IV. HAZARD MANAGEMENT

SEISMIC/SAFETY ELEMENT

1. Safety Element

Introduction

Overview

This Safety Element addresses: seismic, fire and hazardous materials safety.

The objective of the seismic portion of the Safety Element is to reduce the risk of hazard resulting from future seismic and related events. The City of Lawndale does not contain faults but would be affected by fault activity outside of the community and in the regional area. The seriousness of seismic risk to public safety is a function of local seismic conditions, as well as public awareness of the hazards present, and the effectiveness of mitigation utilized to reduce risk resulting from seismic hazards. This Element identifies existing and potential land use and emergency planning efforts which would be instrumental in planning for seismic safety.

The objective of the fire portion of the Safety Element is to ensure the safety of the community from fire and manmade or natural disasters. This Element identifies existing and potential emergency planning efforts which would be instrumental in assuring public safety.

The objective of the hazardous materials portion of the Safety Element is to provide for the protection of the community from any unreasonable risks associated with the presence of hazardous materials (hazardous substances and hazardous wastes). Hazardous materials are generated, stored, used, managed and transported within the City of Lawndale, in close proximity to residential areas. The seriousness of exposure risk to public safety is a function of the proximity of the release, the characteristics of the materials release, the amount of materials present, and public awareness of the hazards present. This Element identifies existing and potential emergency response, community planning and hazardous materials reduction measures which would be instrumental in minimizing hazardous materials risks.

Authority

The purpose of the Safety Element of the General Plan is to bring community safety issues into the long-range planning process. The State of California requires that safety elements be included in city and county general plans per Government Code Section 65302(g):

> "[The general plan shall include] a safety element for the protection of the community from any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence and other geologic hazards known to the legislative body; flooding; and wildland and urban fires. The safety element shall include mapping of known seismic and other geologic

hazards. It shall also address evacuation routes, peakload water supply requirements, and minimum road widths and clearances around structures, as those items relate to identified fire and geologic hazards."

Organization

The seismic, fire, and hazardous materials portions of this Safety Element provide an assessment of existing conditions in the City of Lawndale. These sections consider the identification and appraisal of hazards with respect to their potential impacts on the City. Goals and policies are presented which provide direction for the achievement of seismic, fire, and hazardous materials safety in both existing and future development. Implementation programs are provided which will achieve the safety policies.

Assessment

Seismic

The existing seismic conditions for the City of Lawndale consist of a discussion of fault setting and history, and predicted seismic hazards. Seismic hazards are discussed with respect to their potential impact on the City, and include ground rupture, groundshaking, liquefaction, subsidence, landsliding, tsunamis and seiches, and dam failure.

Fault Setting and History

Lawndale is situated in the seismically active Los Angeles Basin where numerous active and potentially active faults have been identified. Within the city limits of Lawndale, however, no faults or fault-related features have been identified.

The likelihood of a fault being the source of an earthquake varies. In an attempt to compare the significance of different faults, the following classification has bee generated by geologists and seismologists:

1. Historically Active Fault – a fault that is known to have moved during historical time, which is considered to be approximately 150 years.

2. Active Fault – a fault that has slipped in the recent geological past and can be expected to move again in the future. Recent geological past is interpreted to be a period of 11,000 years.

3. Potentially Active Fault – a fault is considered suspect because of identified offset of Quaternary sediments that are less than 1.5 million years old.

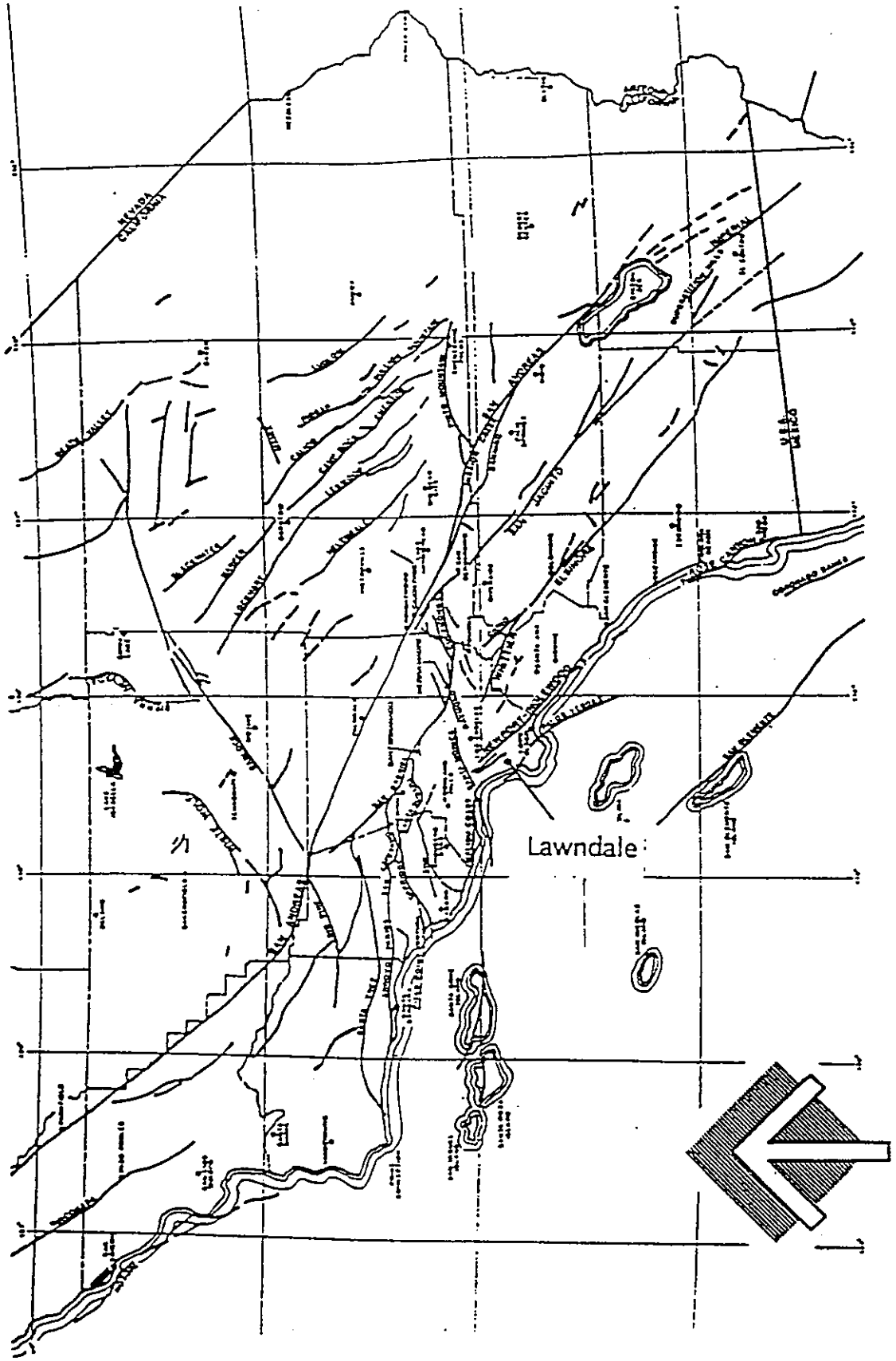
Seismic impacts to Lawndale could only be caused by movement along faults situated outside of the city limits. The historically active and potentially active faults that could affect Lawndale are listed in Table 1 and included in Figure A. The approximate probabilities of fault movement should be considered on a relative scale, where "likely" means a probability greater than 50 percent and "low" a probability of less than 15 percent. From existing information, two faults are particularly significant for the City of Lawndale; the Newport–Inglewood fault because of its proximity to the community; and the San Andreas because of its high probability of occurrence. These two will be discussed in greater detail in the following sections.

Two other faults, the Whittier-Elsinore and the San Fernando, will also be fur[illegible] discussed because of a significant event on each within the last twenty years.

Fault	Distance from Lawndale (miles)	Approximate Probability of Fault Movement (100-year Period)
Historically Active		
Newport-Inglewood	2	Intermediate
Whittier-Elsinore	15	Low
San Fernando	25	Intermediate
San Andreas	46	Likely
San Jacinto	55	Likely
Potentially Active		
Palos Verdes	7	Low
Santa Monica	12	Low
Raymond Hill	18	Very Low

Known Historically Active and Potentially Active Faults

Table 1



SOURCE: Jennings, 1975

NOT TO SCALE

Regional Fault Map

Figure A

Newport–Inglewood Fault. The Newport–Inglewood Fault Zone is the closest active fault to the City of Lawndale. The Newport-Inglewood Fault consists of a series of northwest-trending, generally right-lateral strike-slip fault segments (Figure B). This zone forms the western margin of the Los Angeles Basin. In the north, the Newport-Inglewood Fault terminates at the east–northeast trending Santa Monica fault, which is located along the southern margin of the Transverse Range. To the south, the Newport-Inglewood Fault extends to Newport Beach and projects seaward into a system of faults having similar trends that can be traced south into Baja California (Hauksson 1987).

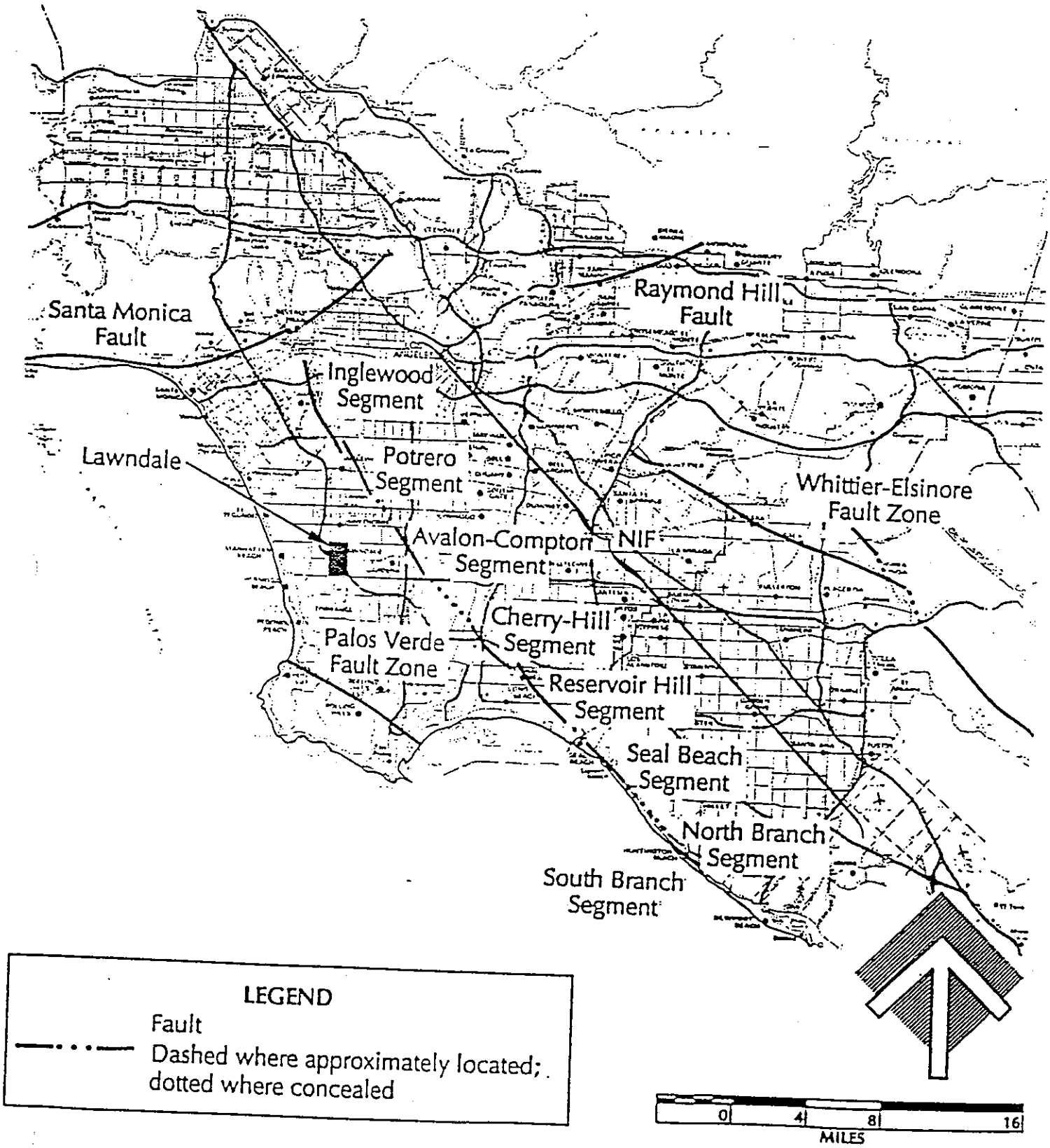
At least five earthquakes of magnitude 4.9 or larger have been associated with the Newport-Inglewood Fault since 1920 and have had an effect on the City of Lawndale. The first reported damaging earthquake was the 1920 Inglewood earthquake with a local magnitude (M_L) of 4.9. The largest instrumentally recorded earthquake in the Newport-Inglewood Fault was the Long Beach earthquake ($M_L = 6.3$) in 1933. This quake was followed by a large aftershock ($M_L = 5.4$) near Signal Hill several months later. In 1941, the Gardena earthquake ($M_L = 5.0$) and the Torrance–Gardena earthquake ($M_L = 5.5$) were also associated with the Newport-Inglewood Fault.

The intensity of groundshaking in the vicinity of Lawndale during each of the four notable earthquakes since 1933 is estimated to have been between V and VII on the Modified Mercalli Intensity Scale (Neumann 1935, 1943). Intensity describes the degree of shaking in terms of the damage at a particular location. The scale used today is the Modified Mercalli scale which is composed of 12 categories as described in Table 2.

Since 1973, short-period seismic networks operated by the University of Southern California, Caltech, and the U.S. Geological Survey have recorded a steady rate of small earthquakes along the Newport-Inglewood Fault. Based partially on the reported seismicity since 1920, the Newport-Inglewood Fault has been identified as an historically active fault capable of generating damaging earthquakes and has been declared a special study zone under the Alquist–Priolo Special Studies Zones Act of 1972 (Hart 1985). The Newport-Inglewood Fault Special Studies zone has an average width of 2 miles. Its western edge is present approximately 1 mile from the eastern edge of the City of Lawndale. The purpose of the Act is to regulate development within the zone and to mitigate the hazard of ground rupture. The City of Lawndale, however, is not in this special study zone; therefore, the regulation of city development with respect to seismic hazards is not affected by state regulations.

San Andreas Fault. The City of Lawndale is 46 miles from the closest segment of the San Andreas fault system. This fault system extends from Cape Mendocino in the north to the Salton Sea, and produces right-lateral offsets (Figure A). The San Andreas system contains a number of distinct segments, each segment displaying a different mode of seismic behavior and, in turn, posing different seismic hazards (Wesnousky 1986).

Two segments of the San Andreas are present east of Lawndale. The first segment is estimated to extend from just south of the Carrizo Plain to just north of the Cajon Pass. The average recurrence interval for this segment is 360 years. The second important segment of the San Andreas, with respect to Lawndale, is the southernmost portion of the fault system. This segment extends from the Cajon Pass to the Salton Sea, and has a predicted repeat-time of 170 years for large earthquakes.



Local Fault and Fault Map

Figure B

M §	Intensity	Effects	v, † cm/s	a ‡
	I.	Not felt. Marginal and long-period effects of large earthquakes.		
3	II.	Felt by persons by rest, on upper floors, or favorably placed.		
	III.	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.		0.0035-0.007
4	IV.	Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking walls. Standing cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV wooden walls and frames creak.		0.007-0.015
	V.	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.	1-3	0.015-0.035
5	VI.	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked. Small bells ring (church, school). Trees, bushes shaken (visibly, or heard to rustle).	3-7	0.035-0.07
	VII.	Difficult to stand. Noticed by drivers of cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices (also unbraced parapets and architectural ornaments). Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.	7-30	0.07-0.15
6	VIII.	Steering of cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.	20-60	0.15-0.35
7	IX.	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundations). Frame structures, if not bolted, shifted off foundations. Frame racked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluviated areas sand and mud ejected, earthquake fountains, sand craters.	60-200	0.35-0.7
8	X.	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.	200-500	0.7-1.2
	XI.	Rails bent greatly. Underground pipelines completely out of service.		>1.2
	XII.	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.		

Note: Masonry A, B, C, D. To avoid ambiguity of language, the quality of masonry, brick or otherwise, is specified by the following lettering (which no connection with the conventional Class A, B, C construction).

- Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally, and bound together by using steel, concrete, etc.; designed to resist lateral forces.
- Masonry B: Good workmanship and mortar; reinforced, but not designed to resist lateral forces.
- Masonry C: Ordinary workmanship and mortar; no extreme weaknesses such as no-tied in corners, but masonry is neither reinforced nor designed against horizontal forces.
- Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.

† Average peak ground velocity, cm/s.

‡ Average peak acceleration (away from source).

§ Magnitude correlation.

Modified Mercalli Scale, 1956 Version

Table 2

The two largest earthquakes recorded along the San Andreas were located north of the Cajon Pass. The Fort Tejon earthquake (M_L = 7.5–8.5) occurred in 1857 and the San Francisco earthquake (M_L = 8.3) in 1906.

The intensity of groundshaking in the vicinity of Lawndale during the 1857 earthquake was not recorded, but reached a level of IV for the 1906 earthquake.

Whittier–Elsinore Fault. The City of Lawndale is 15 miles from the closest segment of the Whittier–Elsinore Fault zone. This fault is right-reverse slip and slip along the fault has been estimated from drainage deflection to be 1.7 miles (Hauksson 1988). This fault zone is the eastern edge of the Los Angeles Basin.

The Whittier Narrows Earthquake (M_L = 5.9) which occurred on October 2, 1989, is one of the largest earthquakes in the Los Angeles Basin in recent history. The earthquakes epicenter was located in the northeast corner of the Los Angeles Basin between the surface traces of the Raymond Hill and Whittier Faults and its focus was 8.7 miles below ground surface. The epicenter region is characterized by northwest trending faults that cross east west trending folds of the Santa Monica anticline. Principal members of this fault set include the Whittier Extension and Whittier Faults.

Initial analysis placed the Whittier Narrows earthquake on the Whittier fault because of the proximity of its epicenter and high levels of destruction near the faults trace in the City of Whittier. Subsequent seismological data on the depth, location and focal mechanism of the main shock and lack of ground rupture on the Whittier Fault indicated otherwise.

The Whittier Narrows earthquake is now believed to have occurred on th. previously unidentified Elysian Park thrust which underlies the Santa Monica Mountains (Davis and Namson 1989).

The City of Whittier experienced groundshaking of modified Mercalli intensity VIII, which was the highest intensity reported, while a VI was recorded in Lawndale (Hauksson 1988).

San Fernando Fault. The City of Lawndale is 25 miles from the San Fernando Fault Zone. The fault zone is an eastward trending system of North-dipping reverse and thrust faults within the Transverse Range structural province. The San Fernando fault zone includes three segments: the Mission Wells; the Sylmar; and the Tujunga.

Prior to 1971, the San Fernando area had been one of low to moderate seismic activity. Only about 10 earthquakes of magnitude 3.0 and greater occurred between 1934 and 1971 as recorded by the California Institute of Technology. Previous to 1934, two earthquakes were described to have had epicenters in the area. An earthquake (M_L = 5.2) occurred in 1930 and the Pico Canyon earthquake (M_L = 6.0) occurred in 1839. None of these earthquakes were determined to have been on the San Fernando Fault.

In 1971, the San Fernando Fault was first discovered to be active when it ruptured on February 9. The intensity of groundshaking in the immediate area of the earthquake ranged from VIII to XI on the modified Mercalli intensity scale, whil VI was measured in the City of Lawndale (Wentworth and Yerkes 1971).

Predictive Seismic Hazards

The abrupt release of slowly accumulating strain on a fault which occurs during an earthquake has a number of primary and secondary effects on the physical environment. Primary effects consist of ground rupture and ground shaking, while secondary effects include liquefaction, ground subsidence, landsliding, tsunamis and seiches, and dam failure.

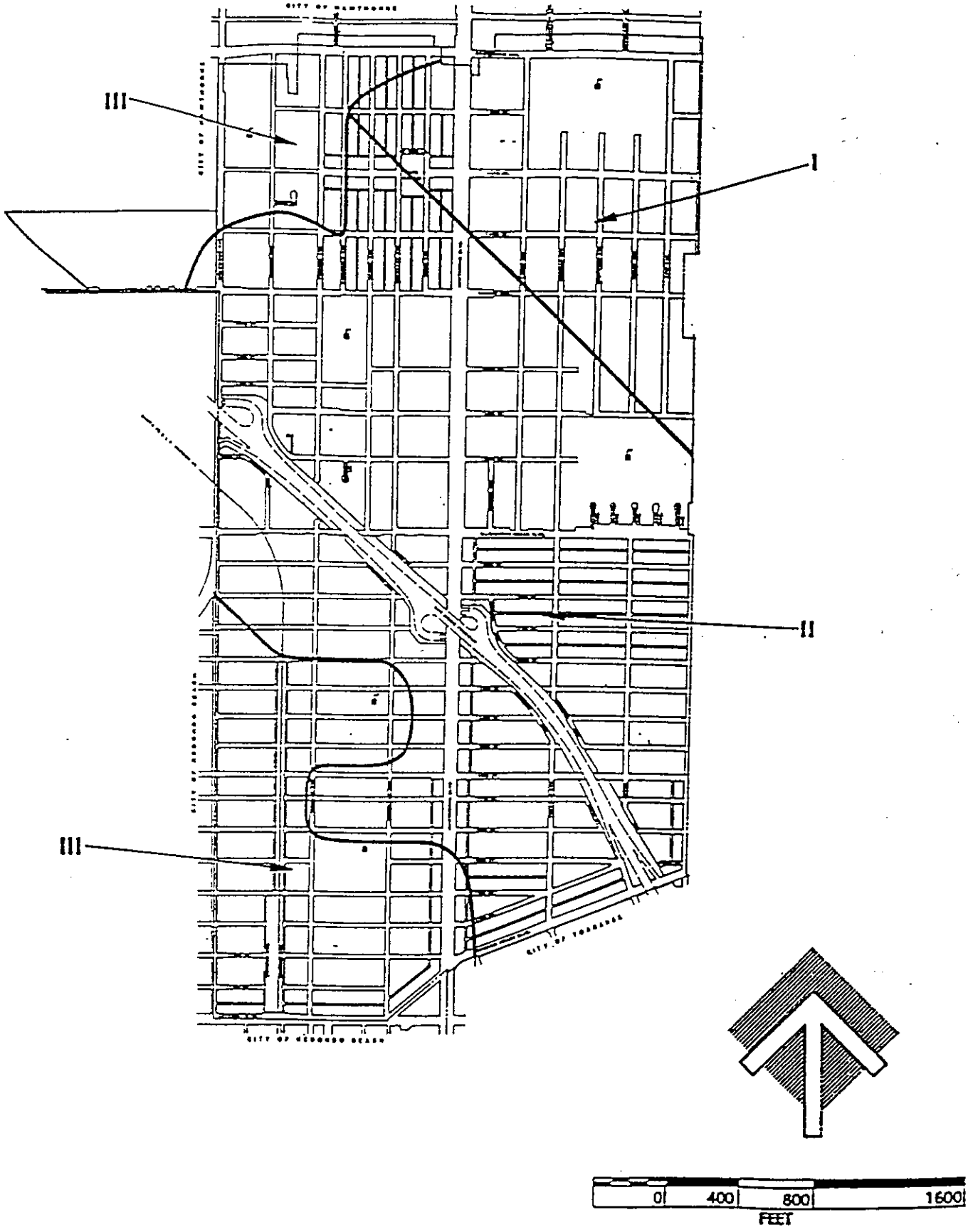
Ground Rupture. Since ground rupture occurs at the surface expression of a fault and no active or potentially active faults are known to be present in the City of Lawndale, hazards due to ground rupture are not considered to be significant.

Groundshaking. The seismic hazard with the most potential for impact to the City of Lawndale is groundshaking induced by any earthquake on a regional fault like the San Andreas or a moderate earthquake on a local fault like the Newport–Inglewood. The extent of groundshaking is dependent upon the distance of Lawndale to the earthquake's epicenter and the characteristics of near surface soils in the city. The majority of the City of Lawndale lies on firm alluvium, and the remainder on sand dunes. Based on these criteria and the distance to the Newport-Inglewood Fault, three seismic zones have been delineated by the city (Figure C) and their characteristics are presented in Table 3. Because the City of Lawndale is small, all of the city is within two to five miles of the Newport-Inglewood Fault. For this reason, groundshaking zones have been developed primarily on the characteristics of near surface soils and secondly on the distance to the Newport-Inglewood Fault. The duration of strong shaking during a Newport-Inglewood Fault seismic event would be the longest in Zone III due to soil conditions, and less but equal in Zones I and II due to distance from Newport-Inglewood Fault.

To ensure that the City of Lawndale can withstand groundshaking from a maximum credible earthquake, ground acceleration parameters were calculated for each fault in the area. Maximum credible earthquakes were determined based on historic seismicity, an understanding of California tectonics, and fault length by Greensfelder in 1972. Using this information and a set of existing curves (Figure D) relating peak acceleration in rock, distance from fault rupture, and magnitude, peak rock acceleration values for Lawndale were estimated (Table 4).

The greatest damage due to groundshaking is not associated with the peak acceleration but rather the series of repeatable accelerations which follow (Ploessel and Slossen 1974). Therefore, repeated high ground acceleration (RHGA) should be of greater concern in structure design than the single peak of maximum acceleration. Typically the RHGA averages 65 percent of the peak acceleration within 20 miles of the epicenter. Beyond 20 miles the RHGA approaches 100 percent of the peak acceleration (Greensfelder 1972). The concept is believed to be valid for earthquakes of magnitude 5.5 to 7+. For larger quakes a similar relationship may exist but sufficient field acceleration data are not available. The seismic parameters for active and potentially active faults and their estimated groundshaking effects in the Lawndale area are presented in Table 4.

The seismic parameters listed in Table 4 are not intended for direct engineering use but rather as a subjective evaluation of fault activity in the Los Angeles Basin with respect to the City of Lawndale. Groundshaking hazards throughout Lawndale will be highly site-specific and building-specific. The geologic and engineering concerns for each site would need to be evaluated by a registered civil or geotechnical engineer (RCE or GE), a certified engineering geologist (CEG), and a registered structural engineer (SE).

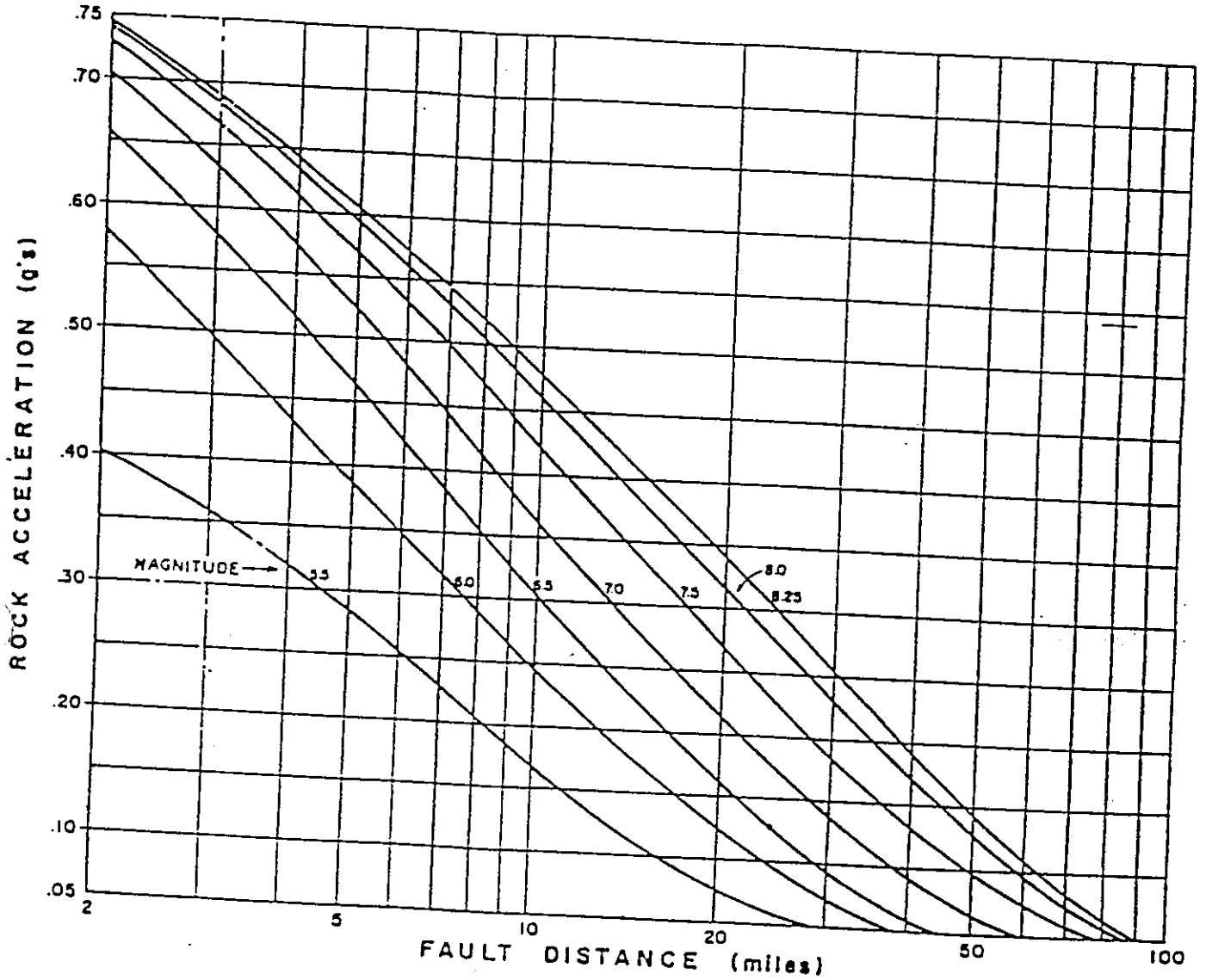


Seismic Hazards Zones for Groundshaking

Figure C

Zone	Distance from Newport-Inglewood Fault (miles)	Near Surface Material
I	2–3	Firm Alluvium
II	3–5	Firm Alluvium
III	3–5	Sand Dunes

Seismic Zones Characteristics Table 3



Rock Acceleration Versus Fault Distance and Earth Magnitude

Figure D

Fault	Distance to Lawndale (miles)	Maximum Credible Earthquake[1] (Richter Magnitude)	Peak Horizontal Bedrock Acceleration[2] (g's)	Repeatable Horizontal Bedrock Acceleration (g's)
Historically Active			—	—
Newport-Inglewood	2	7.0	0.70	0.46
Whittier-Elsinore	15	7.5	0.35	0.23
San Fernando	25	6.5	0.13	0.13
San Andreas	42	8.25	0.18	0.18
San Jacinto	55	7.5	0.08	0.08
Potentially Active				
Palos Verdes	7	7.0	0.45	0.29
Santa Monica	12	7.5	0.39	0.25
Raymond Hill	18	7.5	0.28	0.18

Notes:

[1]Greensfelder, 1972
[2]Schnabel and Seed, 1972

Seismic Parameters for Historically Active and Potentially Active Faults and their Ground Shaking Effects in the City of Lawndale

Table 4

Liquefaction. Liquefaction involves a sudden loss in strength of saturated cohesionless soil and the temporary transformation of the soil to a fluid mass as a result of increased pore pressure and reduced effective stress due to earthquake vibrations (Seed and Idriss 1970). Generally, liquefaction requires loose unconsolidated sands or silts at or near the local water table, where the water table is less than 30 feet below ground surface.

In the City of Lawndale, liquefaction potential must be assessed on a site by site basis. Several factors are significant in influencing liquefaction potential: soil type; in situ density; initial confining pressure; groundshaking intensity; and duration of shaking.

Presently, the liquefaction potential within the city is considered low due to the presence of firm alluvium and the fact that average depth to ground water in local wells reported in 1990 was 100 feet below ground surface (LADPW Personal Communication 1991); however, the possibility of a perched water table must be evaluated on a site-specific basis.

Subsidence. Subsidence can occur in unconsolidated soils during earthquake shaking, producing a more efficient rearrangement of individual soil grains. Subsidence results in the downward movement of the ground surface over a large or limited area. Significant subsidence causing structural damage is typically associated with rapidly deposited alluvial material, or improperly compacted fill. Regarding the former issue, no such areas were identified within Lawndale. The latter issue must be evaluated on a site-specific basis.

Landsliding and Mudsliding. The entire City of Lawndale is located in a relatively flat alluvial plain which is several miles from any hills or mountains. Seismically triggered landslides are generally confined to hilly or mountainous terrain, therefore the likelihood of a seismically triggered landslide affecting the City of Lawndale is unlikely.

Seismically triggered mudslides of rain-saturated soil and weathered bedrock areas would not affect the City of Lawndale, because of its geographic location.

Tsunamis and Seiches. A tsunami is a sea wave generated by submarine earth movement such as a submarine earthquake on an active fault. Faults located off the California coast are not believed to be characterized by the large vertical displacements which are required to generate tsunamis. Further, the topographic relief along the Santa Monica Bay shoreline is abrupt (about 40 feet). Therefore, the risk to Lawndale from tsunamis is considered to be insignificant.

A seiche is an earthquake-induced wave occurring in a confined body of water such as a lake or reservoir. Since no significant bodies of water exist within or adjacent to Lawndale, seiches are anticipated to have no significant impact on the City.

Dam Failure/Flooding. The City of Lawndale does not lie in a 100-year floodplain or a dam inundation zone. Therefore, no risk exists to the City of Lawndale from flooding and dam failure.

Implications for Long-range Planning

- As Lawndale redevelops and older buildings are replaced, the City's seismic risk will decrease since newer buildings will meet the latest local and state seismic safety standards.

- Prepare inventory of unreinforced masonry buildings to assess need for structural rehabilitation.

Fire Safety

The City of Lawndale is under the County of Los Angeles Consolidated Fire Protection District jurisdiction. The District serves 48 cities in the Los Angeles County area, covering 2,186 square miles. Within Lawndale, the District has a station on 147th Street, east of Hawthorne Boulevard.

Due to Lawndale's urban form, fire emergency response is typically limited to structural, rubbish, and vehicular fires. Constraints to fire response include narrow streets, inadequate fire flows and limited access to some large structures. Such constraints decrease fire fighting efficiency and could ultimately result in increased property damage and loss of life. The constraints are related to how the City has evolved into its present urban form, which has resulted in water flow deficiencies and a problematic physical layout.

Water Flow

Water is one of the primary tools in controlling fires. The combination of water quantity and pressure is commonly referred to as fire flow. Fire flow is measured in gallons per minute (gpm) and the total gpm required to adequately fight a fire is determined by the land use pattern and intensity.

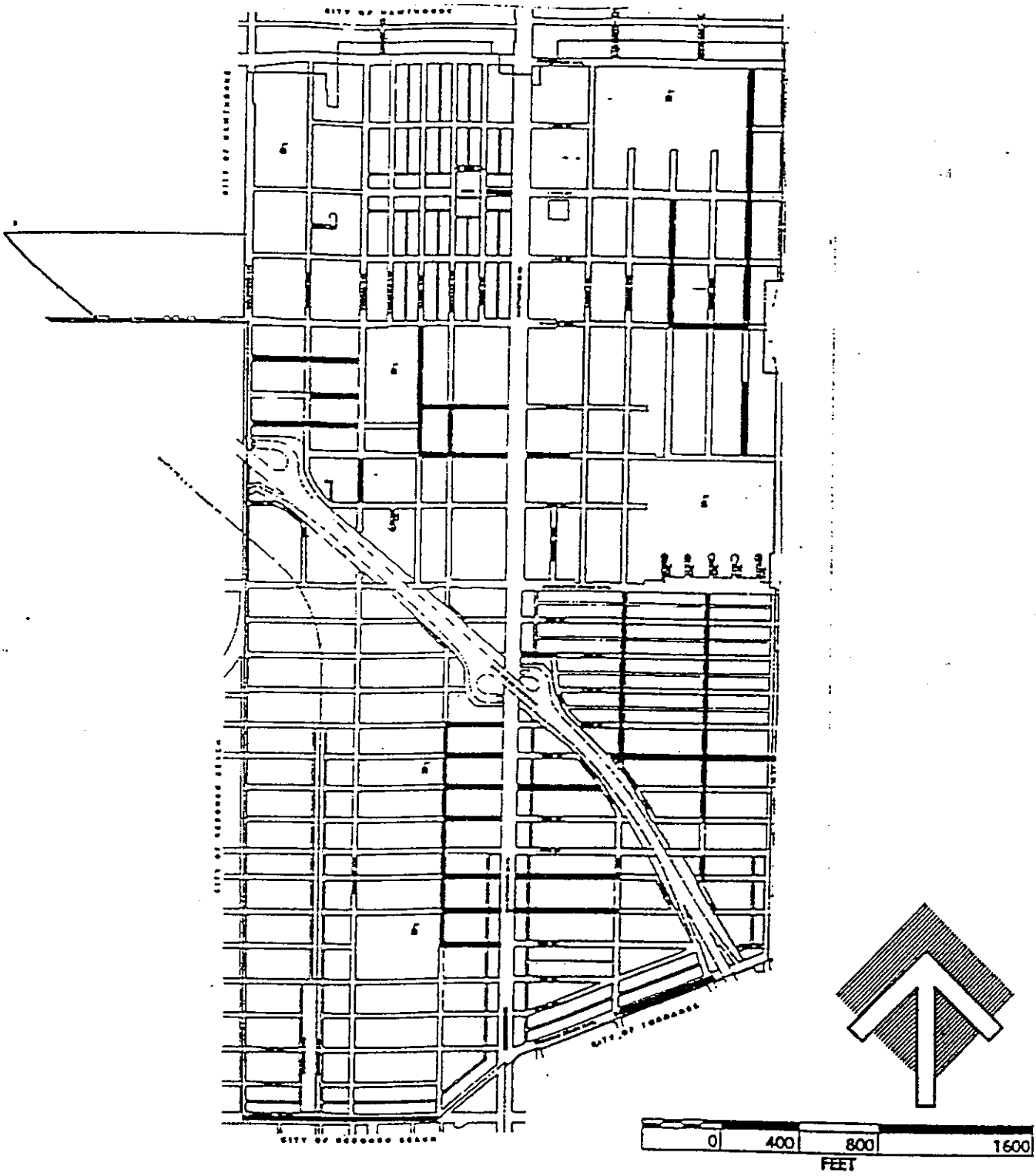
Lawndale was initially developed as a single-family residential suburb of Los Angeles. At that time, four inch mains were adequate to meet water fire flow requirements. Over time, however, as the urban form became more intense, fire flow requirements increased, but the actual physical improvements to the system lagged far behind. Figure E illustrates the areas where the required fire flow is not achieved by the existing conditions of the facility. As the figure shows, there are many areas that require upgrading to meet need. Incremental improvements to the City water facilities have occurred over time. An overall Citywide program should be implemented.

Street Width

Another fire fighting and emergency response constraint is the narrow streets found throughout the City. Narrow streets greatly restrict the maneuverability of fire equipment. This problem is accelerated in the evenings because of on-street parking. Related to narrow streets is the problem of small curb cuts and deep, narrow lots. Subdivision regulations, at the time the City was substantially developed, were less specific regarding access requirements. Because of this, many structures and areas of the City do not meet emergency access requirements.

Accessibility/Design

Beyond fire flow inadequacies, road width, and site access constraints, fire and emergency response is hindered by the physical accessibility and design of structures. Many areas of Lawndale have experienced infill development comprised of large apartment structures. Design of these structures was based on achieving high densities and therefore, many lack sufficient open space areas that would allow



SOURCE: SCWC 1991 (Based on random sampling of fire hydrants)

Water Mains with Inadequate Fire Flow

Figure E

fire fighting and emergency personnel room to operate. Besides the problem of access related to design, many old structures have experienced significant buildups of rubbish. Lack of property maintenance contributes to the number of fires city wide as well as to the overall accessibility constraints of fighting the fire. These problems are being dealt with through code enforcement, fire access guidelines, and the fire department's participation in the development review process.

Emergency Response

Public Safety for the City of Lawndale is further ensured through comprehensive emergency action programs. These programs are in conjunction with the Consolidated County Fire Protection District and the region. The Consolidated Fire Protection District, along with the County of Los Angeles' Sheriff's Department, provides evacuation and emergency response service in the event of a large scale local event. The City is part of a Master Mutual Aid program which details the progression from local to regional to state to federal involvement in an emergency. State and federal involvement require large scale disaster and threat of invasion or massive destruction through natural or manmade occurrences.

Local emergencies requiring City and regional efforts may include the presence of toxic substances in the air, a massive fire or other disaster which would necessitate evacuation or the movement and emergency care of persons. In this respect, The Consolidated County Fire Protection District Plan identifies emergency staging areas, helispots, care facilities (with alternative routing), and evacuation practices.

Staging areas for apparatus, equipment, and manpower include the property adjacent to the fire station on 147th Street, The Lawndale City maintenance yard, the Los Angeles County Road Department Yard, Lloyde High School, Alondra Park, Luezinger High School, and El Camino College. Helispots are identified by the Fire Protection District as either primary or secondary. Lloyde High School is the primary location with El Camino College, Alondra Park and Luezinger High School as secondary. Temporary care facilities are Lloyde High School as well as El Camino College and Alondra Park. Actual evacuation routes and staging areas are dependent upon the level and location of the emergency. Through the Mutual Aid Agreement and Chapter 2.68 of the Lawndale City Code, the City further receives direction from the state and federal governments, should the level of disaster or emergency warrant.

Hazardous Materials

Hazardous materials are defined as substances which may be injurious to human health or the environment. These materials include both hazardous substances and hazardous wastes. This section addresses the potential sources and locations of hazardous materials within the City of Lawndale. A review of disclosure procedures and current laws and regulations is presented for both hazardous substances and hazardous wastes. The potential risks to the community from the presence of hazardous materials is discussed.

Hazardous Substances

Hazardous substances are used in a variety of industrial and non-industrial applications. This section describes those applications deemed likely within the City of Lawndale.

Location/Surrounding Land Use. Industrial facilities with the potential for the presence of hazardous substances include commercial automobile facilities, light industrial facilities, manufacturing facilities and oil production facilities. Typical types of commercial automobile activities within the City of Lawndale are service

stations, body shops and detailing facilities. Typical types of light industry are furniture assembly plants, warehousing activities and printing operations. Typical types of manufacturing operations are machine shops, plastic and ceramic manufacturing. Table 5 presents a listing of hazardous substances present in the City of Lawndale.

Figure F presents the locations of commercial automotive, light industrial and manufacturing facilities within the City of Lawndale. Commercial automobile properties within the city limits tend to be located along the major surface streets such as Hawthorne Boulevard, Redondo Beach Boulevard and Compton Boulevard. Light industrial and manufacturing properties within the city limits are generally clustered into three areas: the western side of the city just south of Interstate 405; the western side of the city north of Interstate 405; and the northwest quadrant of the city. The city's primary industrial area is bounded by Interstate 405, 159th Street, and Inglewood Avenue. The area with the second highest concentration of light industrial and manufacturing properties is located in and around the 15200 block of Grevillea Avenue. The entire area is bounded by Compton Boulevard, Hawthorne Boulevard, Interstate 405 and Inglewood Boulevard. The third cluster of industrial properties is located in and around the 4800 block of Compton Boulevard. The entire area is bounded by Rosecrans Avenue, Hawthorne Boulevard, Compton Boulevard and Inglewood Avenue. The abandoned and capped oil wells can be found mostly near the intersection of Inglewood Avenue and Rosecrans Avenue. Land use surrounding the commercial automotive, light industrial and manufacturing facilities tends to be mixed use residential and commercial. All the facilities are in close proximity to residential property.

Non-industrial sites such as oil production facilities, warehouses, school buildings, laboratories and residences may also contain hazardous substances. In addition, a portion of the City of Lawndale is located within the boundaries of the abandoned Lawndale Oil Field. The city of Lawndale has 25 capped and abandoned oil wells within its boundaries. Most of these abandoned oil wells were dry and capped immediately after drilling. A few were productive oil wells until the mid-1950s, when production ended and they were capped with cement per state regulations. These wells represent potential sources of hazardous materials. Figure G presents the locations of the abandoned oil wells. The Oil and Gas Division of the Department of Conservation is responsible for reviewing building projects above or near abandoned oil wells to determine if they must be reabandoned according to current Department specifications. Furthermore, if any abandoned or unrecorded wells are uncovered or damaged during excavation or grading, remedial plugging may be required. If such damage occurs, the Division's district office must be contacted. The Department of Conservation suggests that property owners avoid building over any abandoned well. The Department of Conservation Division of Oil and Gas should be contacted to determine required procedures in the event of a proposal that might disturb a well.

Hazardous Substance Transportation. The transportation of hazardous materials can pose a potential hazard to the community. Spills of hazardous materials in residential areas can result in exposures to the inhabitants above threshold limits. Two methods of transportation are addressed in this section: railroad and vehicular.

The southwest quadrant of Lawndale is transected by the Atchison Topeka a Santa Fe railroad. This facility, shown as the LA Harbor Line, is the main line between the harbor and the main industrial switching yard in Los Angeles. As

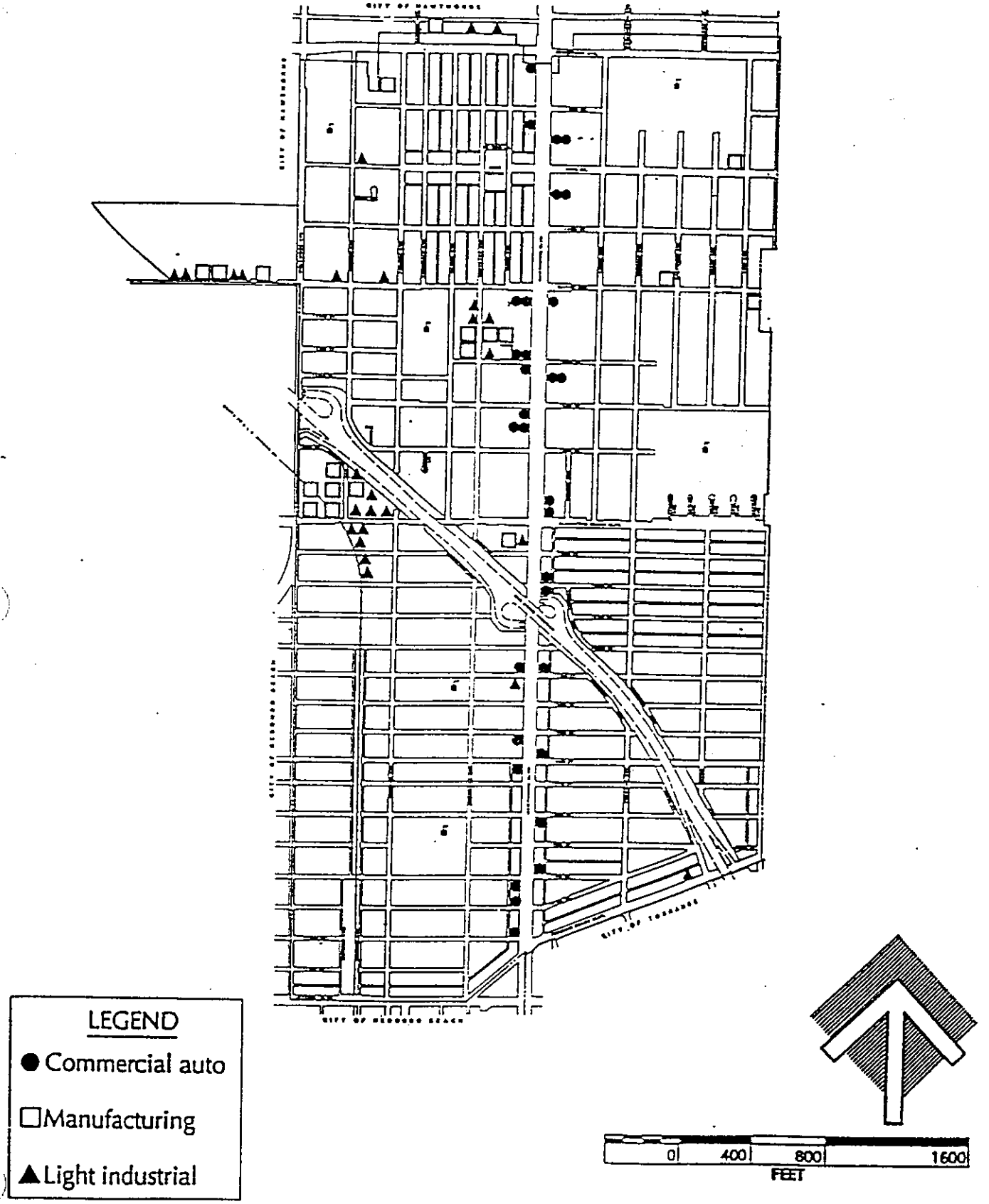
Material Type	Material Volume
Automotive (1)	4,294,071 gal
Gases (2)	26,844 cf
Fertilizer Products	600 lb
Hydrochloric Acid	1,200 gal
Liquid Nitrogen	142 gal
Isopropyl alcohol	110 gal
Oil	7,579 gal
Paint Products (3)	3,804 gal
Pesticides	55 gal
Liquid Propane	10,070 gal
Sodium Hydroxide	443 gal
Sodium Hypochlorite	2,500 gal
Solvent	1,428 gal
Sulfuric Acid	50 gal
Waste Oil	14,165 gal
Waste Paint and Thinner	275 gal

(1) Gasoline, fuel, kerosene, transmission fluid, antifreeze, engine coolant.
(2) Acetylene, argon, carbon, dioxide, helium, hydrogen, nitrogen, nitrous oxide, oxygen.
(3) Paint, lacquer, varnish, stain, primer, thinner.

Source: Hazardous Materials Business Plan and Inventory, County of Los Angeles Fire Department, 1991.

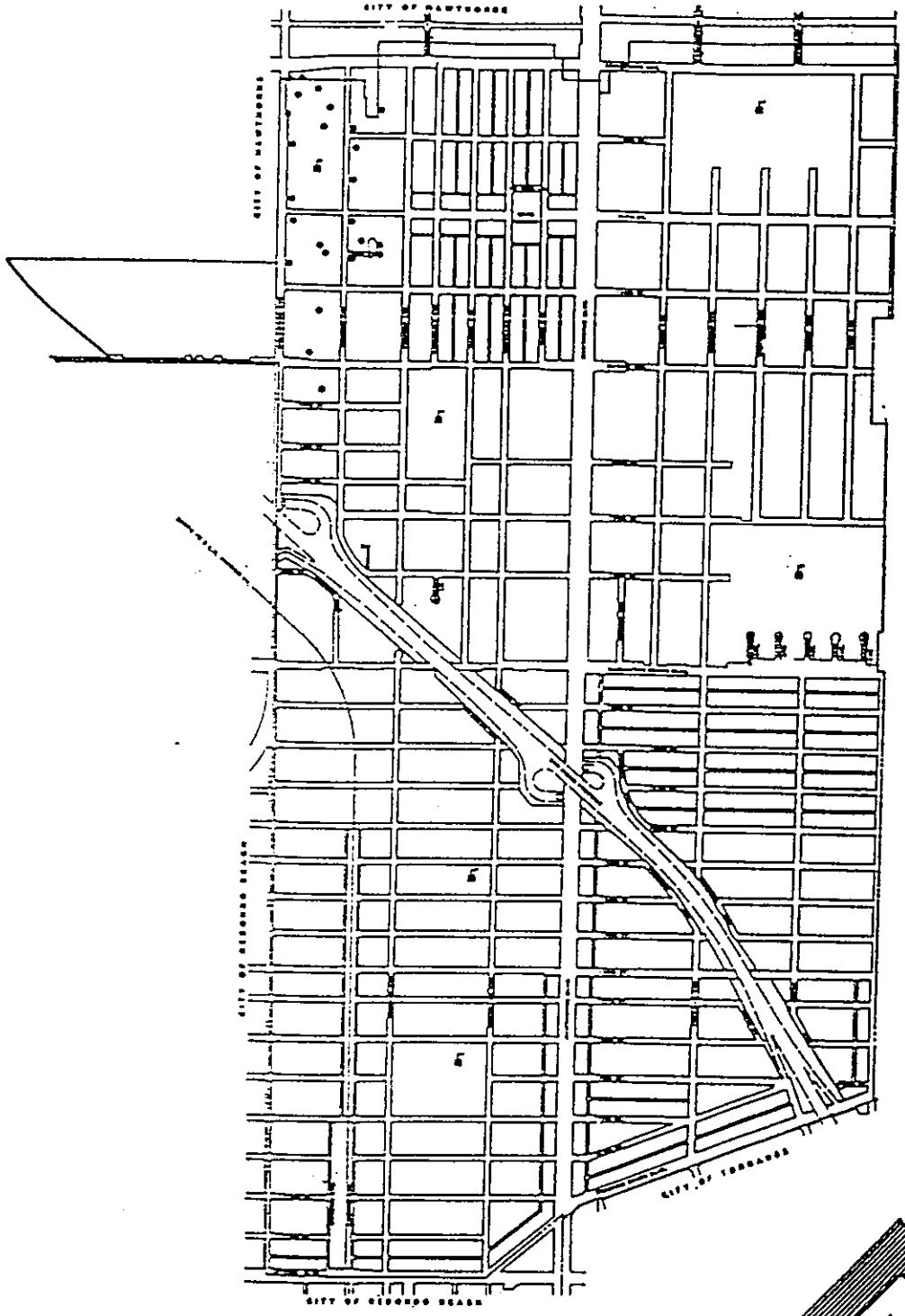
Hazardous Materials Stored on the Site in the City of Lawndale

Table 5



Hazardous Substance Source Location

Figure I



LEGEND

- Abandoned Oil Well Location

0 400 800 1600

FEET

SOURCE: CA Dept. of Conservation, Div. of Oil and Gas, 11/91.

Abandoned Oil Well Locations

Figure G

such, the railroad receives heavy train activity daily. Although trains have a limited speed through the City of Lawndale, train derailments have occurred in the past.

No designated truck routes for the transport of hazardous materials exist through the City of Lawndale. Trucks generally use some of the major streets in the city and the volume of truck traffic is relatively small. City speed limits further reduce the potential for accidents and spills of hazardous materials.

Interstate 405 transects the City of Lawndale, passing from the southeast corner of the city to the middle of the western boundary. This interstate receives heavy truck and vehicle traffic and is a designated route for the transportation of explosives and cargo tanks of fuming nitric acid, anhydrous hydrazine and liquid nitrogen tetroxide by the State of California. However, there are no designated stopping points for transporters of these materials within the vicinity of the City of Lawndale (CCR, Title 13). Many trucks traveling the freeway transport other types of hazardous materials in both bulk and containerized forms. The fire department has been involved in a number of overturned trucks and tankers in the past.

Hazardous Wastes

Hazardous wastes are generated from both industrial and non-industrial operations. This section describes the generating operations deemed likely within the City of Lawndale.

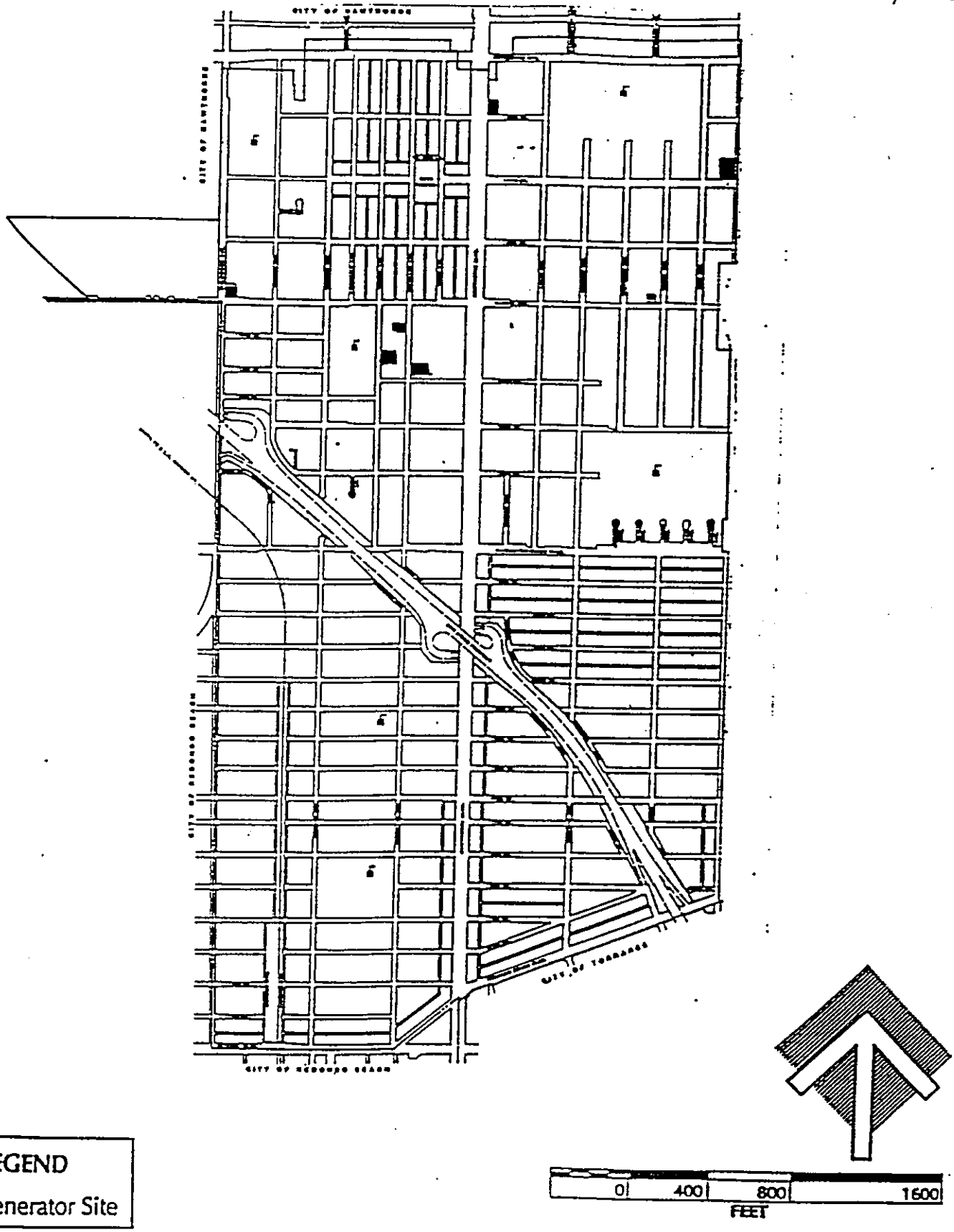
Generator Location/ Surrounding Land Use. Hazardous wastes may be generated by a variety of industrial and non-industrial practices. Facilities with the potential for the presence of hazardous materials include auto shops, light industrial facilities and manufacturing facilities. Non-industrial sites such as school buildings. laboratories and residences may also generate hazardous wastes.

In 1988, the most recent year for which data is available, the following industries generated and shipped hazardous wastes in the City of Lawndale: automotive shops, printing and manufacturing. Non-industrial facilities such as schools, laboratories, an insurance company and households also generated hazardous wastes (Los Angeles County 1988 Summary).

Figure G presents the locations of hazardous waste generating facilities within the City of Lawndale in 1988.

Automotive shops which generated hazardous wastes in 1988 within the city limits tended to be located along Compton Boulevard and in the 15200 block of Grevillea Avenue. Printing operations which generated hazardous wastes tended to be located in the northwest quadrant of the city. The manufacturing operations generating hazardous wastes were located on Compton Boulevard and South Aviation Boulevard. The Unified School District which generated hazardous wastes is located on 147th Street. Surrounding land use is generally mixed use residential.

Typical Hazardous Waste. A review of the State hazardous waste generator list indicates that there are no major hazardous waste generators within the city of Lawndale. In 1988, the latest data available, 62 tons of hazardous waste were generated and shipped by facilities within the City of Lawndale. Seventy one percent (71%) was generated by facilities with recurring waste shipments ; twenty nine percent (29%) was generated by facilities as a one-time shipment (Los Angeles County 1988 Summary). Of the total waste, 8% was generated by



Hazardous Waste Generators

Figure H

automotive operations, 9% was generated by printing operations, 22% was generated by administrative non-manufacturing facilities and 58% was generated by manufacturing facilities. A breakdown of waste types that were transported out of the City of Lawndale is presented in Table 6. Waste oil and solvents represented the largest volume of waste shipped.

Households also produce a variety of hazardous wastes, including paints, solvents, drain openers, cleaner, insecticides and motor oil. Cities are required to adopt a source reduction and recycling program which includes household hazardous waste. A feasibility study for the City of Lawndale will be completed in November 1991. Program implementation is expected in 1992.

Hazardous Waste Transportation. The transportation of hazardous waste can pose a potential hazard to the community. Spills of hazardous waste in residential areas can result in exposures to the inhabitants. The methods of transportation of hazardous wastes are the same as those for hazardous materials. See the Hazardous Substances section for a discussion of this issue.

Public Exposure

The risk of harmful public exposure to a hazardous material release is dependent upon the proximity of the release to the public, the characteristic of the material released and the amount of material released.

The majority of hazardous material users, generators or storers are located in four clusters within the city. Most of the light industrial and manufacturing properties are located in close proximity to residential areas. In addition, the transportation of hazardous materials occurs through residential areas. Therefore, in the event of a release there is a potential risk of exposure to the citizens of Lawndale.

Hazardous materials typically present in the City of Lawndale are flammable liquids; photochemical substances; compressed gases; asbestos-containing materials; pesticides; oily waste; aqueous waste; inorganic chemicals; and tank bottom waste. In the event of a release, these materials have the potential for causing explosions, fires and harmful effects to the public following exposure.

The amount of hazardous materials present within the City of Lawndale is not easily quantifiable. The volume of hazardous substance on a facility site at any one time varies by industry. Gasoline and diesel may be stored in large above or underground storage tanks. Liquefied petroleum gas would be expected to be stored in tanks or cylinders. Smaller container storage volumes would be expected for those materials which were not used in large quantities. Hazardous materials shipments passing on the Interstate 405 or the railroad increase the volume of hazardous materials which may be present. These sources of hazardous materials indicate that the volume of hazardous materials within Lawndale presents a risk of accidental release.

Emergency Response

Rapid and effective emergency response can minimize the risk of public exposure to a hazardous material release. It is for this purpose that the laws require preparation of contingency plans and business plans by facilities which store hazardous materials.

The Los Angeles County Fire Department has the responsibility for response to hazardous material releases in the City of Lawndale. The Fire Department has

Waste Type	Waste Volume (tons)
Solvent	16.57
Aqueous waste	3.38
Oily Waste	21.11
Organic	3.11
Photochemical	0.28
Inorganic	3.0
Adhesives	0.4
Laboratory	0.05
Tank Bottom Waste	2.03
Containers	11.98
TOTAL	61.91

Hazardous Waste Generated
in the City of Lawndale

Table 6

prepared for its emergency response responsibilities by creating a database identifying those businesses which store hazardous materials.

Each engine company is required to inspect every business within its district annually to update this database. The Fire Prevention Division of the Fire Department is responsible for ensuring that all such businesses have submitted business plans and contingency plans detailing the business' emergency response procedures.

The County Fire Department has three hazardous materials squads to service the entire County of Los Angeles. These squads respond to releases of hazardous materials which present a threat to the public. The engines are equipped with data terminals which have access to the hazardous material business database. Typically, two fire engines, a paramedic squad and a hazardous material squad would respond to an emergency hazardous materials release. Law enforcement officials would be relied upon in the event of an evacuation.

Public Education

The Fire Prevention Division of the Los Angeles Fire Department provides hazardous materials training and community awareness presentations for the education of the public. These programs are available to the City of Lawndale.

Conclusion

The presence of hazardous materials within the City of Lawndale presents a potential risk to the public in the event of a hazardous materials release. The proximity of residential areas to facilities known to manage hazardous materials, the types of such materials expected to be present and the volume of such materials combine to increase the risk of harmful public exposure in the event of a release. The Los Angeles County Fire Department has procedures in place to deal with emergency response to such incidents. However, there are steps which the City of Lawndale can take to better prepare the Fire Department and the community to an accidental release of hazardous materials. These measures include improving City emergency response programs, including hazardous materials awareness into community planning activities and working to reduce the amount of hazardous materials in the community. Specific steps for implementing these policies are presented later in this Safety Element.

Goals and Policies

The basic objective of the seismic portion of the Safety Element is to reduce the risk of hazard resulting from future seismic and related events. A seismic event is directly associated with faulting and earthquake activity. The area encompassed by the City of Lawndale does not contain faults but the City would be affected by fault activity outside of the community, and in the regional area. The seriousness of seismic risk to public safety is a function of local seismic conditions, as well as public awareness of the hazards present, and the effectiveness of mitigation utilized to reduce risk resulting from seismic hazards.

The fire portion of the Safety Element provides for the safety of community from fire and manmade or natural disasters. The ability to provide fast and effective emergency response is limited by the City's water flow, accessibility and width of streets.

The hazardous materials portion of the Safety Element addresses the protection the community from any unreasonable risks associated with the presence of hazardous materials (hazardous substances and hazardous wastes) in the

community. These substances can be released to the environment as a result of fires, spills, accidents, or emissions. As such, they potentially pose acute and chronic health risks to individuals who live and work in the city. The risk of public exposure to a hazardous material release is dependent upon the proximity of the release to humans, the characteristics of the material released and the amount of material present. Most of the light industrial and manufacturing properties are located in proximity to residential areas. In addition, hazardous materials transporters pass through residential communities during shipment of hazardous substances and wastes. The presence of Interstate 405 and the railroad tracks passing through the city increases the volume of hazardous materials shipments through Lawndale. There is a potential risk of public exposure to a hazardous material release based upon the proximity to areas of hazardous materials storage and transportation routes.

The following goals and policies provide direction for the achievement of seismic, fire, and hazardous materials safety. The policies will be carried out through implementation programs utilizing public and private resources for the mitigation of safety hazards. The policies and directives encompass both existing and future development.

Seismic and Safety: Goal 1

The City of Lawndale will ensure the protection from loss of life, injury, property damage and reduction of economic and social dislocation associated with seismic and other emergency events.

Policies

Policy 1a
The City of Lawndale will reduce the probability of the occurrence of loss of life, injury, and property damage during seismic events though increased public awareness and disaster preparedness.

Policy 1b
The City of Lawndale will incorporate the provisions of the County of Los Angeles' Emergency Operations Plan into the City's emergency response procedures to maintain consistency and encourage cooperation.

Policy 1c
The City of Lawndale will minimize potential seismic risk to both existing and future structures.

Policy 1d
The City of Lawndale will provide the community with the knowledge of the potential danger resulting from seismic events.

Policy 1e
The City of Lawndale will incorporate seismic hazard awareness as an integral part of community planning activities.

Policy 1f
The City of Lawndale will reduce the probability of the occurrence of loss of life, injury and property damage from fire and other natural or manmade emergencies or disasters through public education and emergency preparedness.

Hazardous Materials: Goal 2

The City of Lawndale will ensure the protection from loss of life, injury, and property damage associated with the accidental dispersal of hazardous materials.

Policies

Policy 2a
The City of Lawndale will ensure the protection of life and property from the hazards of release of hazardous materials to the environment.

Policy 2b
The City of Lawndale, recognizing the potential risks of hazardous materials, will incorporate hazardous material awareness as an integral part of community planning activities.

Policy 2c
The City of Lawndale recognizes the plight of California's increasing waste problem and will actively pursue programs for decreasing the presence of hazardous materials generated from the City's households and businesses.

Implementation Programs

1. Seismic and Safety

1.1 Evacuation Routes
The City of Lawndale shall cooperate with neighboring communities in developing local and inter-city evacuation routes.

1.2 Emergency Operations Plan
The City of Lawndale shall review and assess the County disaster preparedness program and Emergency Operations Plan (EOP) fo application to the City of Lawndale. Applicable sections of these plans shall be incorporated into the City's Safety Element. Department heads in City Hall shall be familiar with these plans and understand their roles during seismic and other disasters.

1.3 Public Awareness
The City of Lawndale shall make the Lawndale EOP available to all its citizens by distributing copies to public institutions (such as libraries and schools) for educational purposes and to encourage awareness. Public seminars shall be organized to further describe procedures in the Plan and to address questions and concerns of the Lawndale citizens.

1.4 Structural Standards
The City shall ensure that new structures be designed and constructed to meet minimum performance standards in accordance with the latest Uniform Building Code (UBC 1988). The City building code shall vary according to the rate of ground acceleration associated with the three seismic zones identified in the technical appendix.

1.5 Groundshaking Evaluation
The City shall require that soils engineering reports,which are submitted for development or redevelopment projects within the seismic hazard zone III, include an evaluation for the potential of groundshaking hazards, and be evaluated by a licensed geologist or geotechnical engineer.

1.6 Liquefaction Evaluation

The City shall require that soils engineering reports, when submitted for development or redevelopment projects within any seismic zone, include an evaluation for the potential of liquefaction at any site where ground water is observed within the upper 50 feet of sediments.

Soils reports shall include a discussion of the magnitude of earthquake shaking, include specific information relating to vertical and horizontal maximum acceleration that could be anticipated at the site, and if the site is susceptible to long or short period horizontal and vertical ground acceleration and make suggestions for possible mitigation if necessary.

1.7 Site Inspections

The City shall initiate a detailed site inspection program to identify existing non-residential facilities that do not currently meet modern seismic and construction standards established in the latest Uniform Building Code. Critical structures such as schools, hospitals, emergency communication centers, important utility centers, police and fire facilities, and bridges and overpasses shall be retrofitted as soon as possible. The existing demolition-rehabilitation program shall be aggressively continued by the City so that old and hazardous structures can be eliminated.

1.8 Hazardous Industries

The City shall adopt an ordinance defining hazardous industries or facilities subject to serious accidents resulting from strong earthquakes. The City Engineer shall be given the authority to: (a) conduct an inventory and selective evaluation of the seismic vulnerability of potentially hazardous buildings in high seismic shaking zones in the City, (b) identify building occupancy type, value and age, and (c) establish priorities for the renovation, demolition, or occupancy reduction of identified hazardous buildings.

1.9 Educational Program

The City shall develop an educational program for use by schools, developers, and the public at large, covering hazards, abatements, and emergency plans and procedures. Earthquake disaster simulations shall occur at regular intervals at a school and community level in order to practice the proper procedures established in the Lawndale Emergency Operations Plan.

1.10 Volunteer Program

The City of Lawndale shall develop, implement and support community programs that train volunteers to assist police, fire and civil defense personnel in how to perform effectively after an earthquake, or other disaster.

1.11 Earthquake Insurance Program

The City of Lawndale shall advocate improved earthquake insurance programs.

1.12 Relocation Assistance

The City of Lawndale shall provide relocation assistance to persons and businesses temporarily or permanently dislocated from hazardous old buildings due to action by the city.

1.13 Seismic Hazard Restrictive Zoning
The City of Lawndale shall adopt an overlay zone, or other restrictive zoning with selective land use in areas of high seismic hazard (e.g., high liquefaction).

1.14 Construction Design
The City of Lawndale shall require that new construction be designed to withstand the ground shaking expected for Seismic Zones I, II, and III.

1.15 Seismic Hazard Zoning
The City of Lawndale shall consider including seismic and geologic hazards in the City's zoning ordinance. Land use allocations shall be compatible with the various degrees and types of geologic and seismic risk within the City.

1.16 Liquefaction Protection
The City of Lawndale shall monitor ground water level in all potential liquefaction areas. If the water levels reach within 40 feet of the surface, the City Engineer shall require appropriate foundation design or other mitigations to alleviate the hazard to large structures as necessary. If the water levels reach within 15 feet of the surface the City engineer shall require special designs for other structures as necessary.

1.17 Critical Facility Design
The City of Lawndale shall advocate detailed site evaluations and improved seismic design and construction standards for linear system nodal facilities providing critical services such as power distribution stations, water supply, and communication centers.

1.18 Fire Safety
The City of Lawndale shall continue its educational and action programs regarding prevention of fires, clean-up of sites, first-aid procedures, and evacuation routing.

2. Hazardous Materials Safety

2.1 Hazardous Waste Generator Survey
The City of Lawndale will conduct a survey of businesses generating hazardous wastes and will review the adequacy of emergency response arrangements between those facilities and local police and fire departments for hazardous waste releases.

2.2 Emergency Preparedness Review
The City of Lawndale will conduct annual reviews of its existing emergency preparedness and evacuation plan to assess its adequacy in dealing with the potential risks of hazardous materials.

2.3 Hazardous Materials Routes
The City of Lawndale will minimize the risk of accidental releases of hazardous materials from transportation accidents by designating routes through the community for the transport of hazardous materials.

2.4 Emergency Operations Plan Exercises
The City of Lawndale will conduct annual community emergency operations plan exercises to assess the effectiveness of its emergency operations plan.

These exercises will include mock spill events and evacuation of public buildings.

2.5 **Emergency Operations Plan Review**
The City of Lawndale will update its community emergency operations plan annually by using information provided in the database prepared by the Los Angeles County Fire Department in order to assess the impact on emergency response needs from new hazardous materials management facilities.

2.6 **Contingency Plan Review**
The City of Lawndale will review the contingency plans that hazardous waste generators have submitted to the Fire Department, and these plans will be incorporated into the community emergency response plan.

2.7 **Hazardous Material Release Prevention**
The City of Lawndale Fire Department will follow up with businesses after a hazardous material release which affects human health or the environment has occurred to verify that the incident cannot recur.

2.8 **Well Abandonment Review**
The City of Lawndale will review the information packet available from the Department of Conservation's Division of Oil and Gas entitled "Construction Project Site Review and Well Abandonment Procedure." Applicable sections will be incorporated into the building department's review process for new development.

2.9 **Well Reabandonment**
The City of Lawndale will ensure that new development over or in the proximity of a previously abandoned oil well be reviewed by the Oil and Gas Division of the Department of Conservation to determine whether the well needs to be reabandoned.

2.10 **Community Planning Priority Ranking**
The City of Lawndale will use the following priority ranking in planning community development to minimize the potential risks resulting from the exposure to hazardous materials: (1) loss of life or injury, (2) damage to property, (3) litigation, (4) excessive maintenance and (5) other social and economic costs.

2.11 **Adjacent Land Use Zoning**
The City of Lawndale Planning Department will minimize exposure of citizens to hazardous materials by controlling the type, location and intensity of development adjacent to sites and facilities which produce, use or store hazardous materials.

2.12 **Hazardous Materials Zoning**
The City of Lawndale will control the presence of hazardous materials by limiting the location of new facilities which manage hazardous materials to those areas zoned for commercial and industrial uses.

2.13 **Land Use Planning**
The City of Lawndale will continuously integrate new data on hazardous materials use and storage areas into its review of land use proposals,

applications and enforcement of development standards to minimize the potential risks.

2.14 **Facility Inspections**
The City of Lawndale will increase the number of facilities that are inspected annually by the fire department to increase the database on existing hazardous materials in the community.

2.15 **Underground Tank Permits**
The City of Lawndale will verify that all underground storage tanks are permitted by the Fire Department.

2.16 **Hazardous Materials Education**
The City of Lawndale will educate the community as to the presence and effects of hazardous materials in the vicinity, through presentations at public forums.

2.17 **Public Awareness**
The City of Lawndale will inform and educate the public on the risks from hazardous materials in the community, and the methods available for hazard abatement, prevention, mitigation and avoidance through development of literature and presentations.

2.18 **Rail Shipment Notification**
The City of Lawndale will require notification of hazardous material shipments by rail within the city limits.

2.19 **Public Presentations**
The City of Lawndale will educate the community as to the presence and effects of hazardous materials in the vicinity through presentations at local schools.

2.20 **Hazardous Material Survey**
The City of Lawndale City Council should authorize the appropriate agency to conduct a survey to evaluate potential hazards and to recommend guidelines for the safe handling, processing, manufacture, or storage of dangerous materials.

2.21 **Transportation Routes**
The City of Lawndale should require that vehicles carrying hazardous materials be routed along transportation corridors that reduce public exposure to risk.

2.22 **Public Building Asbestos Control**
The City of Lawndale will reduce public exposure to asbestos by requiring the identification and control of asbestos-containing materials during renovation of public buildings.

2.23 **Property Transfer Asbestos Control**
The City of Lawndale will minimize asbestos exposure by requiring the identification and control of asbestos-containing material in properties prior to a property transfer.

2.24 **Property Transfer Soils Investigation**
The City of Lawndale will improve the environment by requiring the identification and remediation of soil contamination in properties such as light industrial and manufacturing prior to a property transfer.

2.25 **Source Reduction Program**
The City of Lawndale will prepare, review and update the City source reduction and recycling program for solid hazardous wastes, including household hazardous wastes.

Glossary of Terms

Acceleration: Rate of change of velocity.

Active fault: A fault that has slipped in the recent geological past and can be expected to move again in the future. Recent geological past is interpreted to be a period of 11,000 years.

Alluvium: Geologically recent surficial deposits, which were deposited by a stream or other body of running water and have not undergone significant cementation or consolidation. Typically gravels, sands, silts and clays.

Alquist-Priolo Special Studies Zones Act (1972): This act was initiated to regulate development near active faults so as to mitigate the hazard of surface fault rupture. Under this act special studies zones were delineated along known active faults.

Anticline: A fold, generally convex upward, whose core contains the stratigraphically older rocks.

Breccia: A coarse-grained clastic rock, composed of angular broken rock fragments held together by a mineral cement or in a fine-grained matrix.

Business plan: A written document that contains an inventory of all hazardous materials, emergency response procedures for a release or threatened release of hazardous materials, and procedures for the mitigation, prevention or abatement of hazards to persons, property or the environment.

Contingency plan: A written document that sets forth comprehensive policies and procedures for emergency response.

Earthquake: Perceptible trembling to violent shaking of the ground, produced by the sudden displacement of rocks below and at the earth's surface.

Effective stress: The average normal force per unit area transmitted directly from particle to particle of a soil or rock mass.

Epicenter: The geographical location of the point on the surface of the earth that is vertically above the earthquake focus. It is near the highest intensity of groundshaking.

Fault: A plane of breakage in rock or soil, along which significant offsetting of the two sides of a plane occurred due to tectonic forces.

Fault gouge: Soft, uncemented pulverized clayey or clayeylike material found along some faults or between the walls of a fault, and filling or partially filling a fault zone.

Fault system: A fault set or sets that have the same characteristics of movement.

Fault zone: A fault that is expressed as a zone of numerous small fractures or of breccia or fault gouge.

Focus: The point within the earth which marks the origin of the elastic waves of an earthquake.

Floodplain: Any flat or nearly flat lowland that borders a stream and may be covered by its waters at flood stages.

Ground Rupture: Lateral or vertical fault displacement occurring in the top several feet of rock or soil and extending to a fault plane at depth. Due to movement along that fault or adjacent faults.

Groundshaking: Shaking motions of the soil or rock during an earthquake.

Hazardous material: An injurious substance or waste, including pesticides, herbicides, toxic metals and chemicals, liquified natural gas, explosives, volatile chemicals and nuclear fuels.

Hazardous substance: A hazardous material that is not a waste.

Hazardous waste: An injurious waste or waste-like material.

Incident: An accident, release, spill, explosion or other event which results in the release of a hazardous material to the environment.
Intensity: The degree or strength of shaking at a specified place, rated by the severity of damage at that location.

Landslide: A general term covering a wide variety of mass movement, involving downslope transport, under gravitational influence, of soil and rock material *en masse*.

Left-lateral fault movement: Generally horizontal movement in which the block across the fault from an observer has moved to the left.

Liquefaction: The process in which a soil deposit or layer in a deposit is transformed into a dense fluid which will flow as a liquid when unconfined. It occurs principally in loose saturated sands and silts when they are shaken by an earthquake.

Magnitude: The rating of a given earthquake related to the strain energy released by it as measured on seismograms.

Offsite: The horizontal and/or vertical distance between two parts of a disrupted bed previously joined.

Perched water table: The water table of unconfined ground water separated from an underlying main body of ground water by an unsaturated zone.

Pore pressure: The stress transmitted by the fluid that fills the voids between particles of soil or rock mass.

Potentially active fault: A fault that is considered suspect because of identified offset of Quaternary sediments that are less than 1.5 million years old.

Recurrence Interval: The average length of time between earthquakes of a specific magnitude.

Remediation: Activities resulting in the cleanup or encapsulation of a hazardous material spill.

Right-lateral fault movement: Generally horizontal movement in which the block across from the observer has moved to the right.

Seiche: Earthquake induced waves in lakes or ponds.

Seismic: Pertaining to an earthquake or earth vibrations.

Seismograms: An instrument that writes a permanent continuous record of earth vibrations.

Slip: The relative displacement of formerly adjacent points on opposite sides of a fault.

Source reduction: Activities at the source of the generation of a solid or hazardous waste resulting in a decrease in the amount of waste generated.

Strain: The change in the shape or volume of a body as a result of stress.

Strike: The direction or trend taken by a fault surface.

Strike-slip: In a fault, the component of movement or slip that is parallel to the strike of the fault.

Structural province: A region whose geologic structure differs significantly from that of adjacent regions.

Structure: The general disposition, attitude, arrangement, or relative positions of the rock masses of a region or area.

Tectonic: Pertaining to rock structure resulting from deformation of the earth's crust.

Threshold limit: Concentration of a substance which results in an adverse exposure to an individual.

Threshold quantity: See threshold limit.

Thrust: An overriding movement of one crustal unit over another.

Tsunami: Sea wave generated by a submarine earthquake, landslide, or volcanic action.

Unconsolidated material: Sediment that is loosely arranged or unstratified, and whose particles are not cemented together.

Water table: The surface below which sediments are saturated and above which they are unsaturated. The surface represents the location where pressure is equal to atmospheric pressure.

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