.VICTORIA	CD.IXTEPEC	1,155
CD.VICTORIA	CD.JUAREZ	1,447
CD.VICTORIA	CD.MANTE	137
CD.VICTORIA	CD.OBREGON	1,686
CD.VICTORIA	CD.VICTORIA	0
CD.VICTORIA	CELAYA	571
CD.VICTORIA	CHETUMAL	1,753
CD.VICTORIA	CHIHUAHUA	1,042
CD.VICTORIA	CIUDAD VALLES	231
CD.VICTORIA	COATZACOALCOS	1,019
CD.VICTORIA	COLIMA	855
CD.VICTORIA	CORDOBA	818
CD.VICTORIA	COSAMALOAPAN	854
CD.VICTORIA	CUERNAVACA	754
CD.VICTORIA	CULIACAN	1,259

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CD.VICTORIA	DURANGO	852
CD.VICTORIA	ENSENADA	2,596
CD.VICTORIA	FRESNILLO	570
CD.VICTORIA	GUADALAJARA	663
CD.VICTORIA	HERMOSILLO	1,773
CD.VICTORIA	IGUALA	874
CD.VICTORIA	IRAPUATO	523
CD.VICTORIA	LA PAZ	100,000
CD.VICTORIA	LAZARO CARDENAS	1,024
CD.VICTORIA	LEON	693
CD.VICTORIA	LOS MOCHIS	1,451
CD.VICTORIA	MATAMOROS	318
CD.VICTORIA	MAZATLAN	1,044
CD.VICTORIA	MERIDA	1,737
CD.VICTORIA	MEXICALI	2,367
CD.VICTORIA	MEXICO	668
CD.VICTORIA	MONCLOVA	514
CD.VICTORIA	MONTERREY	285
CD.VICTORIA	MORELIA	709
CD.VICTORIA	NOGALES	1,851
CD.VICTORIA	OAXACA	1,049
CD.VICTORIA	ORIZABA	820
CD.VICTORIA	PACHUCA	736
CD.VICTORIA	POZA RICA	477
CD.VICTORIA	PUEBLA	702
CD.VICTORIA	PUERTO VALLARTA	964
CD.VICTORIA	QUERETARO	523
CD.VICTORIA	REYNOSA	448
CD.VICTORIA	SALINA CRUZ	1,190
CD.VICTORIA	SALTILLO	367
CD.VICTORIA	SAN LUIS POTOSI	333
CD.VICTORIA	TAMPICO	238
CD.VICTORIA	TAPACHULA	1,509
CD.VICTORIA	TEPIC	863
CD.VICTORIA	TIJUANA	2,528
CD.VICTORIA	TOLUCA	711
CD.VICTORIA	TORREON	612
CD.VICTORIA	TUXTLA GUTIERREZ	1,256
CD.VICTORIA	URUAPAN	819
CD.VICTORIA	VERACRUZ	718
CD.VICTORIA	VILLAHERMOSA	1,176
CD.VICTORIA	XALAPA	746
CD.VICTORIA	ZACATECAS	515
CD.VICTORIA	ZAMORA	767
CD.VICTORIA	ZIHUATANEJO	1,060
CELAYA	ACAPULCO	664
CELAYA	AGUASCALIENTES	252
CELAYA	CAMPECHE	1,400

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CELAYA	CANCUN	1,866
CELAYA	CD.DEL CARMEN	1,185
CELAYA	CD.IXTEPEC	980
CELAYA	CD.JUAREZ	1,561
CELAYA	CD.MANTE	518
CELAYA	CD.OBREGON	1,408
CELAYA	CD.VICTORIA	571
CELAYA	CELAYA	0
CELAYA	CHETUMAL	1,577
CELAYA	CHIHUAHUA	1,157
CELAYA	CIUDAD VALLES	425
CELAYA	COATZACOALCOS	843
CELAYA	COLIMA	422
CELAYA	CORDOBA	539
CELAYA	COSAMALOAPAN	678
CELAYA	CUERNAVACA	333
CELAYA	CULIACAN	994
CELAYA	DURANGO	713
CELAYA	ENSENADA	2,597
CELAYA	FRESNILLO	423
CELAYA	GUADALAJARA	306
CELAYA	HERMOSILLO	1,660
CELAYA	IGUALA	407
CELAYA	IRAPUATO	63.3
CELAYA	LA PAZ	100,000
CELAYA	LAZARO CARDENAS	455
CELAYA	LEON	133
CELAYA	LOS MOCHIS	1,186
CELAYA	MATAMOROS	888
CELAYA	MAZATLAN	779
CELAYA	MERIDA	1,561
CELAYA	MEXICALI	2,355
CELAYA	MEXICO	264
CELAYA	MONCLOVA	862
CELAYA	MONTERREY	753
CELAYA	MORELIA	140
CELAYA	NOGALES	1,937
CELAYA	OAXACA	713
CELAYA	ORIZABA	523
CELAYA	PACHUCA	273
CELAYA	POZA RICA	467
CELAYA	PUEBLA	382
CELAYA	PUERTO VALLARTA	607
CELAYA	QUERETARO	52
CELAYA	REYNOSA	900
CELAYA	SALINA CRUZ	976
CELAYA	SALTILLO	694
CELAYA	SAN LUIS POTOSI	260

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CELAYA	TAMPICO	548
CELAYA	TAPACHULA	1,332
CELAYA	TEPIC	506
CELAYA	TIJUANA	2,531
CELAYA	TOLUCA	249
CELAYA	TORREON	752
CELAYA	TUXTLA GUTIERREZ	1,080
CELAYA	URUAPAN	240
CELAYA	VERACRUZ	647
CELAYA	VILLAHERMOSA	1,000
CELAYA	XALAPA	515
CELAYA	ZACATECAS	369
CELAYA	ZAMORA	205
CELAYA	ZIHUATANEJO	491
CHETUMAL	ACAPULCO	1,681
CHETUMAL	AGUASCALIENTES	1,820
CHETUMAL	CAMPECHE	257
CHETUMAL	CANCUN	381
CHETUMAL	CD.DEL CARMEN	438
CHETUMAL	CD.IXTEPEC	990
CHETUMAL	CD.JUAREZ	3,105
CHETUMAL	CD.MANTE	1,664
CHETUMAL	CD.OBREGON	2,962
CHETUMAL	CD.VICTORIA	1,753
CHETUMAL	CELAYA	1,577
CHETUMAL	CHETUMAL	0
CHETUMAL	CHIHUAHUA	2,706
CHETUMAL	CIUDAD VALLES	1,580
CHETUMAL	COATZACOALCOS	739
CHETUMAL	COLIMA	1,986
CHETUMAL	CORDOBA	1,037
CHETUMAL	COSAMALOAPAN	906
CHETUMAL	CUERNAVACA	1,417
CHETUMAL	CULIACAN	2,555
CHETUMAL	DURANGO	2,262
CHETUMAL	ENSENADA	4,157
CHETUMAL	FRESNILLO	1,972
CHETUMAL	GUADALAJARA	1,867
CHETUMAL	HERMOSILLO	3,221
CHETUMAL	IGUALA	1,520
CHETUMAL	IRAPUATO	1,637
CHETUMAL	LA PAZ	100,000
CHETUMAL	LAZARO CARDENAS	1,878
CHETUMAL	LEON	1,707
CHETUMAL	LOS MOCHIS	2,747
CHETUMAL	MATAMOROS	2,014
CHETUMAL	MAZATLAN	2,340
CHETUMAL	MERIDA	386

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CHETUMAL	MEXICALI	3,916
CHETUMAL	MEXICO	1,334
CHETUMAL	MONCLOVA	2,234
CHETUMAL	MONTERREY	2,041
CHETUMAL	MORELIA	1,623
CHETUMAL	NOGALES	3,498
CHETUMAL	OAXACA	1,176
CHETUMAL	ORIZABA	1,060
CHETUMAL	PACHUCA	1,348
CHETUMAL	POZA RICA	1,289
CHETUMAL	PUEBLA	1,212
CHETUMAL	PUERTO VALLARTA	2,168
CHETUMAL	QUERETARO	1,533
CHETUMAL	REYNOSA	2,026
CHETUMAL	SALINA CRUZ	1,031
CHETUMAL	SALTILLO	2,166
CHETUMAL	SAN LUIS POTOSI	1,733
CHETUMAL	TAMPICO	1,522
CHETUMAL	TAPACHULA	946
CHETUMAL	TEPIC	2,067
CHETUMAL	TIJUANA	4,091
CHETUMAL	TOLUCA	1,394
CHETUMAL	TORREON	2,300
CHETUMAL	TUXTLA GUTIERREZ	778
CHETUMAL	URUAPAN	1,733
CHETUMAL	VERACRUZ	1,042
CHETUMAL	VILLAHERMOSA	577
CHETUMAL	XALAPA	1,145
CHETUMAL	ZACATECAS	1,917
CHETUMAL	ZAMORA	1,755
CHETUMAL	ZIHUATANEJO	1,811
CHIHUAHUA	ACAPULCO	1,797
CHIHUAHUA	AGUASCALIENTES	906
CHIHUAHUA	CAMPECHE	2,522
CHIHUAHUA	CANCUN	2,988
CHIHUAHUA	CD.DEL CARMEN	2,344
CHIHUAHUA	CD.IXTEPEC	2,103
CHIHUAHUA	CD.JUAREZ	417
CHIHUAHUA	CD.MANTE	1,179
CHIHUAHUA	CD.OBREGON	679
CHIHUAHUA	CD.VICTORIA	1,042
CHIHUAHUA	CELAYA	1,157
CHIHUAHUA	CHETUMAL	2,706
CHIHUAHUA	CHIHUAHUA	0
CHIHUAHUA	CIUDAD VALLES	1,273
CHIHUAHUA	COATZACOALCOS	2,009
CHIHUAHUA	COLIMA	1,308
CHIHUAHUA	CORDOBA	1,705

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CHIHUAHUA	COSAMALOAPAN	1,844
CHIHUAHUA	CUERNAVACA	1,512
CHIHUAHUA	CULIACAN	1,130
CHIHUAHUA	DURANGO	638
CHIHUAHUA	ENSENADA	1,655
CHIHUAHUA	FRESNILLO	773
CHIHUAHUA	GUADALAJARA	1,120
CHIHUAHUA	HERMOSILLO	727
CHIHUAHUA	IGUALA	1,577
CHIHUAHUA	IRAPUATO	1,140
CHIHUAHUA	LA PAZ	100,000
CHIHUAHUA	LAZARO CARDENAS	1,584
CHIHUAHUA	LEON	1,074
CHIHUAHUA	LOS MOCHIS	881
CHIHUAHUA	MATAMOROS	1,123
CHIHUAHUA	MAZATLAN	915
CHIHUAHUA	MERIDA	2,727
CHIHUAHUA	MEXICALI	1,383
CHIHUAHUA	MEXICO	1,431
CHIHUAHUA	MONCLOVA	836
CHIHUAHUA	MONTERREY	808
CHIHUAHUA	MORELIA	1,269
CHIHUAHUA	NOGALES	812
CHIHUAHUA	OAXACA	1,879
CHIHUAHUA	ORIZABA	1,681
CHIHUAHUA	PACHUCA	1,439
CHIHUAHUA	POZA RICA	1,542
CHIHUAHUA	PUEBLA	1,548
CHIHUAHUA	PUERTO VALLARTA	1,293
CHIHUAHUA	QUERETARO	1,227
CHIHUAHUA	REYNOSA	1,038
CHIHUAHUA	SALINA CRUZ	2,142
CHIHUAHUA	SALTILLO	725
CHIHUAHUA	SAN LUIS POTOSI	1,019
CHIHUAHUA	TAMPICO	1,302
CHIHUAHUA	TAPACHULA	2,498
CHIHUAHUA	TEPIC	1,130
CHIHUAHUA	TIJUANA	1,491
CHIHUAHUA	TOLUCA	1,415
CHIHUAHUA	TORREON	474
CHIHUAHUA	TUXTLA GUTIERREZ	2,246
CHIHUAHUA	URUAPAN	1,372
CHIHUAHUA	VERACRUZ	1,813
CHIHUAHUA	VILLAHERMOSA	2,166
CHIHUAHUA	XALAPA	1,681
CHIHUAHUA	ZACATECAS	833
CHIHUAHUA	ZAMORA	1,273
CHIHUAHUA	ZIHUATANEJO	1,619

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CIUDAD VALLES	ACAPULCO	833
CIUDAD VALLES	AGUASCALIENTES	419
CIUDAD VALLES	CAMPECHE	1,397
CIUDAD VALLES	CANANEA	1,901
CIUDAD VALLES	CANCUN	1,863
CIUDAD VALLES	CD.ACUNA	998
CIUDAD VALLES	CD.DEL CARMEN	1,182
CIUDAD VALLES	CD.DELICIAS	1,189
CIUDAD VALLES	CD.GUZMAN	710
CIUDAD VALLES	CD.IXTEPEC	977
CIUDAD VALLES	CD.JUAREZ	1,636
CIUDAD VALLES	CD.MANTE	96.6
CIUDAD VALLES	CD.OBREGON	1,610
CIUDAD VALLES	CD.VICTORIA	231
CIUDAD VALLES	CELAYA	425
CIUDAD VALLES	CHETUMAL	1,580
CIUDAD VALLES	CHIHUAHUA	1,273
CIUDAD VALLES	CIUDAD VALLES	0
CIUDAD VALLES	COATZACOALCOS	835
CIUDAD VALLES	COLIMA	776
CIUDAD VALLES	CORDOBA	646
CIUDAD VALLES	COSAMALOAPAN	671
CIUDAD VALLES	CUERNAVACA	525
CIUDAD VALLES	CULIACAN	1,194
CIUDAD VALLES	DURANGO	787
CIUDAD VALLES	ENSENADA	2,946
CIUDAD VALLES	FRESNILLO	497
CIUDAD VALLES	GUADALAJARA	584
CIUDAD VALLES	HERMOSILLO	1,860
CIUDAD VALLES	IGUALA	631
CIUDAD VALLES	IRAPUATO	434
CIUDAD VALLES	LA PAZ	100,000
CIUDAD VALLES	LAZARO CARDENAS	877
CIUDAD VALLES	LEON	434
CIUDAD VALLES	LOS MOCHIS	1,386
CIUDAD VALLES	MATAMOROS	547
CIUDAD VALLES	MAZATLAN	980
CIUDAD VALLES	MERIDA	1,554
CIUDAD VALLES	MEXICALI	2,600
CIUDAD VALLES	MEXICO	439
CIUDAD VALLES	MONCLOVA	777
CIUDAD VALLES	MONTERREY	668
CIUDAD VALLES	MORELIA	562
CIUDAD VALLES	NOGALES	2,040
CIUDAD VALLES	OAXACA	820
CIUDAD VALLES	ORIZABA	622
CIUDAD VALLES	PACHUCA	386
CIUDAD VALLES	POZA RICA	292

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CIUDAD VALLES	PUEBLA	489
CIUDAD VALLES	PUERTO VALLARTA	885
CIUDAD VALLES	QUERETARO	435
CIUDAD VALLES	REYNOSA	679
CIUDAD VALLES	SALINA CRUZ	1,007
CIUDAD VALLES	SALTILLO	599
CIUDAD VALLES	SAN LUIS POTOSI	258
CIUDAD VALLES	TAMPICO	193
CIUDAD VALLES	TAPACHULA	1,325
CIUDAD VALLES	TEPIC	785
CIUDAD VALLES	TIJUANA	2,780
CIUDAD VALLES	TOLUCA	498
CIUDAD VALLES	TORREON	826
CIUDAD VALLES	TUXTLA GUTIERREZ	1,073
CIUDAD VALLES	URUAPAN	646
CIUDAD VALLES	VERACRUZ	534
CIUDAD VALLES	VILLAHERMOSA	992
CIUDAD VALLES	XALAPA	494
CIUDAD VALLES	ZACATECAS	443
CIUDAD VALLES	ZAMORA	620
CIUDAD VALLES	ZIHUATANEJO	887
COATZACOALCOS	ACAPULCO	947
COATZACOALCOS	AGUASCALIENTES	1,087
COATZACOALCOS	CAMPECHE	556
COATZACOALCOS	CANCUN	1,022
COATZACOALCOS	CD.DEL CARMEN	341
COATZACOALCOS	CD.IXTEPEC	257
COATZACOALCOS	CD.JUAREZ	2,371
COATZACOALCOS	CD.MANTE	930
COATZACOALCOS	CD.OBREGON	2,228
COATZACOALCOS	CD.VICTORIA	1,019
COATZACOALCOS	CELAYA	843
COATZACOALCOS	CHETUMAL	739
COATZACOALCOS	CHIHUAHUA	2,009
COATZACOALCOS	CIUDAD VALLES	835
COATZACOALCOS	COATZACOALCOS	0
COATZACOALCOS	COLIMA	1,379
COATZACOALCOS	CORDOBA	304
COATZACOALCOS	COSAMALOAPAN	174
COATZACOALCOS	CUERNAVACA	681
COATZACOALCOS	CULIACAN	1,822
COATZACOALCOS	DURANGO	1,529
COATZACOALCOS	ENSENADA	3,425
COATZACOALCOS	FRESNILLO	1,239
COATZACOALCOS	GUADALAJARA	1,134
COATZACOALCOS	HERMOSILLO	2,488
COATZACOALCOS	IGUALA	787
COATZACOALCOS	IRAPUATO	905

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
COATZACOALCOS	LA PAZ	100,000
COATZACOALCOS	LAZARO CARDENAS	1,145
COATZACOALCOS	LEON	975
COATZACOALCOS	LOS MOCHIS	2,014
COATZACOALCOS	MATAMOROS	1,281
COATZACOALCOS	MAZATLAN	1,608
COATZACOALCOS	MERIDA	726
COATZACOALCOS	MEXICALI	3,183
COATZACOALCOS	MEXICO	601
COATZACOALCOS	MONCLOVA	1,501
COATZACOALCOS	MONTERREY	1,309
COATZACOALCOS	MORELIA	891
COATZACOALCOS	NOGALES	2,766
COATZACOALCOS	OAXACA	433
COATZACOALCOS	ORIZABA	327
COATZACOALCOS	PACHUCA	615
COATZACOALCOS	POZA RICA	556
COATZACOALCOS	PUEBLA	479
COATZACOALCOS	PUERTO VALLARTA	1,435
COATZACOALCOS	QUERETARO	800
COATZACOALCOS	REYNOSA	1,294
COATZACOALCOS	SALINA CRUZ	298
COATZACOALCOS	SALTILLO	1,434
COATZACOALCOS	SAN LUIS POTOSI	1,000
COATZACOALCOS	TAMPICO	790
COATZACOALCOS	TAPACHULA	565
COATZACOALCOS	TEPIC	1,335
COATZACOALCOS	TIJUANA	3,359
COATZACOALCOS	TOLUCA	662
COATZACOALCOS	TORREON	1,568
COATZACOALCOS	TUXTLA GUTIERREZ	320
COATZACOALCOS	URUAPAN	1,000
COATZACOALCOS	VERACRUZ	309
COATZACOALCOS	VILLAHERMOSA	164
COATZACOALCOS	XALAPA	412
COATZACOALCOS	ZACATECAS	1,185
COATZACOALCOS	ZAMORA	1,022
COATZACOALCOS	ZIHUATANEJO	1,078
COLIMA	ACAPULCO	654
COLIMA	AGUASCALIENTES	411
COLIMA	CAMPECHE	1,803
COLIMA	CANCUN	2,269
COLIMA	CD.DEL CARMEN	1,588
COLIMA	CD.IXTEPEC	1,383
COLIMA	CD.JUAREZ	1,670
COLIMA	CD.MANTE	845
COLIMA	CD.OBREGON	1,286
COLIMA	CD.VICTORIA	855

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
COLIMA	CELAYA	422
COLIMA	CHETUMAL	1,986
COLIMA	CHIHUAHUA	1,308
COLIMA	CIUDAD VALLES	776
COLIMA	COATZACOALCOS	1,379
COLIMA	COLIMA	0
COLIMA	CORDOBA	939
COLIMA	COSAMALOAPAN	1,078
COLIMA	CUERNAVACA	680
COLIMA	CULIACAN	873
COLIMA	DURANGO	826
COLIMA	ENSENADA	2,476
COLIMA	FRESNILLO	538
COLIMA	GUADALAJARA	196
COLIMA	HERMOSILLO	1,539
COLIMA	IGUALA	753
COLIMA	IRAPUATO	490
COLIMA	LA PAZ	100,000
COLIMA	LAZARO CARDENAS	427
COLIMA	LEON	415
COLIMA	LOS MOCHIS	1,065
COLIMA	MATAMOROS	1,172
COLIMA	MAZATLAN	659
COLIMA	MERIDA	1,960
COLIMA	MEXICALI	2,234
COLIMA	MEXICO	654
COLIMA	MONCLOVA	1,065
COLIMA	MONTERREY	962
COLIMA	MORELIA	404
COLIMA	NOGALES	1,817
COLIMA	OAXACA	1,113
COLIMA	ORIZABA	915
COLIMA	PACHUCA	673
COLIMA	POZA RICA	866
COLIMA	PUEBLA	782
COLIMA	PUERTO VALLARTA	377
COLIMA	QUERETARO	464
COLIMA	REYNOSA	1,192
COLIMA	SALINA CRUZ	1,376
COLIMA	SALTILLO	869
COLIMA	SAN LUIS POTOSI	524
COLIMA	TAMPICO	927
COLIMA	TAPACHULA	1,732
COLIMA	TEPIC	386
COLIMA	TIJUANA	2,410
COLIMA	TOLUCA	591
COLIMA	TORREON	865
COLIMA	TUXTLA GUTIERREZ	1,479

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
COLIMA	URUAPAN	328
COLIMA	VERACRUZ	1,046
COLIMA	VILLAHERMOSA	1,399
COLIMA	XALAPA	914
COLIMA	ZACATECAS	527
COLIMA	ZAMORA	236
COLIMA	ZIHUATANEJO	422
CORDOBA	ACAPULCO	660
CORDOBA	AGUASCALIENTES	783
CORDOBA	CAMPECHE	854
CORDOBA	CANCUN	1,320
CORDOBA	CD.DEL CARMEN	639
CORDOBA	CD.IXTEPEC	434
CORDOBA	CD.JUAREZ	2,068
CORDOBA	CD.MANTE	740
CORDOBA	CD.OBREGON	1,925
CORDOBA	CD.VICTORIA	818
CORDOBA	CELAYA	539
CORDOBA	CHETUMAL	1,037
CORDOBA	CHIHUAHUA	1,705
CORDOBA	CIUDAD VALLES	646
CORDOBA	COATZACOALCOS	304
CORDOBA	COLIMA	939
CORDOBA	CORDOBA	0
CORDOBA	COSAMALOAPAN	140
CORDOBA	CUERNAVACA	378
CORDOBA	CULIACAN	1,519
CORDOBA	DURANGO	1,226
CORDOBA	ENSENADA	3,122
CORDOBA	FRESNILLO	936
CORDOBA	GUADALAJARA	831
CORDOBA	HERMOSILLO	2,185
CORDOBA	IGUALA	484
CORDOBA	IRAPUATO	602
CORDOBA	LA PAZ	100,000
CORDOBA	LAZARO CARDENAS	843
CORDOBA	LEON	672
CORDOBA	LOS MOCHIS	1,711
CORDOBA	MATAMOROS	1,069
CORDOBA	MAZATLAN	1,305
CORDOBA	MERIDA	1,023
CORDOBA	MEXICALI	2,880
CORDOBA	MEXICO	298
CORDOBA	MONCLOVA	1,289
CORDOBA	MONTERREY	1,096
CORDOBA	MORELIA	588
CORDOBA	NOGALES	2,463
CORDOBA	OAXACA	349

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CORDOBA	ORIZABA	24.3
CORDOBA	PACHUCA	312
CORDOBA	POZA RICA	431
CORDOBA	PUEBLA	177
CORDOBA	PUERTO VALLARTA	1,133
CORDOBA	QUERETARO	498
CORDOBA	REYNOSA	1,081
CORDOBA	SALINA CRUZ	476
CORDOBA	SALTILLO	1,131
CORDOBA	SAN LUIS POTOSI	697
CORDOBA	TAMPICO	577
CORDOBA	TAPACHULA	794
CORDOBA	TEPIC	1,032
CORDOBA	TIJUANA	3,056
CORDOBA	TOLUCA	359
CORDOBA	TORREON	1,265
CORDOBA	TUXTLA GUTIERREZ	542
CORDOBA	URUAPAN	697
CORDOBA	VERACRUZ	109
CORDOBA	VILLAHERMOSA	462
CORDOBA	XALAPA	174
CORDOBA	ZACATECAS	882
CORDOBA	ZAMORA	719
CORDOBA	ZIHUATANEJO	776
CUERNAVACA	ACAPULCO	290
CUERNAVACA	AGUASCALIENTES	581
CUERNAVACA	CAMPECHE	1,230
CUERNAVACA	CANCUN	1,697
CUERNAVACA	CD.DEL CARMEN	1,016
CUERNAVACA	CD.IXTEPEC	713
CUERNAVACA	CD.JUAREZ	1,874
CUERNAVACA	CD.MANTE	639
CUERNAVACA	CD.OBREGON	1,666
CUERNAVACA	CD.VICTORIA	754
CUERNAVACA	CELAYA	333
CUERNAVACA	CHETUMAL	1,417
CUERNAVACA	CHIHUAHUA	1,512
CUERNAVACA	CIUDAD VALLES	525
CUERNAVACA	COATZACOALCOS	681
CUERNAVACA	COLIMA	680
CUERNAVACA	CORDOBA	378
CUERNAVACA	COSAMALOAPAN	518
CUERNAVACA	CUERNAVACA	0
CUERNAVACA	CULIACAN	1,252
CUERNAVACA	DURANGO	1,025
CUERNAVACA	ENSENADA	2,855
CUERNAVACA	FRESNILLO	735
CUERNAVACA	GUADALAJARA	564

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CUERNAVACA	HERMOSILLO	1,918
CUERNAVACA	IGUALA	104
CUERNAVACA	IRAPUATO	392
CUERNAVACA	LA PAZ	100,000
CUERNAVACA	LAZARO CARDENAS	567
CUERNAVACA	LEON	462
CUERNAVACA	LOS MOCHIS	1,444
CUERNAVACA	MATAMOROS	1,040
CUERNAVACA	MAZATLAN	1,038
CUERNAVACA	MERIDA	1,390
CUERNAVACA	MEXICALI	2,613
CUERNAVACA	MEXICO	86.4
CUERNAVACA	MONCLOVA	1,098
CUERNAVACA	MONTERREY	989
CUERNAVACA	MORELIA	321
CUERNAVACA	NOGALES	2,196
CUERNAVACA	OAXACA	433
CUERNAVACA	ORIZABA	336
CUERNAVACA	PACHUCA	177
CUERNAVACA	POZA RICA	353
CUERNAVACA	PUEBLA	156
CUERNAVACA	PUERTO VALLARTA	866
CUERNAVACA	QUERETARO	296
CUERNAVACA	REYNOSA	1,053
CUERNAVACA	SALINA CRUZ	696
CUERNAVACA	SALTILLO	930
CUERNAVACA	SAN LUIS POTOSI	496
CUERNAVACA	TAMPICO	561
CUERNAVACA	TAPACHULA	1,162
CUERNAVACA	TEPIC	765
CUERNAVACA	TIJUANA	2,789
CUERNAVACA	TOLUCA	91.6
CUERNAVACA	TORREON	1,064
CUERNAVACA	TUXTLA GUTIERREZ	909
CUERNAVACA	URUAPAN	430
CUERNAVACA	VERACRUZ	476
CUERNAVACA	VILLAHERMOSA	829
CUERNAVACA	XALAPA	375
CUERNAVACA	ZACATECAS	681
CUERNAVACA	ZAMORA	452
CUERNAVACA	ZIHUATANEJO	505
CULIACAN	ACAPULCO	1,553
CULIACAN	AGUASCALIENTES	869
CULIACAN	CAMPECHE	1,371
CULIACAN	CANCUN	2,837
CULIACAN	CD.DEL CARMEN	2,156
CULIACAN	CD.IXTEPEC	1,952
CULIACAN	CD.JUAREZ	1,507

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CULIACAN	CD.MANTE	1,256
CULIACAN	CD.OBREGON	434
CULIACAN	CD.VICTORIA	1,259
CULIACAN	CELAYA	994
CULIACAN	CHETUMAL	2,555
CULIACAN	CHIHUAHUA	1,130
CULIACAN	CIUDAD VALLES	1,194
CULIACAN	COATZACOALCOS	1,822
CULIACAN	COLIMA	873
CULIACAN	CORDOBA	1,519
CULIACAN	COSAMALOAPAN	1,659
CULIACAN	CUERNAVACA	1,252
CULIACAN	CULIACAN	0
CULIACAN	DURANGO	532
CULIACAN	ENSENADA	1,639
CULIACAN	FRESNILLO	701
CULIACAN	GUADALAJARA	697
CULIACAN	HERMOSILLO	702
CULIACAN	IGUALA	1,331
CULIACAN	IRAPUATO	939
CULIACAN	LA PAZ	100,000
CULIACAN	LAZARO CARDENAS	1,178
CULIACAN	LEON	915
CULIACAN	LOS MOCHIS	228
CULIACAN	MATAMOROS	1,369
CULIACAN	MAZATLAN	218
CULIACAN	MERIDA	2,538
CULIACAN	MEXICALI	1,397
CULIACAN	MEXICO	1,231
CULIACAN	MONCLOVA	1,033
CULIACAN	MONTERREY	1,054
CULIACAN	MORELIA	981
CULIACAN	NOGALES	979
CULIACAN	OAXACA	1,690
CULIACAN	ORIZABA	1,492
CULIACAN	PACHUCA	1,250
CULIACAN	POZA RICA	1,444
CULIACAN	PUEBLA	1,359
CULIACAN	PUERTO VALLARTA	655
CULIACAN	QUERETARO	1,043
CULIACAN	REYNOSA	1,285
CULIACAN	SALINA CRUZ	1,953
CULIACAN	SALTILLO	972
CULIACAN	SAN LUIS POTOSI	947
CULIACAN	TAMPICO	1,350
CULIACAN	TAPACHULA	2,309
CULIACAN	TEPIC	492
CULIACAN	TIJUANA	1,573

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
CULIACAN	TOLUCA	1,168
CULIACAN	TORREON	706
CULIACAN	TUXTLA GUTIERREZ	2,057
CULIACAN	URUAPAN	953
CULIACAN	VERACRUZ	1,624
CULIACAN	VILLAHERMOSA	1,976
CULIACAN	XALAPA	1,492
CULIACAN	ZACATECAS	761
CULIACAN	ZAMORA	854
CULIACAN	ZIHUATANEJO	1,214
DURANGO	ACAPULCO	1,317
DURANGO	AGUASCALIENTES	462
DURANGO	CAMPECHE	2,078
DURANGO	CANCUN	2,484
DURANGO	CD.DEL CARMEN	1,863
DURANGO	CD.IXTEPEC	1,659
DURANGO	CD.JUAREZ	925
DURANGO	CD.MANTE	849
DURANGO	CD.OBREGON	941
DURANGO	CD.VICTORIA	852
DURANGO	CELAYA	713
DURANGO	CHETUMAL	2,262
DURANGO	CHIHUAHUA	638
DURANGO	CIUDAD VALLES	787
DURANGO	COATZACOALCOS	1,529
DURANGO	COLIMA	826
DURANGO	CORDOBA	1,226
DURANGO	COSAMALOAPAN	1,366
DURANGO	CUERNAVACA	1,025
DURANGO	CULIACAN	532
DURANGO	DURANGO	0
DURANGO	ENSENADA	2,077
DURANGO	FRESNILLO	290
DURANGO	GUADALAJARA	732
DURANGO	HERMOSILLO	1,181
DURANGO	IGUALA	1,094
DURANGO	IRAPUATO	657
DURANGO	LA PAZ	100,000
DURANGO	LAZARO CARDENAS	1,100
DURANGO	LEON	591
DURANGO	LOS MOCHIS	718
DURANGO	MATAMOROS	946
DURANGO	MAZATLAN	312
DURANGO	MERIDA	2,244
DURANGO	MEXICALI	1,835
DURANGO	MEXICO	947
DURANGO	MONCLOVA	660
DURANGO	MONTERREY	631

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
DURANGO	MORELIA	786
DURANGO	NOGALES	1,333
DURANGO	OAXACA	1,396
DURANGO	ORIZABA	1,198
DURANGO	PACHUCA	956
DURANGO	POZA RICA	1,150
DURANGO	PUEBLA	1,065
DURANGO	PUERTO VALLARTA	690
DURANGO	QUERETARO	744
DURANGO	REYNOSA	862
DURANGO	SALINA CRUZ	1,659
DURANGO	SALTILLO	549
DURANGO	SAN LUIS POTOSI	536
DURANGO	TAMPICO	939
DURANGO	TAPACHULA	2,015
DURANGO	TEPIC	526
DURANGO	TIJUANA	2,011
DURANGO	TOLUCA	932
DURANGO	TORREON	283
DURANGO	TUXTLA GUTIERREZ	1,763
DURANGO	URUAPAN	889
DURANGO	VERACRUZ	1,330
DURANGO	VILLAHERMOSA	1,683
DURANGO	XALAPA	1,198
DURANGO	ZACATECAS	350
DURANGO	ZAMORA	790
DURANGO	ZIHUATANEJO	1,136
GUADALAJARA	ACAPULCO	790
GUADALAJARA	AGUASCALIENTES	217
GUADALAJARA	CAMPECHE	1,682
GUADALAJARA	CANCUN	2,148
GUADALAJARA	CD.DEL CARMEN	1,468
GUADALAJARA	CD.IXTEPEC	1,263
GUADALAJARA	CD.JUAREZ	1,482
GUADALAJARA	CD.MANTE	652
GUADALAJARA	CD.OBREGON	1,106
GUADALAJARA	CD.VICTORIA	663
GUADALAJARA	CELAYA	306
GUADALAJARA	CHETUMAL	1,867
GUADALAJARA	CHIHUAHUA	1,120
GUADALAJARA	CIUDAD VALLES	584
GUADALAJARA	COATZACOALCOS	1,134
GUADALAJARA	COLIMA	196
GUADALAJARA	CORDOBA	831
GUADALAJARA	COSAMALOAPAN	971
GUADALAJARA	CUERNAVACA	564
GUADALAJARA	CULIACAN	697
GUADALAJARA	DURANGO	732

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
GUADALAJARA	ENSENADA	2,298
GUADALAJARA	FRESNILLO	391
GUADALAJARA	GUADALAJARA	0
GUADALAJARA	HERMOSILLO	1,359
GUADALAJARA	IGUALA	637
GUADALAJARA	IRAPUATO	287
GUADALAJARA	LA PAZ	100,000
GUADALAJARA	LAZARO CARDENAS	485
GUADALAJARA	LEON	221
GUADALAJARA	LOS MOCHIS	885
GUADALAJARA	MATAMOROS	978
GUADALAJARA	MAZATLAN	478
GUADALAJARA	MERIDA	1,844
GUADALAJARA	MEXICALI	2,054
GUADALAJARA	MEXICO	537
GUADALAJARA	MONCLOVA	872
GUADALAJARA	MONTERREY	769
GUADALAJARA	MORELIA	287
GUADALAJARA	NOGALES	1,636
GUADALAJARA	OAXACA	996
GUADALAJARA	ORIZABA	798
GUADALAJARA	PACHUCA	556
GUADALAJARA	POZA RICA	750
GUADALAJARA	PUEBLA	665
GUADALAJARA	PUERTO VALLARTA	306
GUADALAJARA	QUERETARO	349
GUADALAJARA	REYNOSA	990
GUADALAJARA	SALINA CRUZ	1,259
GUADALAJARA	SALTILLO	703
GUADALAJARA	SAN LUIS POTOSI	330
GUADALAJARA	TAMPICO	733
GUADALAJARA	TAPACHULA	1,615
GUADALAJARA	TEPIC	205
GUADALAJARA	TIJUANA	2,230
GUADALAJARA	TOLUCA	474
GUADALAJARA	TORREON	723
GUADALAJARA	TUXTLA GUTIERREZ	1,363
GUADALAJARA	URUAPAN	259
GUADALAJARA	VERACRUZ	902
GUADALAJARA	VILLAHERMOSA	1,283
GUADALAJARA	XALAPA	798
GUADALAJARA	ZACATECAS	340
GUADALAJARA	ZAMORA	160
GUADALAJARA	ZIHUATANEJO	520
HERMOSILLO	ACAPULCO	2,219
HERMOSILLO	AGUASCALIENTES	1,535
HERMOSILLO	CAMPECHE	3,037
HERMOSILLO	CANCUN	3,504

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
HERMOSILLO	CD.DEL CARMEN	2,823
HERMOSILLO	CD.IXTEPEC	2,618
HERMOSILLO	CD.JUAREZ	750
HERMOSILLO	CD.MANTE	1,910
HERMOSILLO	CD.OBREGON	252
HERMOSILLO	CD.VICTORIA	1,773
HERMOSILLO	CELAYA	1,660
HERMOSILLO	CHETUMAL	3,221
HERMOSILLO	CHIHUAHUA	727
HERMOSILLO	CIUDAD VALLES	1,860
HERMOSILLO	COATZACOALCOS	2,488
HERMOSILLO	COLIMA	1,539
HERMOSILLO	CORDOBA	2,185
HERMOSILLO	COSAMALOAPAN	2,325
HERMOSILLO	CUERNAVACA	1,918
HERMOSILLO	CULIACAN	702
HERMOSILLO	DURANGO	1,181
HERMOSILLO	ENSENADA	940
HERMOSILLO	FRESNILLO	1,365
HERMOSILLO	GUADALAJARA	1,359
HERMOSILLO	HERMOSILLO	0
HERMOSILLO	IGUALA	1,992
HERMOSILLO	IRAPUATO	1,601
HERMOSILLO	LA PAZ	728
HERMOSILLO	LAZARO CARDENAS	1,840
HERMOSILLO	LEON	1,576
HERMOSILLO	LOS MOCHIS	483
HERMOSILLO	MATAMOROS	1,814
HERMOSILLO	MAZATLAN	884
HERMOSILLO	MERIDA	3,199
HERMOSILLO	MEXICALI	695
HERMOSILLO	MEXICO	1,892
HERMOSILLO	MONCLOVA	1,528
HERMOSILLO	MONTERREY	1,499
HERMOSILLO	MORELIA	1,642
HERMOSILLO	NOGALES	277
HERMOSILLO	OAXACA	2,352
HERMOSILLO	ORIZABA	2,153
HERMOSILLO	PACHUCA	1,911
HERMOSILLO	POZA RICA	2,105
HERMOSILLO	PUEBLA	2,025
HERMOSILLO	PUERTO VALLARTA	1,317
HERMOSILLO	QUERETARO	1,704
HERMOSILLO	REYNOSA	1,729
HERMOSILLO	SALINA CRUZ	2,614
HERMOSILLO	SALTILLO	1,417
HERMOSILLO	SAN LUIS POTOSI	1,608
HERMOSILLO	TAMPICO	1,994

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
HERMOSILLO	TAPACHULA	2,970
HERMOSILLO	TEPIC	1,153
HERMOSILLO	TIJUANA	871
HERMOSILLO	TOLUCA	1,830
HERMOSILLO	TORREON	1,166
HERMOSILLO	TUXTLA GUTIERREZ	2,718
HERMOSILLO	URUAPAN	1,615
HERMOSILLO	VERACRUZ	2,285
HERMOSILLO	VILLAHERMOSA	2,638
HERMOSILLO	XALAPA	2,153
HERMOSILLO	ZACATECAS	1,423
HERMOSILLO	ZAMORA	1,515
HERMOSILLO	ZIHUATANEJO	1,876
IGUALA	ACAPULCO	211
IGUALA	AGUASCALIENTES	655
IGUALA	CAMPECHE	1,336
IGUALA	CANCUN	1,803
IGUALA	CD.DEL CARMEN	1,122
IGUALA	CD.IXTEPEC	819
IGUALA	CD.JUAREZ	1,940
IGUALA	CD.MANTE	754
IGUALA	CD.OBREGON	1,740
IGUALA	CD.VICTORIA	874
IGUALA	CELAYA	407
IGUALA	CHETUMAL	1,520
IGUALA	CHIHUAHUA	1,577
IGUALA	CIUDAD VALLES	631
IGUALA	COATZACOALCOS	787
IGUALA	COLIMA	753
IGUALA	CORDOBA	484
IGUALA	COSAMALOAPAN	624
IGUALA	CUERNAVACA	104
IGUALA	CULIACAN	1,331
IGUALA	DURANGO	1,094
IGUALA	ENSENADA	2,932
IGUALA	FRESNILLO	804
IGUALA	GUADALAJARA	637
IGUALA	HERMOSILLO	1,992
IGUALA	IGUALA	0
IGUALA	IRAPUATO	466
IGUALA	LA PAZ	100,000
IGUALA	LAZARO CARDENAS	455
IGUALA	LEON	536
IGUALA	LOS MOCHIS	1,519
IGUALA	MATAMOROS	1,190
IGUALA	MAZATLAN	1,112
IGUALA	MERIDA	1,496
IGUALA	MEXICALI	2,688

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
IGUALA	MEXICO	172
IGUALA	MONCLOVA	1,163
IGUALA	MONTERREY	1,054
IGUALA	MORELIA	395
IGUALA	NOGALES	2,270
IGUALA	OAXACA	539
IGUALA	ORIZABA	406
IGUALA	PACHUCA	282
IGUALA	POZA RICA	459
IGUALA	PUEBLA	262
IGUALA	PUERTO VALLARTA	940
IGUALA	QUERETARO	362
IGUALA	REYNOSA	1,158
IGUALA	SALINA CRUZ	801
IGUALA	SALTILLO	995
IGUALA	SAN LUIS POTOSI	561
IGUALA	TAMPICO	666
IGUALA	TAPACHULA	1,267
IGUALA	TEPIC	840
IGUALA	TIJUANA	2,864
IGUALA	TOLUCA	165
IGUALA	TORREON	1,129
IGUALA	TUXTLA GUTIERREZ	1,015
IGUALA	URUAPAN	505
IGUALA	VERACRUZ	581
IGUALA	VILLAHERMOSA	934
IGUALA	XALAPA	436
IGUALA	ZACATECAS	774
IGUALA	ZAMORA	527
IGUALA	ZIHUATANEJO	388
IRAPUATO	ACAPULCO	692
IRAPUATO	AGUASCALIENTES	194
IRAPUATO	CAMPECHE	1,454
IRAPUATO	CANCUN	1,920
IRAPUATO	CD.DEL CARMEN	1,239
IRAPUATO	CD.IXTEPEC	1,035
IRAPUATO	CD.JUAREZ	1,502
IRAPUATO	CD.MANTE	512
IRAPUATO	CD.OBREGON	1,348
IRAPUATO	CD.VICTORIA	523
IRAPUATO	CELAYA	63.3
IRAPUATO	CHETUMAL	1,637
IRAPUATO	CHIHUAHUA	1,140
IRAPUATO	CIUDAD VALLES	434
IRAPUATO	COATZACOALCOS	905
IRAPUATO	COLIMA	490
IRAPUATO	CORDOBA	602
IRAPUATO	COSAMALOAPAN	742

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
IRAPUATO	CUERNAVACA	392
IRAPUATO	CULIACAN	939
IRAPUATO	DURANGO	657
IRAPUATO	ENSENADA	2,541
IRAPUATO	FRESNILLO	367
IRAPUATO	GUADALAJARA	287
IRAPUATO	HERMOSILLO	1,601
IRAPUATO	IGUALA	466
IRAPUATO	IRAPUATO	0
IRAPUATO	LA PAZ	100,000
IRAPUATO	LAZARO CARDENAS	443
IRAPUATO	LEON	76
IRAPUATO	LOS MOCHIS	1,125
IRAPUATO	MATAMOROS	837
IRAPUATO	MAZATLAN	719
IRAPUATO	MERIDA	1,616
IRAPUATO	MEXICALI	2,294
IRAPUATO	MEXICO	320
IRAPUATO	MONCLOVA	811
IRAPUATO	MONTERREY	702
IRAPUATO	MORELIA	132
IRAPUATO	NOGALES	1,877
IRAPUATO	OAXACA	769
IRAPUATO	ORIZABA	578
IRAPUATO	PACHUCA	329
IRAPUATO	POZA RICA	523
IRAPUATO	PUEBLA	438
IRAPUATO	PUERTO VALLARTA	547
IRAPUATO	QUERETARO	108
IRAPUATO	REYNOSA	849
IRAPUATO	SALINA CRUZ	1,032
IRAPUATO	SALTILLO	643
IRAPUATO	SAN LUIS POTOSI	209
IRAPUATO	TAMPICO	604
IRAPUATO	TAPACHULA	1,388
IRAPUATO	TEPIC	489
IRAPUATO	TIJUANA	2,470
IRAPUATO	TOLUCA	305
IRAPUATO	TORREON	694
IRAPUATO	TUXTLA GUTIERREZ	1,136
IRAPUATO	URUAPAN	224
IRAPUATO	VERACRUZ	702
IRAPUATO	VILLAHERMOSA	1,055
IRAPUATO	XALAPA	570
IRAPUATO	ZACATECAS	312
IRAPUATO	ZAMORA	144
IRAPUATO	ZIHUATANEJO	478
LA PAZ	ACAPULCO	100,000

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
LA PAZ	AGUASCALIENTES	100,000
LA PAZ	CAMPECHE	100,000
LA PAZ	CANCUN	100,000
LA PAZ	CD.DEL CARMEN	100,000
LA PAZ	CD.IXTEPEC	100,000
LA PAZ	CD.JUAREZ	100,000
LA PAZ	CD.MANTE	100,000
LA PAZ	CD.OBREGON	475
LA PAZ	CD.VICTORIA	100,000
LA PAZ	CELAYA	100,000
LA PAZ	CHETUMAL	100,000
LA PAZ	CHIHUAHUA	100,000
LA PAZ	CIUDAD VALLES	100,000
LA PAZ	COATZACOALCOS	100,000
LA PAZ	COLIMA	100,000
LA PAZ	CORDOBA	100,000
LA PAZ	COSAMALOAPAN	100,000
LA PAZ	CUERNAVACA	100,000
LA PAZ	CULIACAN	100,000
LA PAZ	DURANGO	100,000
LA PAZ	ENSENADA	100,000
LA PAZ	FRESNILLO	100,000
LA PAZ	GUADALAJARA	100,000
LA PAZ	HERMOSILLO	728
LA PAZ	IGUALA	100,000
LA PAZ	IRAPUATO	100,000
LA PAZ	LA PAZ	0
LA PAZ	LAZARO CARDENAS	100,000
LA PAZ	LEON	100,000
LA PAZ	LOS MOCHIS	246
LA PAZ	MATAMOROS	100,000
LA PAZ	MAZATLAN	100,000
LA PAZ	MERIDA	100,000
LA PAZ	MEXICALI	100,000
LA PAZ	MEXICO	100,000
LA PAZ	MONCLOVA	100,000
LA PAZ	MONTERREY	100,000
LA PAZ	MORELIA	100,000
LA PAZ	NOGALES	100,000
LA PAZ	OAXACA	100,000
LA PAZ	ORIZABA	100,000
LA PAZ	PACHUCA	100,000
LA PAZ	POZA RICA	100,000
LA PAZ	PUEBLA	100,000
LA PAZ	PUERTO VALLARTA	100,000
LA PAZ	QUERETARO	100,000
LA PAZ	REYNOSA	100,000
LA PAZ	SALINA CRUZ	100,000

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
LA PAZ	SALTILLO	100,000
LA PAZ	SAN LUIS POTOSI	100,000
LA PAZ	TAMPICO	100,000
LA PAZ	TAPACHULA	100,000
LA PAZ	TEPIC	100,000
LA PAZ	TIJUANA	100,000
LA PAZ	TOLUCA	100,000
LA PAZ	TORREON	100,000
LA PAZ	TUXTLA GUTIERREZ	100,000
LA PAZ	URUAPAN	100,000
LA PAZ	VERACRUZ	100,000
LA PAZ	VILLAHERMOSA	100,000
LA PAZ	XALAPA	100,000
LA PAZ	ZACATECAS	100,000
LA PAZ	ZAMORA	100,000
LA PAZ	ZIHUATANEJO	100,000
LAZARO CARDENAS	ACAPULCO	331
LAZARO CARDENAS	AGUASCALIENTES	637
LAZARO CARDENAS	CAMPECHE	1,754
LAZARO CARDENAS	CANCUN	2,161
LAZARO CARDENAS	CD.DEL CARMEN	1,408
LAZARO CARDENAS	CD.IXTEPEC	1,035
LAZARO CARDENAS	CD.JUAREZ	1,946
LAZARO CARDENAS	CD.MANTE	971
LAZARO CARDENAS	CD.OBREGON	1,587
LAZARO CARDENAS	CD.VICTORIA	1,024
LAZARO CARDENAS	CELAYA	455
LAZARO CARDENAS	CHETUMAL	1,878
LAZARO CARDENAS	CHIHUAHUA	1,584
LAZARO CARDENAS	CIUDAD VALLES	877
LAZARO CARDENAS	COATZACOALCOS	1,145
LAZARO CARDENAS	COLIMA	427
LAZARO CARDENAS	CORDOBA	843
LAZARO CARDENAS	COSAMALOAPAN	983
LAZARO CARDENAS	CUERNAVACA	567
LAZARO CARDENAS	CULIACAN	1,178
LAZARO CARDENAS	DURANGO	1,100
LAZARO CARDENAS	ENSENADA	2,780
LAZARO CARDENAS	FRESNILLO	810
LAZARO CARDENAS	GUADALAJARA	485
LAZARO CARDENAS	HERMOSILLO	1,840
LAZARO CARDENAS	IGUALA	455
LAZARO CARDENAS	IRAPUATO	443
LAZARO CARDENAS	LA PAZ	1,609
LAZARO CARDENAS	LAZARO CARDENAS	0
LAZARO CARDENAS	LEON	480
LAZARO CARDENAS	LOS MOCHIS	1,374
LAZARO CARDENAS	MATAMOROS	1,339

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
LAZARO CARDENAS	MAZATLAN	968
LAZARO CARDENAS	MERIDA	1,913
LAZARO CARDENAS	MEXICALI	2,543
LAZARO CARDENAS	MEXICO	607
LAZARO CARDENAS	MONCLOVA	1,312
LAZARO CARDENAS	MONTERREY	1,204
LAZARO CARDENAS	MORELIA	314
LAZARO CARDENAS	NOGALES	2,126
LAZARO CARDENAS	OAXACA	999
LAZARO CARDENAS	ORIZABA	868
LAZARO CARDENAS	PACHUCA	626
LAZARO CARDENAS	POZA RICA	820
LAZARO CARDENAS	PUEBLA	722
LAZARO CARDENAS	PUERTO VALLARTA	618
LAZARO CARDENAS	QUERETARO	503
LAZARO CARDENAS	REYNOSA	1,351
LAZARO CARDENAS	SALINA CRUZ	986
LAZARO CARDENAS	SALTILLO	1,117
LAZARO CARDENAS	SAN LUIS POTOSI	651
LAZARO CARDENAS	TAMPICO	1,000
LAZARO CARDENAS	TAPACHULA	1,425
LAZARO CARDENAS	TEPIC	695
LAZARO CARDENAS	TIJUANA	2,719
LAZARO CARDENAS	TOLUCA	544
LAZARO CARDENAS	TORREON	1,136
LAZARO CARDENAS	TUXTLA GUTIERREZ	1,294
LAZARO CARDENAS	URUAPAN	226
LAZARO CARDENAS	VERACRUZ	999
LAZARO CARDENAS	VILLAHERMOSA	1,352
LAZARO CARDENAS	XALAPA	867
LAZARO CARDENAS	ZACATECAS	754
LAZARO CARDENAS	ZAMORA	336
LAZARO CARDENAS	ZIHUATANEJO	98.6
LEON	ACAPULCO	763
LEON	AGUASCALIENTES	127
LEON	CAMPECHE	1,524
LEON	CANCUN	1,990
LEON	CD.DEL CARMEN	1,309
LEON	CD.IXTEPEC	1,105
LEON	CD.JUAREZ	1,436
LEON	CD.MANTE	530
LEON	CD.OBREGON	1,323
LEON	CD.VICTORIA	693
LEON	CELAYA	133
LEON	CHETUMAL	1,707
LEON	CHIHUAHUA	1,074
LEON	CIUDAD VALLES	434
LEON	COATZACOALCOS	975

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
LEON	COLIMA	415
LEON	CORDOBA	672
LEON	COSAMALOAPAN	812
LEON	CUERNAVACA	462
LEON	CULIACAN	915
LEON	DURANGO	591
LEON	ENSENADA	2,516
LEON	FRESNILLO	300
LEON	GUADALAJARA	221
LEON	HERMOSILLO	1,576
LEON	IGUALA	536
LEON	IRAPUATO	76
LEON	LA PAZ	1,345
LEON	LAZARO CARDENAS	480
LEON	LEON	0
LEON	LOS MOCHIS	1,100
LEON	MATAMOROS	828
LEON	MAZATLAN	694
LEON	MERIDA	1,682
LEON	MEXICALI	2,269
LEON	MEXICO	386
LEON	MONCLOVA	802
LEON	MONTERREY	693
LEON	MORELIA	200
LEON	NOGALES	1,842
LEON	OAXACA	835
LEON	ORIZABA	636
LEON	PACHUCA	394
LEON	POZA RICA	588
LEON	PUEBLA	504
LEON	PUERTO VALLARTA	522
LEON	QUERETARO	173
LEON	REYNOSA	930
LEON	SALINA CRUZ	1,097
LEON	SALTILLO	607
LEON	SAN LUIS POTOSI	180
LEON	TAMPICO	583
LEON	TAPACHULA	1,454
LEON	TEPIC	421
LEON	TIJUANA	2,445
LEON	TOLUCA	370
LEON	TORREON	627
LEON	TUXTLA GUTIERREZ	1,201
LEON	URUAPAN	309
LEON	VERACRUZ	768
LEON	VILLAHERMOSA	1,121
LEON	XALAPA	636
LEON	ZACATECAS	244

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
LEON	ZAMORA	163
LEON	ZIHUATANEJO	508
LOS MOCHIS	ACAPULCO	1,745
LOS MOCHIS	AGUASCALIENTES	1,061
LOS MOCHIS	CAMPECHE	2,563
LOS MOCHIS	CANCUN	3,029
LOS MOCHIS	CD.DEL CARMEN	2,348
LOS MOCHIS	CD.IXTEPEC	2,144
LOS MOCHIS	CD.JUAREZ	1,232
LOS MOCHIS	CD.MANTE	1,448
LOS MOCHIS	CD.OBREGON	230
LOS MOCHIS	CD.VICTORIA	1,451
LOS MOCHIS	CELAYA	1,186
LOS MOCHIS	CHETUMAL	2,747
LOS MOCHIS	CHIHUAHUA	881
LOS MOCHIS	CIUDAD VALLES	1,386
LOS MOCHIS	COATZACOALCOS	2,014
LOS MOCHIS	COLIMA	1,065
LOS MOCHIS	CORDOBA	1,711
LOS MOCHIS	COSAMALOAPAN	1,851
LOS MOCHIS	CUERNAVACA	1,444
LOS MOCHIS	CULIACAN	228
LOS MOCHIS	DURANGO	718
LOS MOCHIS	ENSENADA	1,422
LOS MOCHIS	FRESNILLO	891
LOS MOCHIS	GUADALAJARA	885
LOS MOCHIS	HERMOSILLO	483
LOS MOCHIS	IGUALA	1,519
LOS MOCHIS	IRAPUATO	1,125
LOS MOCHIS	LA PAZ	246
LOS MOCHIS	LAZARO CARDENAS	1,374
LOS MOCHIS	LEON	1,100
LOS MOCHIS	LOS MOCHIS	0
LOS MOCHIS	MATAMOROS	1,555
LOS MOCHIS	MAZATLAN	409
LOS MOCHIS	MERIDA	2,724
LOS MOCHIS	MEXICALI	1,178
LOS MOCHIS	MEXICO	1,417
LOS MOCHIS	MONCLOVA	1,269
LOS MOCHIS	MONTERREY	1,240
LOS MOCHIS	MORELIA	1,167
LOS MOCHIS	NOGALES	761
LOS MOCHIS	OAXACA	1,876
LOS MOCHIS	ORIZABA	1,678
LOS MOCHIS	PACHUCA	1,436
LOS MOCHIS	POZA RICA	1,630
LOS MOCHIS	PUEBLA	1,545
LOS MOCHIS	PUERTO VALLARTA	841

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
LOS MOCHIS	QUERETARO	1,229
LOS MOCHIS	REYNOSA	1,471
LOS MOCHIS	SALINA CRUZ	2,139
LOS MOCHIS	SALTILLO	1,158
LOS MOCHIS	SAN LUIS POTOSI	1,133
LOS MOCHIS	TAMPICO	1,536
LOS MOCHIS	TAPACHULA	2,495
LOS MOCHIS	TEPIC	678
LOS MOCHIS	TIJUANA	1,354
LOS MOCHIS	TOLUCA	1,354
LOS MOCHIS	TORREON	892
LOS MOCHIS	TUXTLA GUTIERREZ	2,243
LOS MOCHIS	URUAPAN	1,139
LOS MOCHIS	VERACRUZ	1,810
LOS MOCHIS	VILLAHERMOSA	2,163
LOS MOCHIS	XALAPA	1,678
LOS MOCHIS	ZACATECAS	947
LOS MOCHIS	ZAMORA	1,040
LOS MOCHIS	ZIHUATANEJO	1,400
MATAMOROS	ACAPULCO	1,333
MATAMOROS	AGUASCALIENTES	814
MATAMOROS	CAMPECHE	1,831
MATAMOROS	CANCUN	2,297
MATAMOROS	CD.DEL CARMEN	1,617
MATAMOROS	CD.IXTEPEC	1,412
MATAMOROS	CD.JUAREZ	1,485
MATAMOROS	CD.MANTE	452
MATAMOROS	CD.OBREGON	1,751
MATAMOROS	CD.VICTORIA	318
MATAMOROS	CELAYA	888
MATAMOROS	CHETUMAL	2,014
MATAMOROS	CHIHUAHUA	1,123
MATAMOROS	CIUDAD VALLES	547
MATAMOROS	COATZACOALCOS	1,281
MATAMOROS	COLIMA	1,172
MATAMOROS	CORDOBA	1,069
MATAMOROS	COSAMALOAPAN	1,119
MATAMOROS	CUERNAVACA	1,040
MATAMOROS	CULIACAN	1,369
MATAMOROS	DURANGO	946
MATAMOROS	ENSENADA	2,717
MATAMOROS	FRESNILLO	773
MATAMOROS	GUADALAJARA	978
MATAMOROS	HERMOSILLO	1,814
MATAMOROS	IGUALA	1,190
MATAMOROS	IRAPUATO	837
MATAMOROS	LA PAZ	1,799
MATAMOROS	LAZARO CARDENAS	1,339

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MATAMOROS	LEON	828
MATAMOROS	LOS MOCHIS	1,555
MATAMOROS	MATAMOROS	0
MATAMOROS	MAZATLAN	1,145
MATAMOROS	MERIDA	1,994
MATAMOROS	MEXICALI	2,520
MATAMOROS	MEXICO	957
MATAMOROS	MONCLOVA	488
MATAMOROS	MONTERREY	305
MATAMOROS	MORELIA	1,027
MATAMOROS	NOGALES	1,888
MATAMOROS	OAXACA	1,339
MATAMOROS	ORIZABA	1,140
MATAMOROS	PACHUCA	867
MATAMOROS	POZA RICA	734
MATAMOROS	PUEBLA	1,007
MATAMOROS	PUERTO VALLARTA	1,282
MATAMOROS	QUERETARO	842
MATAMOROS	REYNOSA	93.3
MATAMOROS	SALINA CRUZ	1,448
MATAMOROS	SALTILLO	404
MATAMOROS	SAN LUIS POTOSI	651
MATAMOROS	TAMPICO	495
MATAMOROS	TAPACHULA	1,766
MATAMOROS	TEPIC	1,181
MATAMOROS	TIJUANA	2,712
MATAMOROS	TOLUCA	1,030
MATAMOROS	TORREON	649
MATAMOROS	TUXTLA GUTIERREZ	1,513
MATAMOROS	URUAPAN	1,137
MATAMOROS	VERACRUZ	975
MATAMOROS	VILLAHERMOSA	1,433
MATAMOROS	XALAPA	1,003
MATAMOROS	ZACATECAS	778
MATAMOROS	ZAMORA	1,085
MATAMOROS	ZIHUATANEJO	1,378
MAZATLAN	ACAPULCO	1,444
MAZATLAN	AGUASCALIENTES	655
MAZATLAN	CAMPECHE	2,157
MAZATLAN	CANCUN	2,623
MAZATLAN	CD.DEL CARMEN	1,942
MAZATLAN	CD.IXTEPEC	1,738
MAZATLAN	CD.JUAREZ	1,237
MAZATLAN	CD.MANTE	1,042
MAZATLAN	CD.OBREGON	632
MAZATLAN	CD.VICTORIA	1,044
MAZATLAN	CELAYA	779
MAZATLAN	CHETUMAL	2,340

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MAZATLAN	CHIHUAHUA	915
MAZATLAN	CIUDAD VALLES	980
MAZATLAN	COATZACOALCOS	1,608
MAZATLAN	COLIMA	659
MAZATLAN	CORDOBA	1,305
MAZATLAN	COSAMALOAPAN	1,445
MAZATLAN	CUERNAVACA	1,038
MAZATLAN	CULIACAN	218
MAZATLAN	DURANGO	312
MAZATLAN	ENSENADA	1,824
MAZATLAN	FRESNILLO	484
MAZATLAN	GUADALAJARA	478
MAZATLAN	HERMOSILLO	884
MAZATLAN	IGUALA	1,112
MAZATLAN	IRAPUATO	719
MAZATLAN	LA PAZ	653
MAZATLAN	LAZARO CARDENAS	968
MAZATLAN	LEON	694
MAZATLAN	LOS MOCHIS	409
MAZATLAN	MATAMOROS	1,145
MAZATLAN	MAZATLAN	0
MAZATLAN	MERIDA	2,318
MAZATLAN	MEXICALI	1,578
MAZATLAN	MEXICO	1,011
MAZATLAN	MONCLOVA	863
MAZATLAN	MONTERREY	835
MAZATLAN	MORELIA	762
MAZATLAN	NOGALES	1,161
MAZATLAN	OAXACA	1,471
MAZATLAN	ORIZABA	1,273
MAZATLAN	PACHUCA	1,031
MAZATLAN	POZA RICA	1,224
MAZATLAN	PUEBLA	1,140
MAZATLAN	PUERTO VALLARTA	436
MAZATLAN	QUERETARO	823
MAZATLAN	REYNOSA	1,065
MAZATLAN	SALINA CRUZ	1,734
MAZATLAN	SALTILLO	753
MAZATLAN	SAN LUIS POTOSI	728
MAZATLAN	TAMPICO	1,131
MAZATLAN	TAPACHULA	2,090
MAZATLAN	TEPIC	272
MAZATLAN	TIJUANA	1,754
MAZATLAN	TOLUCA	949
MAZATLAN	TORREON	486
MAZATLAN	TUXTLA GUTIERREZ	1,837
MAZATLAN	URUAPAN	734
MAZATLAN	VERACRUZ	1,404

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MAZATLAN	VILLAHERMOSA	1,757
MAZATLAN	XALAPA	1,272
MAZATLAN	ZACATECAS	542
MAZATLAN	ZAMORA	635
MAZATLAN	ZIHUATANEJO	995
MERIDA	ACAPULCO	1,665
MERIDA	AGUASCALIENTES	1,805
MERIDA	CAMPECHE	177
MERIDA	CANCUN	303
MERIDA	CD.DEL CARMEN	385
MERIDA	CD.IXTEPEC	975
MERIDA	CD.JUAREZ	3,089
MERIDA	CD.MANTE	1,648
MERIDA	CD.OBREGON	2,947
MERIDA	CD.VICTORIA	1,737
MERIDA	CELAYA	1,561
MERIDA	CHETUMAL	386
MERIDA	CHIHUAHUA	2,727
MERIDA	CIUDAD VALLES	1,554
MERIDA	COATZACOALCOS	726
MERIDA	COLIMA	1,960
MERIDA	CORDOBA	1,023
MERIDA	COSAMALOAPAN	893
MERIDA	CUERNAVACA	1,390
MERIDA	CULIACAN	2,538
MERIDA	DURANGO	2,244
MERIDA	ENSENADA	4,139
MERIDA	FRESNILLO	1,953
MERIDA	GUADALAJARA	1,844
MERIDA	HERMOSILLO	3,199
MERIDA	IGUALA	1,496
MERIDA	IRAPUATO	1,616
MERIDA	LA PAZ	2,968
MERIDA	LAZARO CARDENAS	1,913
MERIDA	LEON	1,682
MERIDA	LOS MOCHIS	2,724
MERIDA	MATAMOROS	1,994
MERIDA	MAZATLAN	2,318
MERIDA	MERIDA	0
MERIDA	MEXICALI	3,900
MERIDA	MEXICO	1,318
MERIDA	MONCLOVA	2,218
MERIDA	MONTERREY	2,025
MERIDA	MORELIA	1,607
MERIDA	NOGALES	3,482
MERIDA	OAXACA	1,160
MERIDA	ORIZABA	1,044
MERIDA	PACHUCA	1,332

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MERIDA	POZA RICA	1,273
MERIDA	PUEBLA	1,196
MERIDA	PUERTO VALLARTA	2,152
MERIDA	QUERETARO	1,517
MERIDA	REYNOSA	2,010
MERIDA	SALINA CRUZ	1,015
MERIDA	SALTILLO	2,108
MERIDA	SAN LUIS POTOSI	1,717
MERIDA	TAMPICO	1,506
MERIDA	TAPACHULA	997
MERIDA	TEPIC	2,051
MERIDA	TIJUANA	4,076
MERIDA	TOLUCA	1,378
MERIDA	TORREON	2,284
MERIDA	TUXTLA GUTIERREZ	808
MERIDA	URUAPAN	1,717
MERIDA	VERACRUZ	1,026
MERIDA	VILLAHERMOSA	561
MERIDA	XALAPA	1,129
MERIDA	ZACATECAS	1,902
MERIDA	ZAMORA	1,739
MERIDA	ZIHUATANEJO	1,795
MEXICALI	ACAPULCO	2,914
MEXICALI	AGUASCALIENTES	2,249
MEXICALI	CAMPECHE	3,732
MEXICALI	CANCUN	4,198
MEXICALI	CD.DEL CARMEN	3,517
MEXICALI	CD.IXTEPEC	3,313
MEXICALI	CD.JUAREZ	1,136
MEXICALI	CD.MANTE	2,631
MEXICALI	CD.OBREGON	947
MEXICALI	CD.VICTORIA	2,367
MEXICALI	CELAYA	2,355
MEXICALI	CHETUMAL	3,916
MEXICALI	CHIHUAHUA	1,383
MEXICALI	CIUDAD VALLES	2,600
MEXICALI	COATZACOALCOS	3,183
MEXICALI	COLIMA	2,234
MEXICALI	CORDOBA	2,880
MEXICALI	COSAMALOAPAN	3,020
MEXICALI	CUERNAVACA	2,613
MEXICALI	CULIACAN	1,397
MEXICALI	DURANGO	1,835
MEXICALI	ENSENADA	247
MEXICALI	FRESNILLO	2,047
MEXICALI	GUADALAJARA	2,054
MEXICALI	HERMOSILLO	695
MEXICALI	IGUALA	2,688

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MEXICALI	IRAPUATO	2,294
MEXICALI	LA PAZ	1,359
MEXICALI	LAZARO CARDENAS	2,543
MEXICALI	LEON	2,269
MEXICALI	LOS MOCHIS	1,178
MEXICALI	MATAMOROS	2,520
MEXICALI	MAZATLAN	1,578
MEXICALI	MERIDA	3,900
MEXICALI	MEXICALI	0
MEXICALI	MEXICO	2,587
MEXICALI	MONCLOVA	2,220
MEXICALI	MONTERREY	2,081
MEXICALI	MORELIA	2,338
MEXICALI	NOGALES	630
MEXICALI	OAXACA	3,047
MEXICALI	ORIZABA	2,848
MEXICALI	PACHUCA	2,607
MEXICALI	POZA RICA	2,800
MEXICALI	PUEBLA	2,716
MEXICALI	PUERTO VALLARTA	2,012
MEXICALI	QUERETARO	2,399
MEXICALI	REYNOSA	2,358
MEXICALI	SALINA CRUZ	3,309
MEXICALI	SALTILLO	2,006
MEXICALI	SAN LUIS POTOSI	2,293
MEXICALI	TAMPICO	2,743
MEXICALI	TAPACHULA	3,666
MEXICALI	TEPIC	1,848
MEXICALI	TIJUANA	178
MEXICALI	TOLUCA	2,525
MEXICALI	TORREON	1,748
MEXICALI	TUXTLA GUTIERREZ	3,413
MEXICALI	URUAPAN	2,310
MEXICALI	VERACRUZ	2,980
MEXICALI	VILLAHERMOSA	3,333
MEXICALI	XALAPA	2,848
MEXICALI	ZACATECAS	2,107
MEXICALI	ZAMORA	2,211
MEXICALI	ZIHUATANEJO	2,571
MEXICO	ACAPULCO	393
MEXICO	AGUASCALIENTES	501
MEXICO	CAMPECHE	1,150
MEXICO	CANCUN	1,617
MEXICO	CD.DEL CARMEN	942
MEXICO	CD.IXTEPEC	737
MEXICO	CD.JUAREZ	1,793
MEXICO	CD.MANTE	533
MEXICO	CD.OBREGON	1,640

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MEXICO	CD.VICTORIA	668
MEXICO	CELAYA	264
MEXICO	CHETUMAL	1,334
MEXICO	CHIHUAHUA	1,431
MEXICO	CIUDAD VALLES	439
MEXICO	COATZACOALCOS	601
MEXICO	COLIMA	654
MEXICO	CORDOBA	298
MEXICO	COSAMALOAPAN	438
MEXICO	CUERNAVACA	86.4
MEXICO	CULIACAN	1,231
MEXICO	DURANGO	947
MEXICO	ENSENADA	2,832
MEXICO	FRESNILLO	657
MEXICO	GUADALAJARA	537
MEXICO	HERMOSILLO	1,892
MEXICO	IGUALA	172
MEXICO	IRAPUATO	320
MEXICO	LA PAZ	1,661
MEXICO	LAZARO CARDENAS	607
MEXICO	LEON	386
MEXICO	LOS MOCHIS	1,417
MEXICO	MATAMOROS	957
MEXICO	MAZATLAN	1,011
MEXICO	MERIDA	1,318
MEXICO	MEXICALI	2,587
MEXICO	MEXICO	0
MEXICO	MONCLOVA	1,019
MEXICO	MONTERREY	910
MEXICO	MORELIA	294
MEXICO	NOGALES	2,169
MEXICO	OAXACA	464
MEXICO	ORIZABA	265
MEXICO	PACHUCA	90.6
MEXICO	POZA RICA	267
MEXICO	PUEBLA	137
MEXICO	PUERTO VALLARTA	852
MEXICO	QUERETARO	217
MEXICO	REYNOSA	966
MEXICO	SALINA CRUZ	726
MEXICO	SALTILLO	850
MEXICO	SAN LUIS POTOSI	417
MEXICO	TAMPICO	474
MEXICO	TAPACHULA	1,082
MEXICO	TEPIC	751
MEXICO	TIJUANA	2,774
MEXICO	TOLUCA	66.3
MEXICO	TORREON	984

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MEXICO	TUXTLA GUTIERREZ	830
MEXICO	URUAPAN	404
MEXICO	VERACRUZ	397
MEXICO	VILLAHERMOSA	750
MEXICO	XALAPA	292
MEXICO	ZACATECAS	602
MEXICO	ZAMORA	426
MEXICO	ZIHUATANEJO	481
MONCLOVA	ACAPULCO	1,390
MONCLOVA	AGUASCALIENTES	676
MONCLOVA	CAMPECHE	2,051
MONCLOVA	CANCUN	2,517
MONCLOVA	CD.DEL CARMEN	1,837
MONCLOVA	CD.IXTEPEC	1,732
MONCLOVA	CD.JUAREZ	1,198
MONCLOVA	CD.MANTE	614
MONCLOVA	CD.OBREGON	1,465
MONCLOVA	CD.VICTORIA	514
MONCLOVA	CELAYA	862
MONCLOVA	CHETUMAL	2,234
MONCLOVA	CHIHUAHUA	836
MONCLOVA	CIUDAD VALLES	777
MONCLOVA	COATZACOALCOS	1,501
MONCLOVA	COLIMA	1,065
MONCLOVA	CORDOBA	1,289
MONCLOVA	COSAMALOAPAN	1,339
MONCLOVA	CUERNAVACA	1,098
MONCLOVA	CULIACAN	1,033
MONCLOVA	DURANGO	660
MONCLOVA	ENSENADA	2,540
MONCLOVA	FRESNILLO	561
MONCLOVA	GUADALAJARA	872
MONCLOVA	HERMOSILLO	1,528
MONCLOVA	IGUALA	1,163
MONCLOVA	IRAPUATO	811
MONCLOVA	LA PAZ	1,513
MONCLOVA	LAZARO CARDENAS	1,312
MONCLOVA	LEON	802
MONCLOVA	LOS MOCHIS	1,269
MONCLOVA	MATAMOROS	488
MONCLOVA	MAZATLAN	863
MONCLOVA	MERIDA	2,218
MONCLOVA	MEXICALI	2,220
MONCLOVA	MEXICO	1,019
MONCLOVA	MONCLOVA	0
MONCLOVA	MONTERREY	237
MONCLOVA	MORELIA	999
MONCLOVA	NOGALES	1,603

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MONCLOVA	OAXACA	1,466
MONCLOVA	ORIZABA	1,268
MONCLOVA	PACHUCA	1,026
MONCLOVA	POZA RICA	935
MONCLOVA	PUEBLA	1,135
MONCLOVA	PUERTO VALLARTA	1,165
MONCLOVA	QUERETARO	814
MONCLOVA	REYNOSA	404
MONCLOVA	SALINA CRUZ	1,648
MONCLOVA	SALTILLO	197
MONCLOVA	SAN LUIS POTOSI	623
MONCLOVA	TAMPICO	798
MONCLOVA	TAPACHULA	1,966
MONCLOVA	TEPIC	1,064
MONCLOVA	TIJUANA	2,391
MONCLOVA	TOLUCA	1,002
MONCLOVA	TORREON	363
MONCLOVA	TUXTLA GUTIERREZ	1,714
MONCLOVA	URUAPAN	1,103
MONCLOVA	VERACRUZ	1,175
MONCLOVA	VILLAHERMOSA	1,634
MONCLOVA	XALAPA	1,203
MONCLOVA	ZACATECAS	567
MONCLOVA	ZAMORA	1,004
MONCLOVA	ZIHUATANEJO	1,350
MONTERREY	ACAPULCO	1,281
MONTERREY	AGUASCALIENTES	573
MONTERREY	CAMPECHE	1,858
MONTERREY	CANCUN	2,324
MONTERREY	CD.DEL CARMEN	1,644
MONTERREY	CD.IXTEPEC	1,439
MONTERREY	CD.JUAREZ	1,170
MONTERREY	CD.MANTE	421
MONTERREY	CD.OBREGON	1,463
MONTERREY	CD.VICTORIA	285
MONTERREY	CELAYA	753
MONTERREY	CHETUMAL	2,041
MONTERREY	CHIHUAHUA	808
MONTERREY	CIUDAD VALLES	668
MONTERREY	COATZACOALCOS	1,309
MONTERREY	COLIMA	962
MONTERREY	CORDOBA	1,096
MONTERREY	COSAMALOAPAN	1,146
MONTERREY	CUERNAVACA	989
MONTERREY	CULIACAN	1,054
MONTERREY	DURANGO	631
MONTERREY	ENSENADA	2,346
MONTERREY	FRESNILLO	458

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MONTERREY	GUADALAJARA	769
MONTERREY	HERMOSILLO	1,499
MONTERREY	IGUALA	1,054
MONTERREY	IRAPUATO	702
MONTERREY	LA PAZ	1,484
MONTERREY	LAZARO CARDENAS	1,204
MONTERREY	LEON	693
MONTERREY	LOS MOCHIS	1,240
MONTERREY	MATAMOROS	305
MONTERREY	MAZATLAN	835
MONTERREY	MERIDA	2,025
MONTERREY	MEXICALI	2,081
MONTERREY	MEXICO	910
MONTERREY	MONCLOVA	237
MONTERREY	MONTERREY	0
MONTERREY	MORELIA	890
MONTERREY	NOGALES	1,572
MONTERREY	OAXACA	1,334
MONTERREY	ORIZABA	1,136
MONTERREY	PACHUCA	917
MONTERREY	POZA RICA	741
MONTERREY	PUEBLA	1,003
MONTERREY	PUERTO VALLARTA	1,060
MONTERREY	QUERETARO	705
MONTERREY	REYNOSA	221
MONTERREY	SALINA CRUZ	1,454
MONTERREY	SALTILLO	88
MONTERREY	SAN LUIS POTOSI	514
MONTERREY	TAMPICO	660
MONTERREY	TAPACHULA	1,772
MONTERREY	TEPIC	959
MONTERREY	TIJUANA	2,388
MONTERREY	TOLUCA	893
MONTERREY	TORREON	333
MONTERREY	TUXTLA GUTIERREZ	1,520
MONTERREY	URUAPAN	998
MONTERREY	VERACRUZ	981
MONTERREY	VILLAHERMOSA	1,440
MONTERREY	XALAPA	1,009
MONTERREY	ZACATECAS	462
MONTERREY	ZAMORA	845
MONTERREY	ZIHUATANEJO	1,241
MORELIA	ACAPULCO	633
MORELIA	AGUASCALIENTES	322
MORELIA	CAMPECHE	1,440
MORELIA	CANCUN	1,906
MORELIA	CD.DEL CARMEN	1,225
MORELIA	CD.IXTEPEC	1,020

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MORELIA	CD.JUAREZ	1,631
MORELIA	CD.MANTE	631
MORELIA	CD.OBREGON	1,390
MORELIA	CD.VICTORIA	709
MORELIA	CELAYA	140
MORELIA	CHETUMAL	1,623
MORELIA	CHIHUAHUA	1,269
MORELIA	CIUDAD VALLES	562
MORELIA	COATZACOALCOS	891
MORELIA	COLIMA	404
MORELIA	CORDOBA	588
MORELIA	COSAMALOAPAN	728
MORELIA	CUERNAVACA	321
MORELIA	CULIACAN	981
MORELIA	DURANGO	786
MORELIA	ENSENADA	2,582
MORELIA	FRESNILLO	495
MORELIA	GUADALAJARA	287
MORELIA	HERMOSILLO	1,642
MORELIA	IGUALA	395
MORELIA	IRAPUATO	132
MORELIA	LA PAZ	1,411
MORELIA	LAZARO CARDENAS	314
MORELIA	LEON	200
MORELIA	LOS MOCHIS	1,167
MORELIA	MATAMOROS	1,027
MORELIA	MAZATLAN	762
MORELIA	MERIDA	1,607
MORELIA	MEXICALI	2,338
MORELIA	MEXICO	294
MORELIA	MONCLOVA	999
MORELIA	MONTERREY	890
MORELIA	MORELIA	0
MORELIA	NOGALES	1,920
MORELIA	OAXACA	752
MORELIA	ORIZABA	553
MORELIA	PACHUCA	312
MORELIA	POZA RICA	506
MORELIA	PUEBLA	420
MORELIA	PUERTO VALLARTA	590
MORELIA	QUERETARO	189
MORELIA	REYNOSA	1,037
MORELIA	SALINA CRUZ	1,015
MORELIA	SALTILLO	803
MORELIA	SAN LUIS POTOSI	392
MORELIA	TAMPICO	686
MORELIA	TAPACHULA	1,371
MORELIA	TEPIC	534

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
MORELIA	TIJUANA	2,513
MORELIA	TOLUCA	230
MORELIA	TORREON	822
MORELIA	TUXTLA GUTIERREZ	1,119
MORELIA	URUAPAN	110
MORELIA	VERACRUZ	684
MORELIA	VILLAHERMOSA	1,038
MORELIA	XALAPA	554
MORELIA	ZACATECAS	440
MORELIA	ZAMORA	150
MORELIA	ZIHUATANEJO	351
NOGALES	ACAPULCO	2,497
NOGALES	AGUASCALIENTES	1,813
NOGALES	CAMPECHE	3,315
NOGALES	CANCUN	3,781
NOGALES	CD.DEL CARMEN	3,100
NOGALES	CD.IXTEPEC	2,896
NOGALES	CD.JUAREZ	599
NOGALES	CD.MANTE	1,988
NOGALES	CD.OBREGON	529
NOGALES	CD.VICTORIA	1,851
NOGALES	CELAYA	1,937
NOGALES	CHETUMAL	3,498
NOGALES	CHIHUAHUA	812
NOGALES	CIUDAD VALLES	2,040
NOGALES	COATZACOALCOS	2,766
NOGALES	COLIMA	1,817
NOGALES	CORDOBA	2,463
NOGALES	COSAMALOAPAN	2,603
NOGALES	CUERNAVACA	2,196
NOGALES	CULIACAN	979
NOGALES	DURANGO	1,333
NOGALES	ENSENADA	874
NOGALES	FRESNILLO	1,545
NOGALES	GUADALAJARA	1,636
NOGALES	HERMOSILLO	277
NOGALES	IGUALA	2,270
NOGALES	IRAPUATO	1,877
NOGALES	LA PAZ	1,005
NOGALES	LAZARO CARDENAS	2,126
NOGALES	LEON	1,842
NOGALES	LOS MOCHIS	761
NOGALES	MATAMOROS	1,888
NOGALES	MAZATLAN	1,161
NOGALES	MERIDA	3,482
NOGALES	MEXICALI	630
NOGALES	MEXICO	2,169
NOGALES	MONCLOVA	1,603

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
NOGALES	MONTERREY	1,572
NOGALES	MORELIA	1,920
NOGALES	NOGALES	0
NOGALES	OAXACA	2,630
NOGALES	ORIZABA	2,431
NOGALES	PACHUCA	2,189
NOGALES	POZA RICA	2,383
NOGALES	PUEBLA	2,303
NOGALES	PUERTO VALLARTA	1,595
NOGALES	QUERETARO	1,982
NOGALES	REYNOSA	1,810
NOGALES	SALINA CRUZ	2,892
NOGALES	SALTILLO	1,497
NOGALES	SAN LUIS POTOSI	1,791
NOGALES	TAMPICO	2,074
NOGALES	TAPACHULA	3,249
NOGALES	TEPIC	1,431
NOGALES	TIJUANA	804
NOGALES	TOLUCA	2,108
NOGALES	TORREON	1,246
NOGALES	TUXTLA GUTIERREZ	2,996
NOGALES	URUAPAN	1,893
NOGALES	VERACRUZ	2,563
NOGALES	VILLAHERMOSA	2,919
NOGALES	XALAPA	2,431
NOGALES	ZACATECAS	1,605
NOGALES	ZAMORA	1,794
NOGALES	ZIHUATANEJO	2,154
OAXACA	ACAPULCO	604
OAXACA	AGUASCALIENTES	957
OAXACA	CAMPECHE	993
OAXACA	CANCUN	1,459
OAXACA	CD.DEL CARMEN	778
OAXACA	CD.IXTEPEC	280
OAXACA	CD.JUAREZ	2,242
OAXACA	CD.MANTE	914
OAXACA	CD.OBREGON	2,099
OAXACA	CD.VICTORIA	1,049
OAXACA	CELAYA	713
OAXACA	CHETUMAL	1,176
OAXACA	CHIHUAHUA	1,879
OAXACA	CIUDAD VALLES	820
OAXACA	COATZACOALCOS	433
OAXACA	COLIMA	1,113
OAXACA	CORDOBA	349
OAXACA	COSAMALOAPAN	278
OAXACA	CUERNAVACA	433
OAXACA	CULIACAN	1,690

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
OAXACA	DURANGO	1,396
OAXACA	ENSENADA	3,291
OAXACA	FRESNILLO	1,106
OAXACA	GUADALAJARA	996
OAXACA	HERMOSILLO	2,352
OAXACA	IGUALA	539
OAXACA	IRAPUATO	769
OAXACA	LA PAZ	2,120
OAXACA	LAZARO CARDENAS	999
OAXACA	LEON	835
OAXACA	LOS MOCHIS	1,876
OAXACA	MATAMOROS	1,339
OAXACA	MAZATLAN	1,471
OAXACA	MERIDA	1,160
OAXACA	MEXICALI	3,047
OAXACA	MEXICO	464
OAXACA	MONCLOVA	1,466
OAXACA	MONTERREY	1,334
OAXACA	MORELIA	752
OAXACA	NOGALES	2,630
OAXACA	OAXACA	0
OAXACA	ORIZABA	316
OAXACA	PACHUCA	479
OAXACA	POZA RICA	616
OAXACA	PUEBLA	343
OAXACA	PUERTO VALLARTA	1,299
OAXACA	QUERETARO	664
OAXACA	REYNOSA	1,351
OAXACA	SALINA CRUZ	264
OAXACA	SALTILLO	1,297
OAXACA	SAN LUIS POTOSI	864
OAXACA	TAMPICO	805
OAXACA	TAPACHULA	671
OAXACA	TEPIC	1,199
OAXACA	TIJUANA	3,223
OAXACA	TOLUCA	525
OAXACA	TORREON	1,432
OAXACA	TUXTLA GUTIERREZ	539
OAXACA	URUAPAN	865
OAXACA	VERACRUZ	371
OAXACA	VILLAHERMOSA	580
OAXACA	XALAPA	438
OAXACA	ZACATECAS	1,049
OAXACA	ZAMORA	886
OAXACA	ZIHUATANEJO	942
ORIZABA	ACAPULCO	636
ORIZABA	AGUASCALIENTES	759
ORIZABA	CAMPECHE	876

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
ORIZABA	CANCUN	1,343
ORIZABA	CD.DEL CARMEN	662
ORIZABA	CD.IXTEPEC	457
ORIZABA	CD.JUAREZ	2,043
ORIZABA	CD.MANTE	716
ORIZABA	CD.OBREGON	1,901
ORIZABA	CD.VICTORIA	820
ORIZABA	CELAYA	523
ORIZABA	CHETUMAL	1,060
ORIZABA	CHIHUAHUA	1,681
ORIZABA	CIUDAD VALLES	622
ORIZABA	COATZACOALCOS	327
ORIZABA	COLIMA	915
ORIZABA	CORDOBA	24.3
ORIZABA	COSAMALOAPAN	164
ORIZABA	CUERNAVACA	336
ORIZABA	CULIACAN	1,492
ORIZABA	DURANGO	1,198
ORIZABA	ENSENADA	3,093
ORIZABA	FRESNILLO	908
ORIZABA	GUADALAJARA	798
ORIZABA	HERMOSILLO	2,153
ORIZABA	IGUALA	406
ORIZABA	IRAPUATO	578
ORIZABA	LA PAZ	1,922
ORIZABA	LAZARO CARDENAS	868
ORIZABA	LEON	636
ORIZABA	LOS MOCHIS	1,678
ORIZABA	MATAMOROS	1,140
ORIZABA	MAZATLAN	1,273
ORIZABA	MERIDA	1,044
ORIZABA	MEXICALI	2,848
ORIZABA	MEXICO	265
ORIZABA	MONCLOVA	1,268
ORIZABA	MONTERREY	1,136
ORIZABA	MORELIA	553
ORIZABA	NOGALES	2,431
ORIZABA	OAXACA	316
ORIZABA	ORIZABA	0
ORIZABA	PACHUCA	288
ORIZABA	POZA RICA	349
ORIZABA	PUEBLA	153
ORIZABA	PUERTO VALLARTA	1,109
ORIZABA	QUERETARO	474
ORIZABA	REYNOSA	1,086
ORIZABA	SALINA CRUZ	490
ORIZABA	SALTILLO	1,107
ORIZABA	SAN LUIS POTOSI	673

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
ORIZABA	TAMPICO	582
ORIZABA	TAPACHULA	808
ORIZABA	TEPIC	1,008
ORIZABA	TIJUANA	3,032
ORIZABA	TOLUCA	335
ORIZABA	TORREON	241
ORIZABA	TUXTLA GUTIERREZ	565
ORIZABA	URUAPAN	673
ORIZABA	VERACRUZ	132
ORIZABA	VILLAHERMOSA	485
ORIZABA	XALAPA	179
ORIZABA	ZACATECAS	858
ORIZABA	ZAMORA	695
ORIZABA	ZIHUATANEJO	752
PACHUCA	ACAPULCO	469
PACHUCA	AGUASCALIENTES	517
PACHUCA	CAMPECHE	1,164
PACHUCA	CANCUN	1,630
PACHUCA	CD.DEL CARMEN	949
PACHUCA	CD.IXTEPEC	745
PACHUCA	CD.JUAREZ	1,801
PACHUCA	CD.MANTE	442
PACHUCA	CD.OBREGON	1,659
PACHUCA	CD.VICTORIA	736
PACHUCA	CELAYA	273
PACHUCA	CHETUMAL	1,348
PACHUCA	CHIHUAHUA	1,439
PACHUCA	CIUDAD VALLES	386
PACHUCA	COATZACOALCOS	615
PACHUCA	COLIMA	673
PACHUCA	CORDOBA	312
PACHUCA	COSAMALOAPAN	452
PACHUCA	CUERNAVACA	177
PACHUCA	CULIACAN	1,250
PACHUCA	DURANGO	956
PACHUCA	ENSENADA	2,851
PACHUCA	FRESNILLO	666
PACHUCA	GUADALAJARA	556
PACHUCA	HERMOSILLO	1,911
PACHUCA	IGUALA	282
PACHUCA	IRAPUATO	329
PACHUCA	LA PAZ	1,680
PACHUCA	LAZARO CARDENAS	626
PACHUCA	LEON	394
PACHUCA	LOS MOCHIS	1,436
PACHUCA	MATAMOROS	867
PACHUCA	MAZATLAN	1,031
PACHUCA	MERIDA	1,332

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
PACHUCA	MEXICALI	2,607
PACHUCA	MEXICO	90.6
PACHUCA	MONCLOVA	1,026
PACHUCA	MONTERREY	917
PACHUCA	MORELIA	312
PACHUCA	NOGALES	2,189
PACHUCA	OAXACA	479
PACHUCA	ORIZABA	288
PACHUCA	PACHUCA	0
PACHUCA	POZA RICA	196
PACHUCA	PUEBLA	145
PACHUCA	PUERTO VALLARTA	859
PACHUCA	QUERETARO	224
PACHUCA	REYNOSA	878
PACHUCA	SALINA CRUZ	739
PACHUCA	SALTILLO	857
PACHUCA	SAN LUIS POTOSI	424
PACHUCA	TAMPICO	393
PACHUCA	TAPACHULA	1,096
PACHUCA	TEPIC	758
PACHUCA	TIJUANA	2,783
PACHUCA	TOLUCA	152
PACHUCA	TORREON	991
PACHUCA	TUXTLA GUTIERREZ	843
PACHUCA	URUAPAN	424
PACHUCA	VERACRUZ	410
PACHUCA	VILLAHERMOSA	763
PACHUCA	XALAPA	278
PACHUCA	ZACATECAS	609
PACHUCA	ZAMORA	446
PACHUCA	ZIHUATANEJO	569
POZA RICA	ACAPULCO	776
POZA RICA	AGUASCALIENTES	711
POZA RICA	CAMPECHE	1,096
POZA RICA	CANCUN	1,572
POZA RICA	CD.DEL CARMEN	891
POZA RICA	CD.IXTEPEC	686
POZA RICA	CD.JUAREZ	1,904
POZA RICA	CD.MANTE	386
POZA RICA	CD.OBREGON	1,853
POZA RICA	CD.VICTORIA	477
POZA RICA	CELAYA	467
POZA RICA	CHETUMAL	1,289
POZA RICA	CHIHUAHUA	1,542
POZA RICA	CIUDAD VALLES	292
POZA RICA	COATZACOALCOS	556
POZA RICA	COLIMA	866
POZA RICA	CORDOBA	431

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
POZA RICA	COSAMALOAPAN	393
POZA RICA	CUERNAVACA	353
POZA RICA	CULIACAN	1,444
POZA RICA	DURANGO	1,150
POZA RICA	ENSENADA	3,045
POZA RICA	FRESNILLO	792
POZA RICA	GUADALAJARA	750
POZA RICA	HERMOSILLO	2,105
POZA RICA	IGUALA	459
POZA RICA	IRAPUATO	523
POZA RICA	LA PAZ	1,875
POZA RICA	LAZARO CARDENAS	820
POZA RICA	LEON	588
POZA RICA	LOS MOCHIS	1,630
POZA RICA	MATAMOROS	734
POZA RICA	MAZATLAN	1,224
POZA RICA	MERIDA	1,273
POZA RICA	MEXICALI	2,800
POZA RICA	MEXICO	267
POZA RICA	MONCLOVA	935
POZA RICA	MONTERREY	741
POZA RICA	MORELIA	506
POZA RICA	NOGALES	2,383
POZA RICA	OAXACA	616
POZA RICA	ORIZABA	349
POZA RICA	PACHUCA	196
POZA RICA	POZA RICA	0
POZA RICA	PUEBLA	260
POZA RICA	PUERTO VALLARTA	1,051
POZA RICA	QUERETARO	416
POZA RICA	REYNOSA	745
POZA RICA	SALINA CRUZ	718
POZA RICA	SALTILLO	843
POZA RICA	SAN LUIS POTOSI	556
POZA RICA	TAMPICO	241
POZA RICA	TAPACHULA	1,045
POZA RICA	TEPIC	951
POZA RICA	TIJUANA	2,975
POZA RICA	TOLUCA	329
POZA RICA	TORREON	1,087
POZA RICA	TUXTLA GUTIERREZ	793
POZA RICA	URUAPAN	616
POZA RICA	VERACRUZ	249
POZA RICA	VILLAHERMOSA	713
POZA RICA	XALAPA	282
POZA RICA	ZACATECAS	772
POZA RICA	ZAMORA	638
POZA RICA	ZIHUATANEJO	746

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
PUEBLA	ACAPULCO	448
PUEBLA	AGUASCALIENTES	626
PUEBLA	CAMPECHE	1,019
PUEBLA	CANCUN	1,495
PUEBLA	CD.DEL CARMEN	814
PUEBLA	CD.IXTEPEC	609
PUEBLA	CD.JUAREZ	1,910
PUEBLA	CD.MANTE	583
PUEBLA	CD.OBREGON	1,768
PUEBLA	CD.VICTORIA	702
PUEBLA	CELAYA	382
PUEBLA	CHETUMAL	1,212
PUEBLA	CHIHUAHUA	1,548
PUEBLA	CIUDAD VALLES	489
PUEBLA	COATZACOALCOS	479
PUEBLA	COLIMA	782
PUEBLA	CORDOBA	177
PUEBLA	COSAMALOAPAN	317
PUEBLA	CUERNAVACA	156
PUEBLA	CULIACAN	1,359
PUEBLA	DURANGO	1,065
PUEBLA	ENSENADA	2,960
PUEBLA	FRESNILLO	775
PUEBLA	GUADALAJARA	665
PUEBLA	HERMOSILLO	2,025
PUEBLA	IGUALA	262
PUEBLA	IRAPUATO	438
PUEBLA	LA PAZ	1,794
PUEBLA	LAZARO CARDENAS	722
PUEBLA	LEON	504
PUEBLA	LOS MOCHIS	1,545
PUEBLA	MATAMOROS	1,007
PUEBLA	MAZATLAN	1,140
PUEBLA	MERIDA	1,196
PUEBLA	MEXICALI	2,716
PUEBLA	MEXICO	137
PUEBLA	MONCLOVA	1,135
PUEBLA	MONTERREY	1,003
PUEBLA	MORELIA	420
PUEBLA	NOGALES	2,303
PUEBLA	OAXACA	343
PUEBLA	ORIZABA	153
PUEBLA	PACHUCA	145
PUEBLA	POZA RICA	260
PUEBLA	PUEBLA	0
PUEBLA	PUERTO VALLARTA	966
PUEBLA	QUERETARO	331
PUEBLA	REYNOSA	1,018

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
PUEBLA	SALINA CRUZ	604
PUEBLA	SALTILLO	964
PUEBLA	SAN LUIS POTOSI	531
PUEBLA	TAMPICO	464
PUEBLA	TAPACHULA	960
PUEBLA	TEPIC	865
PUEBLA	TIJUANA	2,890
PUEBLA	TOLUCA	192
PUEBLA	TORREON	1,098
PUEBLA	TUXTLA GUTIERREZ	708
PUEBLA	URUAPAN	531
PUEBLA	VERACRUZ	275
PUEBLA	VILLAHERMOSA	627
PUEBLA	XALAPA	173
PUEBLA	ZACATECAS	716
PUEBLA	ZAMORA	553
PUEBLA	ZIHUATANEJO	609
PUERTO VALLARTA	ACAPULCO	945
PUERTO VALLARTA	AGUASCALIENTES	520
PUERTO VALLARTA	CAMPECHE	1,975
PUERTO VALLARTA	CANCUN	2,451
PUERTO VALLARTA	CD.DEL CARMEN	1,170
PUERTO VALLARTA	CD.IXTEPEC	1,565
PUERTO VALLARTA	CD.JUAREZ	1,615
PUERTO VALLARTA	CD.MANTE	954
PUERTO VALLARTA	CD.OBREGON	1,064
PUERTO VALLARTA	CD.VICTORIA	964
PUERTO VALLARTA	CELAYA	607
PUERTO VALLARTA	CHETUMAL	2,168
PUERTO VALLARTA	CHIHUAHUA	1,293
PUERTO VALLARTA	CIUDAD VALLES	885
PUERTO VALLARTA	COATZACOALCOS	1,435
PUERTO VALLARTA	COLIMA	377
PUERTO VALLARTA	CORDOBA	1,133
PUERTO VALLARTA	COSAMALOAPAN	1,273
PUERTO VALLARTA	CUERNAVACA	866
PUERTO VALLARTA	CULIACAN	655
PUERTO VALLARTA	DURANGO	690
PUERTO VALLARTA	ENSENADA	2,256
PUERTO VALLARTA	FRESNILLO	621
PUERTO VALLARTA	GUADALAJARA	306
PUERTO VALLARTA	HERMOSILLO	1,317
PUERTO VALLARTA	IGUALA	940
PUERTO VALLARTA	IRAPUATO	547
PUERTO VALLARTA	LA PAZ	1,085
PUERTO VALLARTA	LAZARO CARDENAS	618
PUERTO VALLARTA	LEON	522
PUERTO VALLARTA	LOS MOCHIS	841

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
PUERTO VALLARTA	MATAMOROS	1,282
PUERTO VALLARTA	MAZATLAN	436
PUERTO VALLARTA	MERIDA	2,152
PUERTO VALLARTA	MEXICALI	2,012
PUERTO VALLARTA	MEXICO	852
PUERTO VALLARTA	MONCLOVA	1,165
PUERTO VALLARTA	MONTERREY	1,060
PUERTO VALLARTA	MORELIA	590
PUERTO VALLARTA	NOGALES	1,595
PUERTO VALLARTA	OAXACA	1,299
PUERTO VALLARTA	ORIZABA	1,109
PUERTO VALLARTA	PACHUCA	859
PUERTO VALLARTA	POZA RICA	1,051
PUERTO VALLARTA	PUEBLA	966
PUERTO VALLARTA	PUERTO VALLARTA	0
PUERTO VALLARTA	QUERETARO	650
PUERTO VALLARTA	REYNOSA	1,295
PUERTO VALLARTA	SALINA CRUZ	1,560
PUERTO VALLARTA	SALTILLO	1,004
PUERTO VALLARTA	SAN LUIS POTOSI	631
PUERTO VALLARTA	TAMPICO	1,034
PUERTO VALLARTA	TAPACHULA	1,916
PUERTO VALLARTA	TEPIC	167
PUERTO VALLARTA	TIJUANA	2,186
PUERTO VALLARTA	TOLUCA	775
PUERTO VALLARTA	TORREON	863
PUERTO VALLARTA	TUXTLA GUTIERREZ	1,664
PUERTO VALLARTA	URUAPAN	541
PUERTO VALLARTA	VERACRUZ	1,231
PUERTO VALLARTA	VILLAHERMOSA	1,584
PUERTO VALLARTA	XALAPA	1,099
PUERTO VALLARTA	ZACATECAS	641
PUERTO VALLARTA	ZAMORA	461
PUERTO VALLARTA	ZIHUATANEJO	720
QUERETARO	ACAPULCO	588
QUERETARO	AGUASCALIENTES	296
QUERETARO	CAMPECHE	1,340
QUERETARO	CANCUN	1,816
QUERETARO	CD.DEL CARMEN	1,135
QUERETARO	CD.IXTEPEC	930
QUERETARO	CD.JUAREZ	1,589
QUERETARO	CD.MANTE	513
QUERETARO	CD.OBREGON	1,451
QUERETARO	CD.VICTORIA	523
QUERETARO	CELAYA	52
QUERETARO	CHETUMAL	1,533
QUERETARO	CHIHUAHUA	1,227
QUERETARO	CIUDAD VALLES	435

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
QUERETARO	COATZACOALCOS	800
QUERETARO	COLIMA	464
QUERETARO	CORDOBA	498
QUERETARO	COSAMALOAPAN	638
QUERETARO	CUERNAVACA	296
QUERETARO	CULIACAN	1,043
QUERETARO	DURANGO	744
QUERETARO	ENSENADA	2,644
QUERETARO	FRESNILLO	453
QUERETARO	GUADALAJARA	349
QUERETARO	HERMOSILLO	1,704
QUERETARO	IGUALA	362
QUERETARO	IRAPUATO	108
QUERETARO	LA PAZ	1,473
QUERETARO	LAZARO CARDENAS	503
QUERETARO	LEON	173
QUERETARO	LOS MOCHIS	1,229
QUERETARO	MATAMOROS	842
QUERETARO	MAZATLAN	823
QUERETARO	MERIDA	1,517
QUERETARO	MEXICALI	2,399
QUERETARO	MEXICO	217
QUERETARO	MONCLOVA	814
QUERETARO	MONTERREY	705
QUERETARO	MORELIA	189
QUERETARO	NOGALES	1,982
QUERETARO	OAXACA	664
QUERETARO	ORIZABA	474
QUERETARO	PACHUCA	224
QUERETARO	POZA RICA	416
QUERETARO	PUEBLA	331
QUERETARO	PUERTO VALLARTA	650
QUERETARO	QUERETARO	0
QUERETARO	REYNOSA	851
QUERETARO	SALINA CRUZ	926
QUERETARO	SALTILLO	645
QUERETARO	SAN LUIS POTOSI	211
QUERETARO	TAMPICO	499
QUERETARO	TAPACHULA	1,283
QUERETARO	TEPIC	550
QUERETARO	TIJUANA	2,574
QUERETARO	TOLUCA	199
QUERETARO	TORREON	779
QUERETARO	TUXTLA GUTIERREZ	1,030
QUERETARO	URUAPAN	300
QUERETARO	VERACRUZ	597
QUERETARO	VILLAHERMOSA	950
QUERETARO	XALAPA	465

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
QUERETARO	ZACATECAS	396
QUERETARO	ZAMORA	248
QUERETARO	ZIHUATANEJO	519
REYNOSA	ACAPULCO	1,345
REYNOSA	AGUASCALIENTES	804
REYNOSA	CAMPECHE	1,833
REYNOSA	CANCUN	2,309
REYNOSA	CD.DEL CARMEN	1,629
REYNOSA	CD.IXTEPEC	1,424
REYNOSA	CD.JUAREZ	1,400
REYNOSA	CD.MANTE	584
REYNOSA	CD.OBREGON	1,693
REYNOSA	CD.VICTORIA	448
REYNOSA	CELAYA	900
REYNOSA	CHETUMAL	2,026
REYNOSA	CHIHUAHUA	1,038
REYNOSA	CIUDAD VALLES	679
REYNOSA	COATZACOALCOS	1,294
REYNOSA	COLIMA	1,192
REYNOSA	CORDOBA	1,081
REYNOSA	COSAMALOAPAN	1,131
REYNOSA	CUERNAVACA	1,053
REYNOSA	CULIACAN	1,285
REYNOSA	DURANGO	862
REYNOSA	ENSENADA	2,610
REYNOSA	FRESNILLO	689
REYNOSA	GUADALAJARA	990
REYNOSA	HERMOSILLO	1,729
REYNOSA	IGUALA	1,158
REYNOSA	IRAPUATO	849
REYNOSA	LA PAZ	1,715
REYNOSA	LAZARO CARDENAS	1,351
REYNOSA	LEON	930
REYNOSA	LOS MOCHIS	1,471
REYNOSA	MATAMOROS	93.3
REYNOSA	MAZATLAN	1,065
REYNOSA	MERIDA	2,010
REYNOSA	MEXICALI	2,358
REYNOSA	MEXICO	966
REYNOSA	MONCLOVA	404
REYNOSA	MONTERREY	221
REYNOSA	MORELIA	1,037
REYNOSA	NOGALES	1,810
REYNOSA	OAXACA	1,351
REYNOSA	ORIZABA	1,086
REYNOSA	PACHUCA	878
REYNOSA	POZA RICA	745
REYNOSA	PUEBLA	1,018

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
REYNOSA	PUERTO VALLARTA	1,295
REYNOSA	QUERETARO	851
REYNOSA	REYNOSA	0
REYNOSA	SALINA CRUZ	1,458
REYNOSA	SALTILLO	319
REYNOSA	SAN LUIS POTOSI	662
REYNOSA	TAMPICO	506
REYNOSA	TAPACHULA	1,777
REYNOSA	TEPIC	1,190
REYNOSA	TIJUANA	2,619
REYNOSA	TOLUCA	1,028
REYNOSA	TORREON	564
REYNOSA	TUXTLA GUTIERREZ	1,524
REYNOSA	URUAPAN	1,148
REYNOSA	VERACRUZ	986
REYNOSA	VILLAHERMOSA	1,444
REYNOSA	XALAPA	1,014
REYNOSA	ZACATECAS	693
REYNOSA	ZAMORA	1,096
REYNOSA	ZIHUATANEJO	1,389
SALINA CRUZ	ACAPULCO	649
SALINA CRUZ	AGUASCALIENTES	1,220
SALINA CRUZ	CAMPECHE	848
SALINA CRUZ	CANCUN	1,366
SALINA CRUZ	CD.DEL CARMEN	685
SALINA CRUZ	CD.IXTEPEC	58.5
SALINA CRUZ	CD.JUAREZ	2,504
SALINA CRUZ	CD.MANTE	1,101
SALINA CRUZ	CD.OBREGON	2,362
SALINA CRUZ	CD.VICTORIA	1,190
SALINA CRUZ	CELAYA	976
SALINA CRUZ	CHETUMAL	1,031
SALINA CRUZ	CHIHUAHUA	2,142
SALINA CRUZ	CIUDAD VALLES	1,007
SALINA CRUZ	COATZACOALCOS	298
SALINA CRUZ	COLIMA	1,376
SALINA CRUZ	CORDOBA	476
SALINA CRUZ	COSAMALOAPAN	347
SALINA CRUZ	CUERNAVACA	696
SALINA CRUZ	CULIACAN	1,953
SALINA CRUZ	DURANGO	1,659
SALINA CRUZ	ENSENADA	3,554
SALINA CRUZ	FRESNILLO	1,369
SALINA CRUZ	GUADALAJARA	1,259
SALINA CRUZ	HERMOSILLO	2,614
SALINA CRUZ	IGUALA	801
SALINA CRUZ	IRAPUATO	1,032
SALINA CRUZ	LA PAZ	2,383

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
SALINA CRUZ	LAZARO CARDENAS	986
SALINA CRUZ	LEON	1,097
SALINA CRUZ	LOS MOCHIS	2,139
SALINA CRUZ	MATAMOROS	1,448
SALINA CRUZ	MAZATLAN	1,734
SALINA CRUZ	MERIDA	1,015
SALINA CRUZ	MEXICALI	3,309
SALINA CRUZ	MEXICO	726
SALINA CRUZ	MONCLOVA	1,648
SALINA CRUZ	MONTERREY	1,454
SALINA CRUZ	MORELIA	1,015
SALINA CRUZ	NOGALES	2,892
SALINA CRUZ	OAXACA	264
SALINA CRUZ	ORIZABA	490
SALINA CRUZ	PACHUCA	739
SALINA CRUZ	POZA RICA	718
SALINA CRUZ	PUEBLA	604
SALINA CRUZ	PUERTO VALLARTA	1,560
SALINA CRUZ	QUERETARO	926
SALINA CRUZ	REYNOSA	1,458
SALINA CRUZ	SALINA CRUZ	0
SALINA CRUZ	SALTILLO	1,606
SALINA CRUZ	SAN LUIS POTOSI	1,173
SALINA CRUZ	TAMPICO	962
SALINA CRUZ	TAPACHULA	440
SALINA CRUZ	TEPIC	1,494
SALINA CRUZ	TIJUANA	3,531
SALINA CRUZ	TOLUCA	801
SALINA CRUZ	TORREON	1,740
SALINA CRUZ	TUXTLA GUTIERREZ	309
SALINA CRUZ	URUAPAN	1,149
SALINA CRUZ	VERACRUZ	472
SALINA CRUZ	VILLAHERMOSA	456
SALINA CRUZ	XALAPA	574
SALINA CRUZ	ZACATECAS	1,357
SALINA CRUZ	ZAMORA	1,181
SALINA CRUZ	ZIHUATANEJO	1,204
SALTILLO	ACAPULCO	1,221
SALTILLO	AGUASCALIENTES	481
SALTILLO	CAMPECHE	1,971
SALTILLO	CANCUN	2,449
SALTILLO	CD.DEL CARMEN	1,768
SALTILLO	CD.IXTEPEC	1,564
SALTILLO	CD.JUAREZ	1,088
SALTILLO	CD.MANTE	504
SALTILLO	CD.OBREGON	1,354
SALTILLO	CD.VICTORIA	367
SALTILLO	CELAYA	694

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
SALTILLO	CHETUMAL	2,166
SALTILLO	CHIHUAHUA	725
SALTILLO	CIUDAD VALLES	599
SALTILLO	COATZACOALCOS	1,434
SALTILLO	COLIMA	869
SALTILLO	CORDOBA	1,131
SALTILLO	COSAMALOAPAN	1,228
SALTILLO	CUERNAVACA	930
SALTILLO	CULIACAN	972
SALTILLO	DURANGO	549
SALTILLO	ENSENADA	2,293
SALTILLO	FRESNILLO	366
SALTILLO	GUADALAJARA	703
SALTILLO	HERMOSILLO	1,417
SALTILLO	IGUALA	995
SALTILLO	IRAPUATO	643
SALTILLO	LA PAZ	1,402
SALTILLO	LAZARO CARDENAS	1,117
SALTILLO	LEON	607
SALTILLO	LOS MOCHIS	1,158
SALTILLO	MATAMOROS	404
SALTILLO	MAZATLAN	753
SALTILLO	MERIDA	2,108
SALTILLO	MEXICALI	2,006
SALTILLO	MEXICO	850
SALTILLO	MONCLOVA	197
SALTILLO	MONTERREY	88
SALTILLO	MORELIA	803
SALTILLO	NOGALES	1,497
SALTILLO	OAXACA	1,297
SALTILLO	ORIZABA	1,107
SALTILLO	PACHUCA	857
SALTILLO	POZA RICA	843
SALTILLO	PUEBLA	964
SALTILLO	PUERTO VALLARTA	1,004
SALTILLO	QUERETARO	645
SALTILLO	REYNOSA	319
SALTILLO	SALINA CRUZ	1,606
SALTILLO	SALTILLO	0
SALTILLO	SAN LUIS POTOSI	554
SALTILLO	TAMPICO	589
SALTILLO	TAPACHULA	1,860
SALTILLO	TEPIC	900
SALTILLO	TIJUANA	2,134
SALTILLO	TOLUCA	830
SALTILLO	TORREON	254
SALTILLO	TUXTLA GUTIERREZ	1,607
SALTILLO	URUAPAN	907

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
SALTILLO	VERACRUZ	1,069
SALTILLO	VILLAHERMOSA	1,581
SALTILLO	XALAPA	1,096
SALTILLO	ZACATECAS	371
SALTILLO	ZAMORA	755
SALTILLO	ZIHUATANEJO	1,154
SAN LUIS POTOSI	ACAPULCO	788
SAN LUIS POTOSI	AGUASCALIENTES	166
SAN LUIS POTOSI	CAMPECHE	1,549
SAN LUIS POTOSI	CANCUN	2,015
SAN LUIS POTOSI	CD.DEL CARMEN	1,335
SAN LUIS POTOSI	CD.IXTEPEC	1,130
SAN LUIS POTOSI	CD.JUAREZ	1,381
SAN LUIS POTOSI	CD.MANTE	354
SAN LUIS POTOSI	CD.OBREGON	1,356
SAN LUIS POTOSI	CD.VICTORIA	333
SAN LUIS POTOSI	CELAYA	260
SAN LUIS POTOSI	CHETUMAL	1,733
SAN LUIS POTOSI	CHIHUAHUA	1,019
SAN LUIS POTOSI	CIUDAD VALLES	258
SAN LUIS POTOSI	COATZACOALCOS	1,000
SAN LUIS POTOSI	COLIMA	524
SAN LUIS POTOSI	CORDOBA	697
SAN LUIS POTOSI	COSAMALOAPAN	837
SAN LUIS POTOSI	CUERNAVACA	496
SAN LUIS POTOSI	CULIACAN	947
SAN LUIS POTOSI	DURANGO	536
SAN LUIS POTOSI	ENSENADA	2,537
SAN LUIS POTOSI	FRESNILLO	246
SAN LUIS POTOSI	GUADALAJARA	330
SAN LUIS POTOSI	HERMOSILLO	1,608
SAN LUIS POTOSI	IGUALA	561
SAN LUIS POTOSI	IRAPUATO	209
SAN LUIS POTOSI	LA PAZ	1,377
SAN LUIS POTOSI	LAZARO CARDENAS	651
SAN LUIS POTOSI	LEON	180
SAN LUIS POTOSI	LOS MOCHIS	1,133
SAN LUIS POTOSI	MATAMOROS	651
SAN LUIS POTOSI	MAZATLAN	728
SAN LUIS POTOSI	MERIDA	1,717
SAN LUIS POTOSI	MEXICALI	2,293
SAN LUIS POTOSI	MEXICO	417
SAN LUIS POTOSI	MONCLOVA	623
SAN LUIS POTOSI	MONTERREY	514
SAN LUIS POTOSI	MORELIA	392
SAN LUIS POTOSI	NOGALES	1,791
SAN LUIS POTOSI	OAXACA	864
SAN LUIS POTOSI	ORIZABA	673

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
SAN LUIS POTOSI	PACHUCA	424
SAN LUIS POTOSI	POZA RICA	556
SAN LUIS POTOSI	PUEBLA	531
SAN LUIS POTOSI	PUERTO VALLARTA	631
SAN LUIS POTOSI	QUERETARO	211
SAN LUIS POTOSI	REYNOSA	662
SAN LUIS POTOSI	SALINA CRUZ	1,173
SAN LUIS POTOSI	SALTILLO	554
SAN LUIS POTOSI	SAN LUIS POTOSI	0
SAN LUIS POTOSI	TAMPICO	405
SAN LUIS POTOSI	TAPACHULA	1,484
SAN LUIS POTOSI	TEPIC	529
SAN LUIS POTOSI	TIJUANA	2,428
SAN LUIS POTOSI	TOLUCA	401
SAN LUIS POTOSI	TORREON	573
SAN LUIS POTOSI	TUXTLA GUTIERREZ	1,232
SAN LUIS POTOSI	URUAPAN	508
SAN LUIS POTOSI	VERACRUZ	711
SAN LUIS POTOSI	VILLAHERMOSA	1,152
SAN LUIS POTOSI	XALAPA	667
SAN LUIS POTOSI	ZACATECAS	190
SAN LUIS POTOSI	ZAMORA	437
SAN LUIS POTOSI	ZIHUATANEJO	739
TAMPICO	ACAPULCO	852
TAMPICO	AGUASCALIENTES	568
TAMPICO	CAMPECHE	1,339
TAMPICO	CANCUN	1,805
TAMPICO	CD.DEL CARMEN	1,124
TAMPICO	CD.IXTEPEC	920
TAMPICO	CD.JUAREZ	1,665
TAMPICO	CD.MANTE	149
TAMPICO	CD.OBREGON	1,759
TAMPICO	CD.VICTORIA	238
TAMPICO	CELAYA	548
TAMPICO	CHETUMAL	1,522
TAMPICO	CHIHUAHUA	1,302
TAMPICO	CIUDAD VALLES	193
TAMPICO	COATZACOALCOS	790
TAMPICO	COLIMA	927
TAMPICO	CORDOBA	577
TAMPICO	COSAMALOAPAN	627
TAMPICO	CUERNAVACA	561
TAMPICO	CULIACAN	1,350
TAMPICO	DURANGO	939
TAMPICO	ENSENADA	2,997
TAMPICO	FRESNILLO	649
TAMPICO	GUADALAJARA	733
TAMPICO	HERMOSILLO	1,994

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
TAMPICO	IGUALA	666
TAMPICO	IRAPUATO	604
TAMPICO	LA PAZ	1,780
TAMPICO	LAZARO CARDENAS	1,000
TAMPICO	LEON	583
TAMPICO	LOS MOCHIS	1,536
TAMPICO	MATAMOROS	495
TAMPICO	MAZATLAN	1,131
TAMPICO	MERIDA	1,506
TAMPICO	MEXICALI	2,743
TAMPICO	MONCLOVA	798
TAMPICO	MONTERREY	660
TAMPICO	MORELIA	686
TAMPICO	NOGALES	2,074
TAMPICO	OAXACA	805
TAMPICO	ORIZABA	582
TAMPICO	PACHUCA	393
TAMPICO	POZA RICA	241
TAMPICO	PUEBLA	464
TAMPICO	PUERTO VALLARTA	1,034
TAMPICO	QUERETARO	499
TAMPICO	REYNOSA	506
TAMPICO	SALINA CRUZ	962
TAMPICO	SALTILLO	589
TAMPICO	SAN LUIS POTOSI	405
TAMPICO	TAMPICO	0
TAMPICO	TAPACHULA	1,272
TAMPICO	TEPIC	934
TAMPICO	TIJUANA	2,767
TAMPICO	TOLUCA	536
TAMPICO	TORREON	849
TAMPICO	TUXTLA GUTIERREZ	1,020
TAMPICO	URUAPAN	816
TAMPICO	VERACRUZ	481
TAMPICO	VILLAHERMOSA	940
TAMPICO	XALAPA	509
TAMPICO	ZACATECAS	592
TAMPICO	ZAMORA	734
TAMPICO	ZIHUATANEJO	952
TAPACHULA	ACAPULCO	1,088
TAPACHULA	AGUASCALIENTES	1,576
TAPACHULA	CAMPECHE	763
TAPACHULA	CANCUN	1,295
TAPACHULA	CD.DEL CARMEN	745
TAPACHULA	CD.IXTEPEC	411
TAPACHULA	CD.JUAREZ	2,861
TAPACHULA	CD.MANTE	1,420
TAPACHULA	CD.OBREGON	2,718

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
TAPACHULA	CD.VICTORIA	1,509
TAPACHULA	CELAYA	1,332
TAPACHULA	CHETUMAL	946
TAPACHULA	CHIHUAHUA	2,498
TAPACHULA	CIUDAD VALLES	1,325
TAPACHULA	COATZACOALCOS	565
TAPACHULA	COLIMA	1,732
TAPACHULA	CORDOBA	794
TAPACHULA	COSAMALOAPAN	665
TAPACHULA	CUERNAVACA	1,162
TAPACHULA	CULIACAN	2,309
TAPACHULA	DURANGO	2,015
TAPACHULA	ENSENADA	3,910
TAPACHULA	FRESNILLO	1,725
TAPACHULA	GUADALAJARA	1,615
TAPACHULA	HERMOSILLO	2,970
TAPACHULA	IGUALA	1,267
TAPACHULA	IRAPUATO	1,388
TAPACHULA	LA PAZ	2,739
TAPACHULA	LAZARO CARDENAS	1,425
TAPACHULA	LEON	1,454
TAPACHULA	LOS MOCHIS	2,495
TAPACHULA	MATAMOROS	1,766
TAPACHULA	MAZATLAN	2,090
TAPACHULA	MERIDA	997
TAPACHULA	MEXICALI	3,666
TAPACHULA	MEXICO	1,082
TAPACHULA	MONCLOVA	1,966
TAPACHULA	MONTERREY	1,772
TAPACHULA	MORELIA	1,371
TAPACHULA	NOGALES	3,249
TAPACHULA	OAXACA	671
TAPACHULA	ORIZABA	808
TAPACHULA	PACHUCA	1,096
TAPACHULA	POZA RICA	1,045
TAPACHULA	PUEBLA	960
TAPACHULA	PUERTO VALLARTA	1,916
TAPACHULA	QUERETARO	1,283
TAPACHULA	REYNOSA	1,777
TAPACHULA	SALINA CRUZ	440
TAPACHULA	SALTILLO	1,860
TAPACHULA	SAN LUIS POTOSI	1,484
TAPACHULA	TAMPICO	1,272
TAPACHULA	TAPACHULA	0
TAPACHULA	TEPIC	1,826
TAPACHULA	TIJUANA	3,842
TAPACHULA	TOLUCA	1,152
TAPACHULA	TORREON	2,058

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
TAPACHULA	TUXTLA GUTIERREZ	371
TAPACHULA	URUAPAN	1,491
TAPACHULA	VERACRUZ	790
TAPACHULA	VILLAHERMOSA	612
TAPACHULA	XALAPA	903
TAPACHULA	ZACATECAS	1,676
TAPACHULA	ZAMORA	1,513
TAPACHULA	ZIHUATANEJO	1,569
TEPIC	ACAPULCO	979
TEPIC	AGUASCALIENTES	419
TEPIC	CAMPECHE	1,884
TEPIC	CANCUN	2,350
TEPIC	CD.DEL CARMEN	1,669
TEPIC	CD.IXTEPEC	1,763
TEPIC	CD.JUAREZ	1,451
TEPIC	CD.MANTE	853
TEPIC	CD.OBREGON	901
TEPIC	CD.VICTORIA	863
TEPIC	CELAYA	506
TEPIC	CHETUMAL	2,067
TEPIC	CHIHUAHUA	1,130
TEPIC	CIUDAD VALLES	785
TEPIC	COATZACOALCOS	1,335
TEPIC	COLIMA	386
TEPIC	CORDOBA	1,032
TEPIC	COSAMALOAPAN	1,172
TEPIC	CUERNAVACA	765
TEPIC	CULIACAN	492
TEPIC	DURANGO	526
TEPIC	ENSENADA	2,093
TEPIC	FRESNILLO	520
TEPIC	GUADALAJARA	205
TEPIC	HERMOSILLO	1,153
TEPIC	IGUALA	840
TEPIC	IRAPUATO	489
TEPIC	LA PAZ	922
TEPIC	LAZARO CARDENAS	695
TEPIC	LEON	421
TEPIC	LOS MOCHIS	678
TEPIC	MATAMOROS	1,181
TEPIC	MAZATLAN	272
TEPIC	MERIDA	2,051
TEPIC	MEXICALI	1,848
TEPIC	MEXICO	751
TEPIC	MONCLOVA	1,064
TEPIC	MONTERREY	959
TEPIC	MORELIA	534
TEPIC	NOGALES	1,431

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
TEPIC	OAXACA	1,199
TEPIC	ORIZABA	1,008
TEPIC	PACHUCA	758
TEPIC	POZA RICA	951
TEPIC	PUEBLA	865
TEPIC	PUERTO VALLARTA	167
TEPIC	QUERETARO	550
TEPIC	REYNOSA	1,190
TEPIC	SALINA CRUZ	1,494
TEPIC	SALTILLO	900
TEPIC	SAN LUIS POTOSI	529
TEPIC	TAMPICO	934
TEPIC	TAPACHULA	1,826
TEPIC	TEPIC	0
TEPIC	TIJUANA	2,023
TEPIC	TOLUCA	676
TEPIC	TORREON	700
TEPIC	TUXTLA GUTIERREZ	1,564
TEPIC	URUAPAN	461
TEPIC	VERACRUZ	1,131
TEPIC	VILLAHERMOSA	1,448
TEPIC	XALAPA	999
TEPIC	ZACATECAS	542
TEPIC	ZAMORA	362
TEPIC	ZIHUATANEJO	722
TIJUANA	ACAPULCO	3,090
TIJUANA	AGUASCALIENTES	2,404
TIJUANA	CAMPECHE	3,908
TIJUANA	CANCUN	4,374
TIJUANA	CD.DEL CARMEN	3,693
TIJUANA	CD.IXTEPEC	3,489
TIJUANA	CD.JUAREZ	1,297
TIJUANA	CD.MANTE	2,820
TIJUANA	CD.OBREGON	1,123
TIJUANA	CD.VICTORIA	2,528
TIJUANA	CELAYA	2,531
TIJUANA	CHETUMAL	4,091
TIJUANA	CHIHUAHUA	1,491
TIJUANA	CIUDAD VALLES	2,780
TIJUANA	COATZACOALCOS	3,359
TIJUANA	COLIMA	2,410
TIJUANA	CORDOBA	3,056
TIJUANA	COSAMALOAPAN	3,196
TIJUANA	CUERNAVACA	2,789
TIJUANA	CULIACAN	1,573
TIJUANA	DURANGO	2,011
TIJUANA	ENSENADA	107
TIJUANA	FRESNILLO	2,222

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
TIJUANA	GUADALAJARA	2,230
TIJUANA	HERMOSILLO	871
TIJUANA	IGUALA	2,864
TIJUANA	IRAPUATO	2,470
TIJUANA	LA PAZ	1,476
TIJUANA	LAZARO CARDENAS	2,719
TIJUANA	LEON	2,445
TIJUANA	LOS MOCHIS	1,354
TIJUANA	MATAMOROS	2,712
TIJUANA	MAZATLAN	1,754
TIJUANA	MERIDA	4,076
TIJUANA	MEXICALI	178
TIJUANA	MEXICO	2,774
TIJUANA	MONCLOVA	2,391
TIJUANA	MONTERREY	2,388
TIJUANA	MORELIA	2,513
TIJUANA	NOGALES	804
TIJUANA	OAXACA	3,223
TIJUANA	ORIZABA	3,032
TIJUANA	PACHUCA	2,783
TIJUANA	POZA RICA	2,975
TIJUANA	PUEBLA	2,890
TIJUANA	PUERTO VALLARTA	2,186
TIJUANA	QUERETARO	2,574
TIJUANA	REYNOSA	2,619
TIJUANA	SALINA CRUZ	3,531
TIJUANA	SALTILLO	2,134
TIJUANA	SAN LUIS POTOSI	2,428
TIJUANA	TAMPICO	2,767
TIJUANA	TAPACHULA	3,842
TIJUANA	TEPIC	2,023
TIJUANA	TIJUANA	0
TIJUANA	TOLUCA	2,704
TIJUANA	TORREON	1,963
TIJUANA	TUXTLA GUTIERREZ	3,592
TIJUANA	URUAPAN	2,489
TIJUANA	VERACRUZ	3,159
TIJUANA	VILLAHERMOSA	3,512
TIJUANA	XALAPA	3,027
TIJUANA	ZACATECAS	2,329
TIJUANA	ZAMORA	2,390
TIJUANA	ZIHUATANEJO	2,750
TOLUCA	ACAPULCO	392
TOLUCA	AGUASCALIENTES	493
TOLUCA	CAMPECHE	1,211
TOLUCA	CANCUN	1,677
TOLUCA	CD.DEL CARMEN	996
TOLUCA	CD.IXTEPEC	791

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
TOLUCA	CD.JUAREZ	1,777
TOLUCA	CD.MANTE	592
TOLUCA	CD.OBREGON	1,577
TOLUCA	CD.VICTORIA	711
TOLUCA	CELAYA	249
TOLUCA	CHETUMAL	1,394
TOLUCA	CHIHUAHUA	1,415
TOLUCA	CIUDAD VALLES	498
TOLUCA	COATZACOALCOS	662
TOLUCA	COLIMA	591
TOLUCA	CORDOBA	359
TOLUCA	COSAMALOAPAN	499
TOLUCA	CUERNAVACA	91.6
TOLUCA	CULIACAN	1,168
TOLUCA	DURANGO	932
TOLUCA	ENSENADA	2,769
TOLUCA	FRESNILLO	641
TOLUCA	GUADALAJARA	474
TOLUCA	HERMOSILLO	1,830
TOLUCA	IGUALA	165
TOLUCA	IRAPUATO	305
TOLUCA	LA PAZ	1,598
TOLUCA	LAZARO CARDENAS	544
TOLUCA	LEON	370
TOLUCA	LOS MOCHIS	1,354
TOLUCA	MATAMOROS	1,030
TOLUCA	MAZATLAN	949
TOLUCA	MERIDA	1,378
TOLUCA	MEXICALI	2,525
TOLUCA	MEXICO	66.3
TOLUCA	MONCLOVA	1,002
TOLUCA	MONTERREY	893
TOLUCA	MORELIA	230
TOLUCA	NOGALES	2,108
TOLUCA	OAXACA	525
TOLUCA	ORIZABA	335
TOLUCA	PACHUCA	152
TOLUCA	POZA RICA	329
TOLUCA	PUEBLA	192
TOLUCA	PUERTO VALLARTA	775
TOLUCA	QUERETARO	199
TOLUCA	REYNOSA	1,028
TOLUCA	SALINA CRUZ	801
TOLUCA	SALTILLO	830
TOLUCA	SAN LUIS POTOSI	401
TOLUCA	TAMPICO	536
TOLUCA	TAPACHULA	1,152
TOLUCA	TEPIC	676

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
TOLUCA	TIJUANA	2,704
TOLUCA	TOLUCA	0
TOLUCA	TORREON	968
TOLUCA	TUXTLA GUTIERREZ	890
TOLUCA	URUAPAN	344
TOLUCA	VERACRUZ	457
TOLUCA	VILLAHERMOSA	810
TOLUCA	XALAPA	355
TOLUCA	ZACATECAS	585
TOLUCA	ZAMORA	366
TOLUCA	ZIHUATANEJO	550
TORREON	ACAPULCO	1,355
TORREON	AGUASCALIENTES	501
TORREON	CAMPECHE	2,117
TORREON	CANCUN	2,583
TORREON	CD.DEL CARMEN	1,902
TORREON	CD.IXTEPEC	1,698
TORREON	CD.JUAREZ	837
TORREON	CD.MANTE	749
TORREON	CD.OBREGON	1,103
TORREON	CD.VICTORIA	612
TORREON	CELAYA	752
TORREON	CHETUMAL	2,300
TORREON	CHIHUAHUA	474
TORREON	CIUDAD VALLES	826
TORREON	COATZACOALCOS	1,568
TORREON	COLIMA	865
TORREON	CORDOBA	1,265
TORREON	COSAMALOAPAN	1,405
TORREON	CUERNAVACA	1,064
TORREON	CULIACAN	706
TORREON	DURANGO	283
TORREON	ENSENADA	1,992
TORREON	FRESNILLO	330
TORREON	GUADALAJARA	723
TORREON	HERMOSILLO	1,166
TORREON	IGUALA	1,129
TORREON	IRAPUATO	694
TORREON	LA PAZ	1,136
TORREON	LAZARO CARDENAS	1,136
TORREON	LEON	627
TORREON	LOS MOCHIS	892
TORREON	MATAMOROS	649
TORREON	MAZATLAN	486
TORREON	MERIDA	2,284
TORREON	MEXICALI	1,748
TORREON	MEXICO	984
TORREON	MONCLOVA	363

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
TORREON	MONTERREY	333
TORREON	MORELIA	822
TORREON	NOGALES	1,246
TORREON	OAXACA	1,432
TORREON	ORIZABA	241
TORREON	PACHUCA	991
TORREON	POZA RICA	1,087
TORREON	PUEBLA	1,098
TORREON	PUERTO VALLARTA	863
TORREON	QUERETARO	779
TORREON	REYNOSA	564
TORREON	SALINA CRUZ	1,740
TORREON	SALTILLO	254
TORREON	SAN LUIS POTOSI	573
TORREON	TAMPICO	849
TORREON	TAPACHULA	2,058
TORREON	TEPIC	700
TORREON	TIJUANA	1,963
TORREON	TOLUCA	968
TORREON	TORREON	0
TORREON	TUXTLA GUTIERREZ	1,818
TORREON	URUAPAN	944
TORREON	VERACRUZ	1,313
TORREON	VILLAHERMOSA	1,737
TORREON	XALAPA	1,252
TORREON	ZACATECAS	405
TORREON	ZAMORA	845
TORREON	ZIHUATANEJO	1,191
TUXTLA GUTIERREZ	ACAPULCO	957
TUXTLA GUTIERREZ	AGUASCALIENTES	1,324
TUXTLA GUTIERREZ	CAMPECHE	640
TUXTLA GUTIERREZ	CANCUN	1,106
TUXTLA GUTIERREZ	CD.DEL CARMEN	425
TUXTLA GUTIERREZ	CD.IXTEPEC	279
TUXTLA GUTIERREZ	CD.JUAREZ	2,608
TUXTLA GUTIERREZ	CD.MANTE	1,167
TUXTLA GUTIERREZ	CD.OBREGON	2,466
TUXTLA GUTIERREZ	CD.VICTORIA	1,256
TUXTLA GUTIERREZ	CELAYA	1,080
TUXTLA GUTIERREZ	CHETUMAL	778
TUXTLA GUTIERREZ	CHIHUAHUA	2,246
TUXTLA GUTIERREZ	CIUDAD VALLES	1,073
TUXTLA GUTIERREZ	COATZACOALCOS	320
TUXTLA GUTIERREZ	COLIMA	1,479
TUXTLA GUTIERREZ	CORDOBA	542
TUXTLA GUTIERREZ	COSAMALOAPAN	412
TUXTLA GUTIERREZ	CUERNAVACA	909
TUXTLA GUTIERREZ	CULIACAN	2,057

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
TUXTLA GUTIERREZ	DURANGO	1,763
TUXTLA GUTIERREZ	ENSENADA	3,658
TUXTLA GUTIERREZ	FRESNILLO	1,472
TUXTLA GUTIERREZ	GUADALAJARA	1,363
TUXTLA GUTIERREZ	HERMOSILLO	2,718
TUXTLA GUTIERREZ	IGUALA	1,015
TUXTLA GUTIERREZ	IRAPUATO	1,136
TUXTLA GUTIERREZ	LA PAZ	2,487
TUXTLA GUTIERREZ	LAZARO CARDENAS	1,294
TUXTLA GUTIERREZ	LEON	1,201
TUXTLA GUTIERREZ	LOS MOCHIS	2,243
TUXTLA GUTIERREZ	MATAMOROS	1,513
TUXTLA GUTIERREZ	MAZATLAN	1,837
TUXTLA GUTIERREZ	MERIDA	808
TUXTLA GUTIERREZ	MEXICALI	3,413
TUXTLA GUTIERREZ	MEXICO	830
TUXTLA GUTIERREZ	MONCLOVA	1,714
TUXTLA GUTIERREZ	MONTERREY	1,520
TUXTLA GUTIERREZ	MORELIA	1,119
TUXTLA GUTIERREZ	NOGALES	2,996
TUXTLA GUTIERREZ	OAXACA	539
TUXTLA GUTIERREZ	ORIZABA	565
TUXTLA GUTIERREZ	PACHUCA	843
TUXTLA GUTIERREZ	POZA RICA	793
TUXTLA GUTIERREZ	PUEBLA	708
TUXTLA GUTIERREZ	PUERTO VALLARTA	1,664
TUXTLA GUTIERREZ	QUERETARO	1,030
TUXTLA GUTIERREZ	SALINA CRUZ	309
TUXTLA GUTIERREZ	SALTILLO	1,607
TUXTLA GUTIERREZ	SAN LUIS POTOSI	1,232
TUXTLA GUTIERREZ	TAMPICO	1,020
TUXTLA GUTIERREZ	TAPACHULA	371
TUXTLA GUTIERREZ	TEPIC	1,564
TUXTLA GUTIERREZ	TIJUANA	3,592
TUXTLA GUTIERREZ	TOLUCA	890
TUXTLA GUTIERREZ	TORREON	1,818
TUXTLA GUTIERREZ	TUXTLA GUTIERREZ	0
TUXTLA GUTIERREZ	URUAPAN	1,237
TUXTLA GUTIERREZ	VERACRUZ	547
TUXTLA GUTIERREZ	VILLAHERMOSA	246
TUXTLA GUTIERREZ	XALAPA	649
TUXTLA GUTIERREZ	ZACATECAS	1,422
TUXTLA GUTIERREZ	ZAMORA	1,259
TUXTLA GUTIERREZ	ZIHUATANEJO	1,316
URUAPAN	ACAPULCO	493
URUAPAN	AGUASCALIENTES	426
URUAPAN	CAMPECHE	1,549
URUAPAN	CANCUN	2,016

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
URUAPAN	CD.DEL CARMEN	1,335
URUAPAN	CD.IXTEPEC	1,130
URUAPAN	CD.JUAREZ	1,734
URUAPAN	CD.MANTE	740
URUAPAN	CD.OBREGON	1,362
URUAPAN	CD.VICTORIA	819
URUAPAN	CELAYA	240
URUAPAN	CHETUMAL	1,733
URUAPAN	CHIHUAHUA	1,372
URUAPAN	CIUDAD VALLES	646
URUAPAN	COATZACOALCOS	1,000
URUAPAN	COLIMA	328
URUAPAN	CORDOBA	697
URUAPAN	COSAMALOAPAN	837
URUAPAN	CUERNAVACA	430
URUAPAN	CULIACAN	953
URUAPAN	DURANGO	889
URUAPAN	ENSENADA	2,554
URUAPAN	FRESNILLO	599
URUAPAN	GUADALAJARA	259
URUAPAN	HERMOSILLO	1,615
URUAPAN	IGUALA	505
URUAPAN	IRAPUATO	224
URUAPAN	LA PAZ	1,383
URUAPAN	LAZARO CARDENAS	226
URUAPAN	LEON	309
URUAPAN	LOS MOCHIS	1,139
URUAPAN	MATAMOROS	1,137
URUAPAN	MAZATLAN	734
URUAPAN	MERIDA	1,717
URUAPAN	MEXICALI	2,310
URUAPAN	MEXICO	404
URUAPAN	MONCLOVA	1,103
URUAPAN	MONTERREY	998
URUAPAN	MORELIA	110
URUAPAN	NOGALES	1,893
URUAPAN	OAXACA	865
URUAPAN	ORIZABA	673
URUAPAN	PACHUCA	424
URUAPAN	POZA RICA	616
URUAPAN	PUEBLA	531
URUAPAN	PUERTO VALLARTA	541
URUAPAN	QUERETARO	300
URUAPAN	REYNOSA	1,148
URUAPAN	SALINA CRUZ	1,149
URUAPAN	SALTILLO	907
URUAPAN	SAN LUIS POTOSI	508
URUAPAN	TAMPICO	816

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
URUAPAN	TAPACHULA	1,491
URUAPAN	TEPIC	461
URUAPAN	TIJUANA	2,489
URUAPAN	TOLUCA	344
URUAPAN	TORREON	944
URUAPAN	TUXTLA GUTIERREZ	1,237
URUAPAN	URUAPAN	0
URUAPAN	VERACRUZ	766
URUAPAN	VILLAHERMOSA	1,147
URUAPAN	XALAPA	662
URUAPAN	ZACATECAS	544
URUAPAN	ZAMORA	103
URUAPAN	ZIHUATANEJO	261
VERACRUZ	ACAPULCO	768
VERACRUZ	AGUASCALIENTES	891
VERACRUZ	CAMPECHE	859
VERACRUZ	CANCUN	1,325
VERACRUZ	CD.DEL CARMEN	644
VERACRUZ	CD.IXTEPEC	439
VERACRUZ	CD.JUAREZ	2,175
VERACRUZ	CD.MANTE	629
VERACRUZ	CD.OBREGON	2,032
VERACRUZ	CD.VICTORIA	718
VERACRUZ	CELAYA	647
VERACRUZ	CHETUMAL	1,042
VERACRUZ	CHIHUAHUA	1,813
VERACRUZ	CIUDAD VALLES	534
VERACRUZ	COATZACOALCOS	309
VERACRUZ	COLIMA	1,046
VERACRUZ	CORDOBA	109
VERACRUZ	COSAMALOAPAN	146
VERACRUZ	CUERNAVACA	476
VERACRUZ	CULIACAN	1,624
VERACRUZ	DURANGO	1,330
VERACRUZ	ENSENADA	3,225
VERACRUZ	FRESNILLO	1,035
VERACRUZ	GUADALAJARA	902
VERACRUZ	HERMOSILLO	2,285
VERACRUZ	IGUALA	581
VERACRUZ	IRAPUATO	702
VERACRUZ	LA PAZ	2,054
VERACRUZ	LAZARO CARDENAS	999
VERACRUZ	LEON	768
VERACRUZ	LOS MOCHIS	1,810
VERACRUZ	MATAMOROS	975
VERACRUZ	MAZATLAN	1,404
VERACRUZ	MERIDA	1,026
VERACRUZ	MEXICALI	2,980

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
VERACRUZ	MEXICO	397
VERACRUZ	MONCLOVA	1,175
VERACRUZ	MONTERREY	981
VERACRUZ	MORELIA	684
VERACRUZ	NOGALES	2,563
VERACRUZ	OAXACA	371
VERACRUZ	ORIZABA	132
VERACRUZ	PACHUCA	410
VERACRUZ	POZA RICA	249
VERACRUZ	PUEBLA	275
VERACRUZ	PUERTO VALLARTA	1,231
VERACRUZ	QUERETARO	597
VERACRUZ	REYNOSA	986
VERACRUZ	SALINA CRUZ	472
VERACRUZ	SALTILLO	1,069
VERACRUZ	SAN LUIS POTOSI	711
VERACRUZ	TAMPICO	481
VERACRUZ	TAPACHULA	790
VERACRUZ	TEPIC	1,131
VERACRUZ	TIJUANA	3,159
VERACRUZ	TOLUCA	457
VERACRUZ	TORREON	1,313
VERACRUZ	TUXTLA GUTIERREZ	547
VERACRUZ	URUAPAN	766
VERACRUZ	VERACRUZ	0
VERACRUZ	VILLAHERMOSA	467
VERACRUZ	XALAPA	103
VERACRUZ	ZACATECAS	982
VERACRUZ	ZAMORA	788
VERACRUZ	ZIHUATANEJO	883
VILLAHERMOSA	ACAPULCO	1,154
VILLAHERMOSA	AGUASCALIENTES	1,243
VILLAHERMOSA	CAMPECHE	393
VILLAHERMOSA	CANCUN	859
VILLAHERMOSA	CD.DEL CARMEN	178
VILLAHERMOSA	CD.IXTEPEC	413
VILLAHERMOSA	CD.JUAREZ	2,528
VILLAHERMOSA	CD.MANTE	1,087
VILLAHERMOSA	CD.OBREGON	2,385
VILLAHERMOSA	CD.VICTORIA	1,176
VILLAHERMOSA	CELAYA	1,000
VILLAHERMOSA	CHETUMAL	577
VILLAHERMOSA	CHIHUAHUA	2,166
VILLAHERMOSA	CIUDAD VALLES	992
VILLAHERMOSA	COATZACOALCOS	164
VILLAHERMOSA	COLIMA	1,399
VILLAHERMOSA	CORDOBA	462
VILLAHERMOSA	COSAMALOAPAN	332

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
VILLAHERMOSA	CUERNAVACA	829
VILLAHERMOSA	CULIACAN	1,976
VILLAHERMOSA	DURANGO	1,683
VILLAHERMOSA	ENSENADA	3,577
VILLAHERMOSA	FRESNILLO	1,392
VILLAHERMOSA	GUADALAJARA	1,283
VILLAHERMOSA	HERMOSILLO	2,638
VILLAHERMOSA	IGUALA	934
VILLAHERMOSA	IRAPUATO	1,055
VILLAHERMOSA	LA PAZ	2,406
VILLAHERMOSA	LAZARO CARDENAS	1,352
VILLAHERMOSA	LEON	1,121
VILLAHERMOSA	LOS MOCHIS	2,163
VILLAHERMOSA	MATAMOROS	1,433
VILLAHERMOSA	MAZATLAN	1,757
VILLAHERMOSA	MERIDA	561
VILLAHERMOSA	MEXICALI	3,333
VILLAHERMOSA	MEXICO	750
VILLAHERMOSA	MONCLOVA	1,634
VILLAHERMOSA	MONTERREY	1,440
VILLAHERMOSA	MORELIA	1,038
VILLAHERMOSA	NOGALES	2,919
VILLAHERMOSA	OAXACA	580
VILLAHERMOSA	ORIZABA	485
VILLAHERMOSA	PACHUCA	763
VILLAHERMOSA	POZA RICA	713
VILLAHERMOSA	PUEBLA	627
VILLAHERMOSA	PUERTO VALLARTA	1,584
VILLAHERMOSA	QUERETARO	950
VILLAHERMOSA	REYNOSA	1,444
VILLAHERMOSA	SALINA CRUZ	456
VILLAHERMOSA	SALTILLO	1,581
VILLAHERMOSA	SAN LUIS POTOSI	1,152
VILLAHERMOSA	TAMPICO	940
VILLAHERMOSA	TAPACHULA	612
VILLAHERMOSA	TEPIC	1,448
VILLAHERMOSA	TIJUANA	3,512
VILLAHERMOSA	TOLUCA	810
VILLAHERMOSA	TORREON	1,737
VILLAHERMOSA	TUXTLA GUTIERREZ	246
VILLAHERMOSA	URUAPAN	1,147
VILLAHERMOSA	VERACRUZ	467
VILLAHERMOSA	VILLAHERMOSA	0
VILLAHERMOSA	XALAPA	570
VILLAHERMOSA	ZACATECAS	1,343
VILLAHERMOSA	ZAMORA	1,181
VILLAHERMOSA	ZIHUATANEJO	1,237
XALAPA	ACAPULCO	666

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
XALAPA	AGUASCALIENTES	759
XALAPA	CAMPECHE	961
XALAPA	CANCUN	1,427
XALAPA	CD.DEL CARMEN	747
XALAPA	CD.IXTEPEC	542
XALAPA	CD.JUAREZ	2,043
XALAPA	CD.MANTE	588
XALAPA	CD.OBREGON	1,900
XALAPA	CD.VICTORIA	746
XALAPA	CELAYA	515
XALAPA	CHETUMAL	1,145
XALAPA	CHIHUAHUA	1,681
XALAPA	CIUDAD VALLES	494
XALAPA	COATZACOALCOS	412
XALAPA	COLIMA	914
XALAPA	CORDOBA	174
XALAPA	COSAMALOAPAN	241
XALAPA	CUERNAVACA	375
XALAPA	CULIACAN	1,492
XALAPA	DURANGO	1,198
XALAPA	ENSENADA	3,093
XALAPA	FRESNILLO	907
XALAPA	GUADALAJARA	798
XALAPA	HERMOSILLO	2,153
XALAPA	IGUALA	436
XALAPA	IRAPUATO	570
XALAPA	LA PAZ	1,922
XALAPA	LAZARO CARDENAS	867
XALAPA	LEON	636
XALAPA	LOS MOCHIS	1,678
XALAPA	MATAMOROS	1,003
XALAPA	MAZATLAN	1,272
XALAPA	MERIDA	1,129
XALAPA	MEXICALI	2,848
XALAPA	MEXICO	292
XALAPA	MONCLOVA	1,203
XALAPA	MONTERREY	1,009
XALAPA	MORELIA	554
XALAPA	NOGALES	2,431
XALAPA	OAXACA	438
XALAPA	ORIZABA	179
XALAPA	PACHUCA	278
XALAPA	POZA RICA	282
XALAPA	PUEBLA	173
XALAPA	PUERTO VALLARTA	1,099
XALAPA	QUERETARO	465
XALAPA	REYNOSA	1,014
XALAPA	SALINA CRUZ	574

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
XALAPA	SALTILLO	1,096
XALAPA	SAN LUIS POTOSI	667
XALAPA	TAMPICO	509
XALAPA	TAPACHULA	903
XALAPA	TEPIC	999
XALAPA	TIJUANA	3,027
XALAPA	TOLUCA	355
XALAPA	TORREON	1,252
XALAPA	TUXTLA GUTIERREZ	649
XALAPA	URUAPAN	662
XALAPA	VERACRUZ	103
XALAPA	VILLAHERMOSA	570
XALAPA	XALAPA	0
XALAPA	ZACATECAS	847
XALAPA	ZAMORA	685
XALAPA	ZIHUATANEJO	772
ZACATECAS	ACAPULCO	1,017
ZACATECAS	AGUASCALIENTES	118
ZACATECAS	CAMPECHE	1,734
ZACATECAS	CANCUN	2,200
ZACATECAS	CD.DEL CARMEN	1,519
ZACATECAS	CD.IXTEPEC	1,315
ZACATECAS	CD.JUAREZ	1,195
ZACATECAS	CD.MANTE	505
ZACATECAS	CD.OBREGON	1,170
ZACATECAS	CD.VICTORIA	515
ZACATECAS	CELAYA	369
ZACATECAS	CHETUMAL	1,917
ZACATECAS	CHIHUAHUA	833
ZACATECAS	CIUDAD VALLES	443
ZACATECAS	COATZACOALCOS	1,185
ZACATECAS	COLIMA	527
ZACATECAS	CORDOBA	882
ZACATECAS	COSAMALOAPAN	1,022
ZACATECAS	CUERNAVACA	681
ZACATECAS	CULIACAN	761
ZACATECAS	DURANGO	350
ZACATECAS	ENSENADA	2,351
ZACATECAS	FRESNILLO	59.6
ZACATECAS	GUADALAJARA	340
ZACATECAS	HERMOSILLO	1,423
ZACATECAS	IGUALA	774
ZACATECAS	IRAPUATO	312
ZACATECAS	LA PAZ	1,191
ZACATECAS	LAZARO CARDENAS	754
ZACATECAS	LEON	244
ZACATECAS	LOS MOCHIS	947
ZACATECAS	MATAMOROS	778

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<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
ZACATECAS	MAZATLAN	542
ZACATECAS	MERIDA	1,902
ZACATECAS	MEXICALI	2,107
ZACATECAS	MEXICO	602
ZACATECAS	MONCLOVA	567
ZACATECAS	MONTERREY	462
ZACATECAS	MORELIA	440
ZACATECAS	NOGALES	1,605
ZACATECAS	OAXACA	1,049
ZACATECAS	ORIZABA	858
ZACATECAS	PACHUCA	609
ZACATECAS	POZA RICA	772
ZACATECAS	PUEBLA	716
ZACATECAS	PUERTO VALLARTA	641
ZACATECAS	QUERETARO	396
ZACATECAS	REYNOSA	693
ZACATECAS	SALINA CRUZ	1,357
ZACATECAS	SALTILLO	371
ZACATECAS	SAN LUIS POTOSI	190
ZACATECAS	TAMPICO	592
ZACATECAS	TAPACHULA	1,676
ZACATECAS	TEPIC	542
ZACATECAS	TIJUANA	2,329
ZACATECAS	TOLUCA	585
ZACATECAS	TORREON	405
ZACATECAS	TUXTLA GUTIERREZ	1,422
ZACATECAS	URUAPAN	544
ZACATECAS	VERACRUZ	982
ZACATECAS	VILLAHERMOSA	1,343
ZACATECAS	XALAPA	847
ZACATECAS	ZACATECAS	0
ZACATECAS	ZAMORA	445
ZACATECAS	ZIHUATANEJO	792
ZAMORA	ACAPULCO	753
ZAMORA	AGUASCALIENTES	326
ZAMORA	CAMPECHE	1,571
ZAMORA	CANCUN	2,038
ZAMORA	CD.DEL CARMEN	1,357
ZAMORA	CD.IXTEPEC	1,152
ZAMORA	CD.JUAREZ	1,635
ZAMORA	CD.MANTE	714
ZAMORA	CD.OBREGON	1,263
ZAMORA	CD.VICTORIA	767
ZAMORA	CELAYA	205
ZAMORA	CHETUMAL	1,755
ZAMORA	CHIHUAHUA	1,273
ZAMORA	CIUDAD VALLES	620
ZAMORA	COATZACOALCOS	1,022

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
ZAMORA	COLIMA	236
ZAMORA	CORDOBA	719
ZAMORA	COSAMALOAPAN	859
ZAMORA	CUERNAVACA	452
ZAMORA	CULIACAN	854
ZAMORA	DURANGO	790
ZAMORA	ENSENADA	2,455
ZAMORA	FRESNILLO	499
ZAMORA	GUADALAJARA	160
ZAMORA	HERMOSILLO	1,515
ZAMORA	IGUALA	527
ZAMORA	IRAPUATO	144
ZAMORA	LA PAZ	1,284
ZAMORA	LAZARO CARDENAS	336
ZAMORA	LEON	163
ZAMORA	LOS MOCHIS	1,040
ZAMORA	MATAMOROS	1,085
ZAMORA	MAZATLAN	635
ZAMORA	MERIDA	1,739
ZAMORA	MEXICALI	2,211
ZAMORA	MEXICO	426
ZAMORA	MONCLOVA	1,004
ZAMORA	MONTERREY	845
ZAMORA	MORELIA	150
ZAMORA	NOGALES	1,794
ZAMORA	OAXACA	886
ZAMORA	ORIZABA	695
ZAMORA	PACHUCA	446
ZAMORA	POZA RICA	638
ZAMORA	PUEBLA	553
ZAMORA	PUERTO VALLARTA	461
ZAMORA	QUERETARO	248
ZAMORA	REYNOSA	1,096
ZAMORA	SALINA CRUZ	1,181
ZAMORA	SALTILLO	755
ZAMORA	SAN LUIS POTOSI	437
ZAMORA	TAMPICO	734
ZAMORA	TAPACHULA	1,513
ZAMORA	TEPIC	362
ZAMORA	TIJUANA	2,390
ZAMORA	TOLUCA	366
ZAMORA	TORREON	845
ZAMORA	TUXTLA GUTIERREZ	1,259
ZAMORA	URUAPAN	103
ZAMORA	VERACRUZ	788
ZAMORA	VILLAHERMOSA	1,181
ZAMORA	XALAPA	685
ZAMORA	ZACATECAS	445

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
ZAMORA	ZAMORA	0
ZAMORA	ZIHUATANEJO	365
ZIHUATANEJO	ACAPULCO	235
ZIHUATANEJO	AGUASCALIENTES	673
ZIHUATANEJO	CAMPECHE	1,628
ZIHUATANEJO	CANCUN	2,094
ZIHUATANEJO	CD.DEL CARMEN	1,413
ZIHUATANEJO	CD.IXTEPEC	939
ZIHUATANEJO	CD.JUAREZ	1,982
ZIHUATANEJO	CD.MANTE	1,007
ZIHUATANEJO	CD.OBREGON	1,623
ZIHUATANEJO	CD.VICTORIA	1,060
ZIHUATANEJO	CELAYA	491
ZIHUATANEJO	CHETUMAL	1,811
ZIHUATANEJO	CHIHUAHUA	1,619
ZIHUATANEJO	CIUDAD VALLES	887
ZIHUATANEJO	COATZACOALCOS	1,078
ZIHUATANEJO	COLIMA	422
ZIHUATANEJO	CORDOBA	776
ZIHUATANEJO	COSAMALOAPAN	916
ZIHUATANEJO	CUERNAVACA	505
ZIHUATANEJO	CULIACAN	1,214
ZIHUATANEJO	DURANGO	1,136
ZIHUATANEJO	ENSENADA	2,815
ZIHUATANEJO	FRESNILLO	846
ZIHUATANEJO	GUADALAJARA	520
ZIHUATANEJO	HERMOSILLO	1,876
ZIHUATANEJO	IGUALA	388
ZIHUATANEJO	IRAPUATO	478
ZIHUATANEJO	LA PAZ	1,644
ZIHUATANEJO	LAZARO CARDENAS	98.6
ZIHUATANEJO	LEON	508
ZIHUATANEJO	LOS MOCHIS	1,400
ZIHUATANEJO	MATAMOROS	1,378
ZIHUATANEJO	MAZATLAN	995
ZIHUATANEJO	MERIDA	1,795
ZIHUATANEJO	MEXICALI	2,571
ZIHUATANEJO	MEXICO	481
ZIHUATANEJO	MONCLOVA	1,350
ZIHUATANEJO	MONTERREY	1,241
ZIHUATANEJO	MORELIA	351
ZIHUATANEJO	NOGALES	2,154
ZIHUATANEJO	OAXACA	942
ZIHUATANEJO	ORIZABA	752
ZIHUATANEJO	PACHUCA	569
ZIHUATANEJO	POZA RICA	746
ZIHUATANEJO	PUEBLA	609
ZIHUATANEJO	PUERTO VALLARTA	720

Continues next page

<i>< from - loc ></i>	<i>< to - loc ></i>	<i>< Dist ></i>
ZIHUATANEJO	QUERETARO	519
ZIHUATANEJO	REYNOSA	1,389
ZIHUATANEJO	SALINA CRUZ	1,204
ZIHUATANEJO	SALTILLO	1,154
ZIHUATANEJO	SAN LUIS POTOSI	739
ZIHUATANEJO	TAMPICO	952
ZIHUATANEJO	TAPACHULA	1,569
ZIHUATANEJO	TEPIC	722
ZIHUATANEJO	TIJUANA	2,750
ZIHUATANEJO	TOLUCA	550
ZIHUATANEJO	TORREON	1,191
ZIHUATANEJO	TUXTLA GUTIERREZ	1,316
ZIHUATANEJO	URUAPAN	261
ZIHUATANEJO	VERACRUZ	883
ZIHUATANEJO	VILLAHERMOSA	1,237
ZIHUATANEJO	XALAPA	772
ZIHUATANEJO	ZACATECAS	792
ZIHUATANEJO	ZAMORA	365
ZIHUATANEJO	ZIHUATANEJO	0

Table A.5: Distances.

END

References and Bibliography

- [Min, 2019] (2019). The minizinc compiler and ide.
- [UDT, 2019] (2019). Public consultation. <https://www.treasury.gov/about/education/Pages/distribution.aspx>.
- [RCM, 2019] (2019). Public consultation. <https://www.mint.ca/store/template/home.jsp>.
- [BCC, 2019] (2019). Public consultation. <https://www.bcentral.cl/>.
- [BCR, 2019] (2019). Public consultation. <http://www.bcrp.gob.pe/>.
- [RAM, 2019] (2019). Public consultation. <https://www.ramint.gov.au/>.
- [BdP, 2019] (2019). Public consultation. <https://www.bportugal.pt/>.
- [BdE, 2019] (2019). Public consultation. https://www.bde.es/bde/es/areas/billemone/Publico_general/Monedas_de_euro/.
- [BdI, 2019] (2019). Public consultation. <https://www.bancaditalia.it/>.
- [rbi, 2019] (2019). Report of the high level group on systems and procedures for currency distribution.
- [Andrei, 2011] Andrei, L. (2011). *Money and Market in the Economy of All Times: Another world history of money and pre-money based economies*.
- [Baldacci, 2011] Baldacci (2011). New route relaxation and pricing strategies for the vehicle routing problem.
- [Baldacci R., 2008] Baldacci R., Battarra M., V. D. (2008). *Routing a heterogeneous fleet of vehicles*.
- [Banxico, 2018a] Banxico (2018a). Circular de operaciones de caja. <http://www.anterior.banxico.org.mx/disposiciones/normativa/circular-operaciones-de-caja/%7B79DA3F88-917D-F447-867B-2053E121E378%7D.pdf>.
- [Banxico, 2018b] Banxico (2018b). The history of coins and banknotes in mexico. <http://www.banxico.org.mx/banknotes-and-coins/d/%7BB8C0D87B-F55F-792A-A6C6-FC0F58CF2EA3%7D.pdf>.
- [Banxico, 2018c] Banxico (2018c). Money supply.
- [Banxico, 2018d] Banxico (2018d). Resultados de estudios cuantitativos y cualitativos sobre efectivo 2018. <http://www.banxico.org.mx/billetes-y-monedas/estudios-e-indicadores/%7BE78EA1C4-B511-2E4D-2935-5DA0EA60AC0F%7D.pdf>.
- [Blacketer, 2004] Blacketer, B. (2004). *Forging your banks link in the new currency supply chain*.

- [Bodi-Schubert A., 2012] Bodi-Schubert A., Zsolt A., L. E. (2012). Network-based analyses of hungarian cash supply.
- [Braysy, 2014] Braysy (2014). Software tools and emerging technologies for vehicle routing and intermodal transportation.
- [Clarke G., 1964] Clarke G., W. J. (1964). Scheduling of vehicles from a central depot to a number of delivery points.
- [Daskin, 2002] Daskin, M. S., C. C. R. S. Z. J. M. (2002). An inventory-location model: Formulation, solution algorithm and computational results.
- [Dawande M., 2010] Dawande M., Mehrotra M., M. V. S. C. (2010). An analysis of coordination mechanisms for the u.s. cash supply chain.
- [De Jaegere N., 2013] De Jaegere N., Defraeye M., V. N. I. (2013). The vehicle routing problem: State of the art classification and review.
- [Eksioglu B., 2009] Eksioglu B., Volkan A., R. A. (2009). The vehicle routing problem: A taxonomic review.
- [Erdogan, 2017] Erdogan, G. (2017). An open source spreadsheet solver for vehicle routing problems.
- [Geismar and Zhu, 2017] Geismar, S. and Zhu (2017). Managing currency supply chains: A review.
- [Geismar N.,] Geismar N., Dawande M., R. D. S. C. Managing a bank's currency inventory under new federal reserve guidelines.
- [Geismar N., 2016] Geismar N., Sriskandarajah C., Z. Y. (2016). A review of operational issues in managing physical currency supply chains.
- [Goel A., 2008] Goel A., G. V. (2008). A general vehicle routing problem.
- [Golden B., 1984] Golden B., Assad A., L. L. G. F. (1984). The fleet size and mix vehicle routing problem.
- [Huang Y., 2016] Huang Y., Geismar, R. S. S. M. C. (2016). Optimizing logistics operations in a country's currency supply network.
- [Kilby P., 2011] Kilby P., V. A. (2011). Flexible routing combining constraint programming, large neighbourhood search, and feature-based insertion.
- [Laporte G., 1986] Laporte G., Mercure H., N. Y. (1986). An exact algorithm for the asymmetrical capacitated vehicle routing problem.
- [Mehrotra, 2010] Mehrotra, M., D. M. S. C. (2010). A depository institution's optimal currency supply network under the fed's new guidelines: operating policies, logistics, and impact.
- [Mishkin, 2007] Mishkin (2007). *Moneda, Banca y Mercados Financieros*.
- [NICTA, 2013] NICTA (2013). Solving real-world vehicle routing problems.
- [Nozick, 1998] Nozick, L. K., T. M. A. (1998). Integrating inventory impacts into a fixed-charge model for locating distribution centers.
- [Nozick, 2001a] Nozick, L. K., T. M. A. (2001a). Inventory, transportation, service quality and the location of distribution centers.
- [Nozick, 2001b] Nozick, L. K., T. M. A. (2001b). A two-echelon inventory allocation and distribution center location analysis.

- [OxfordEconomics, 2017] OxfordEconomics (2017). The future of money: How digital payments are changing global commerce. https://d1iydh3qrygeij.cloudfront.net/Media/Default/landing-pages/recent-releases/2017/Future_of_Money_Report_V12%20FINAL%20WEB.pdf.
- [Partyka, 2014] Partyka (2014). Vehicle routing software survey: Vr delivers the goods.
- [Rajamani D., 2005] Rajamani D., Geismar H.N., S. C. (2005). A framework to analyze cash supply chains.
- [Rodríguez, 2010] Rodríguez (2010). *Grafos. Software para la construcción, edición y análisis de grafos*.
- [Ropke S., 2006] Ropke S., P. D. (2006). An adaptative large neighborhood search heuristic for the pickup and delivery problem with time windows.
- [Sampaio, 2014] Sampaio (2014). Cash management optimization in commercial bank branches.
- [Shaw, 1997] Shaw (1997). A new local search algorithm providing high quality solutions to vehicle routing problems.
- [Shen, 2003] Shen, Z. J. M., C. C. D. M. S. (2003). A joint location-inventory model.
- [Solomon, 1987] Solomon (1987). Algorithms for the vehicle routing and scheduling problem with time window constraints.
- [Subramanian, 2010] Subramanian (2010). A parallel heuristic for the vehicle routing problem with simultaneous pickup and delivery.
- [Tancrez, 2012] Tancrez, J. S., L. J. C. S. P. (2012). A location-inventory model for large three-level supply chains.
- [Toth P., 2014] Toth P., V. D. (2014). *Vehicle Routing. Problems, Methods, and Applications*.
- [Vidal, 2014] Vidal (2014). A unified solution framework for multi-attribute vehicle routing problems.
- [Warjiyo P., 2019] Warjiyo P., J. S. (2019). *Central Bank Policy: Theory and Practice*.
- [Yao, 2010] Yao, Z., L. L. H. J. W. T. V. H. C. F. (2010). Multi-source facility location-allocation and inventory problem.
- [Zhu, 2011] Zhu, Y., D. M. S. C. (2011). Value of local cash reuse: inventory models for medium-size depository institutions under the new federal policy.
- [Zhu, 2015] Zhu, Y., K. S. R.-S. S. S. C. (2015). Managing logistics in regional banknote supply chain under security concerns.