Appendix
Section A

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Appendix
Section A

APPENDIX 1A
DEFINITIONS OF SELECTED LAND USE TERMS

Assumption: A statement of assumed present or future conditions describing the physical, social, or economic setting within which the comprehensive plan is to be used (Anderson 1995).

Build-out: Condition that exists when all of the available vacant land is consumed by development.

Data: Information concerning past or present conditions within or affecting the planning area (Anderson 1995).

Density bonus: A developer is commonly allowed additional residential units within a project beyond the maximum for which the parcel is otherwise permitted. Usually, a density bonus is permitted in exchange for the provision or preservation of affordable housing units at the same site or at another location.

Development: Substantial property improvement and usually, a change of land use character within site; the act of using land for building, extractive or agricultural purposes.

Extraterritorial zoning (ETZ): New Mexico state law authorizes city and county governments to set up a joint powers agreement to consider subdivision (3 mile radius of the city) and zoning regulations (2 mile radius) concurrently.

Goal: A statement that describes, usually in general terms, a desired future condition (Anderson 1995).

Infrastructure Capital Improvements Program (ICIP): A method of planning new and improved physical facilities: streets, public utilities, flood control, municipal buildings, and other structures. It also provides for budgeting and scheduling of these improvements.

Implementation: The specific programs and stated courses of action used to achieve the desired outcome of the future land use plan.

Infill: Directing new development to built-up areas, and filling vacant lots. Used to direct growth to existing infrastructure and encourage compact development.

Land use: Classification of a particular development activity taking place on a parcel of land (ex. commercial, residential, agriculture)

Land use demand: The amount of land that is needed to meet projected future development needs over the next 20 years.

Land use supply: The amount of land available for future development over the next 20 years.

Objective: A statement that describes a specific future condition to be attained within a state period of time (Anderson 1995).

Parcel: A piece of usable property, a tract or plot of land, or adjoining group of tracts in single ownership. A parcel is usually considered a unit for the purpose of development.

Policy alternative: A course of action or rule of conduct to be used to achieve the

goals and objectives of the plan (Anderson 1995).

Scenario: A hypothetical understanding of future land use based on a set of chosen policy alternatives.

Tax abatement: Programs that reduce or waive property taxes, usually to encourage economic development within a certain area. This incentive-based policy is also used on agricultural lands to encourage the continuation of farming operations.

APPENDIX 1B
POPULATION PROJECTIONS

To determine the future population for the City of Carlsbad two projection methods were used. The first method used historical Census data between 1910 and 2000 to create a series of regression models. The outputs from these models were then compared to determine the most realistic projection for the City of Carlsbad. The outputs from the selected regression model serves as the long-range population projection, since it takes into account historical population trends. **See Table 1.2**

The second projection method used the linear trend model to create the short-term population projection, see **Table 1.3**. Only U.S. Census data from 1980 to 2000 was used for this method in order to reflect more recent growth patterns.

LINEAR TREND MODEL (1980 - 2000)
Source: U.S. Census

$Pt = Po(1+rt)$
$r=((P2000/P1980) - 1) / 20$
$r = 0.00025298$
$P2010 = 25,690$
$P2020 = 25,755$
$P2030 = 25,820$

P_o = current population
P_t = future population
r = growth rate
t = time

Year	Pop
1910	1736
1920	2205
1930	3708
1940	7116
1950	17975
1960	25541
1970	21297
1980	25496
1990	25320
2000	25625
2010	25690
2020	25755
2030	25820

Table A.1 Linear Regression Model

REGRESSION MODEL (1910-2000)
Source: U.S. Census

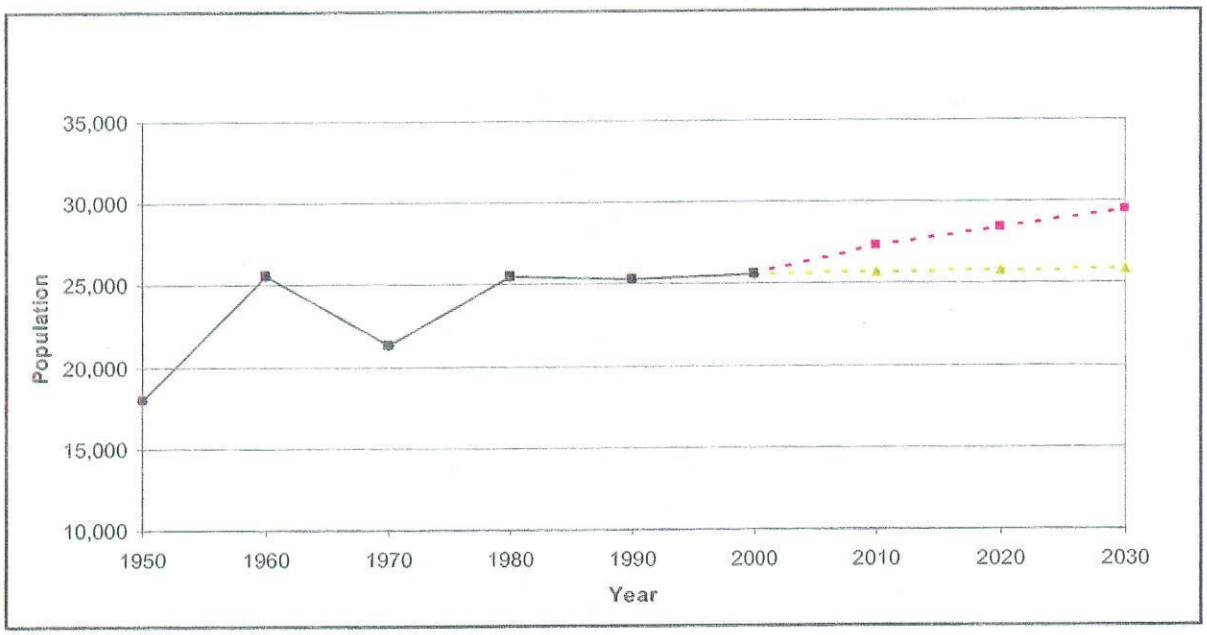
X (Year)	Y (Population)	$y=B_o+B_1+\ln(x)$
1910	1736	-4262.595298
1920	2205	4853.296394
1930	3708	10185.75119
1940	7116	13969.18809
1950	17975	16903.84973
1960	25541	19301.64289
1970	21297	21328.94811
1980	25496	23085.07978
1990	25320	24634.09769
2000	25625	26019.74142
2010		27273.20865
2020		28417.53458
2030		29470.21239

Table A.2 Regression Model

Appendix
Section A

Table A.4 Carlsbad High and Low Population Projections

	2010	2020	2030
Low	25,690	25,755	25,820
High	27,273	28,418	29,470



APPENDIX 1C
SCENARIO DEVELOPMENT

This appendix describes the technical analysis used to create the future land use scenarios. The methodology used for computing future land use came from a combination of recent sources from the planning literature and professional practice (Kaiser, et. al 1995; Landis 1995; Withers 2001).

The first step was to compute residential and commercial demand through an analysis of recent building permit data. Next an analysis was completed to determine the supply of land available for development within the next twenty years. The final step consisted of allocating projected land use demand to prioritized supply areas.

Computing Residential Demand

Demand for future residential land use was determined through an analysis of recent building permit data. A regression analysis was first completed to predict the future number of single family and manufactured/mobile home dwelling units in the year 2020. The results illustrated the trend toward an increase in the number of manufactured/mobile homes and a decline in the number of single-family dwelling units. Results from this analysis were not used to predict future residential demand due to the limited amount of building permit data available (1996-2000). The limited number of observations led to statistically insignificant results.

In the second residential demand analysis no distinction was made between the various types of residential dwelling units. Despite the coarse level of analysis, outputs were not highly skewed since the majority of new housing units are manufactured and mobile home units followed by single family, detached units. Multifamily style housing units are very rarely built (the last apartment complex was constructed in the early 1990's). Also the State of New Mexico does not allow local governments to exclude mobile homes and manufactured housing in their zoning regulations, hence there is little difference in residential densities and site characteristics.

For this analysis the available building permit data was averaged to determine the annual increase for the number of residential dwelling units, see Table A.5.

Table A.5 Average Annual Increase of New Residences in Carlsbad (1996-2000)

YEAR	TOTAL # NEW RESIDENCES
1996	69
1997	73
1998	113
1999	112
2000	50
AVG	83.4

Appendix
Section A

	Annual Increase*	2000-2020 Increase*
New Residences	83	1,660

Minimum Residential Density Assumption:
1 unit / .75 acres

Based upon minimum lot size due to septic constraints set by New Mexico Department of Environmental Quality.

Total Residential Land Needed:
1,245 acres

Total Residential Land Needed = Total Residential Demand $_{2020}$ * Residential Density Assumption

*Measured in dwelling units

Table A.6 Residential Demand Assumptions

Next the total amount of land needed through 2020 was calculated based on an assumed minimum residential density (see Table A.).

Residential Supply

The amount of land available for residential supply was determined using a GIS analysis of characteristics favorable for the location of residential land. GIS data was previously assembled and made available through Planning Technologies (2001). Two different sets of assumptions were used to develop each scenario according to a specific set of policy alternatives.

The Trend Scenario considered four major factors to help prioritize the supply of residential land. These factors included:

- Quality of existing residential development
- Proximity to major rural highways
- Land use regulations restricting the location of development in the floodway
- Land use regulations restricting the location of development near wells servicing the City of Carlsbad

Each factor received a score of 0 or 1 based on whether or not they exhibited these characteristics. Factors were then summed for each parcel of vacant land within the study area. Parcels with the highest scores were allocated development first until all of the supply was filled.

Zoning was not considered a limiting land use regulation since it was determined that it was not a significant obstacle to the location of residential development according to local realtors.

There are several limitations to the model developed. The Trend Scenario had an abundance of residential land supply in the high priority category. The abundance of land available for development for residential development can be attributed to the large number of factors not considered in this analysis that go into the determination of where future land use will locate. Many of these factors are difficult to capture quantitatively. For example, it is difficult to determine which large landowners are most likely to sell their land for subdivision purposes. Residential land use is also limited by few factors as subdividers only need access to existing roads, but not necessarily access to City water and sewer services since, they can subdivide by lots that are .75 acres or larger and use individual wells and septic tanks.

Since supply greatly outmatched demand even in the high priority land supply category, other factors were required to help assign projected future residential development. For the Trend Scenario these factors considered parcels that were less than one acre as being the next available lands for residential development.

The Infill/Redevelopment Scenario considered a number of other factors to help prioritize where residential development would locate in the future. These factors included:

- Quality of existing residential development
- Proximity to major rural highways
- Land use regulations restricting the location of development in the floodway
- Land use regulations restricting the location of development near wells servicing the City of Carlsbad
- Land use regulations restricting the location of development in the flood zone
- Location within existing sewer service area
- Location within existing water service area
- Parcels less than one acre
- Proximity to existing development

In this scenario land use supply again greatly outnumbered projected land use demand. Therefore other factors were used to allocate land in accordance with policy alternatives of the Infill/Redevelopment Scenario. These factors included proximity to the urban core to promote more compact development. Parcels located on the West side of the river also received higher priority since a build up on the other side of the river and railroad tracks would require another bridge be built, which has not been considered according to the most recent ICIP (2001)

Commercial Demand

A similar process was used to determine future commercial land use demand as was described previously (see residential demand description). A regression analysis was initially completed with building permit data, but it too was limited by the number of observations. **Table 1.7** shows the number of commercial building permits in Carlsbad between 1996 and 2000.

Table A.7 Carlsbad Commercial Building Permits (1996-2000)

YEAR	# COMM BLDG PERMITS
1996	6
1997	12
1998	16
1999	5
2000	5

Commercial Supply

Like the residential land supply model, the commercial land supply model consisted of a geographic systems analysis to determine which areas of the community are most favorable for commercial development. For the Trend Scenario the following six factors were considered when determining which lands would develop first:

- Location within existing sewer service boundary
- Location within existing water service boundary
- Proximity to major rural highways
- Parcels greater than one acre
- Land use regulations restricting the location of development in the floodway
- Land use regulations restricting the location of development near wells servicing the City of Carlsbad

The following eight factors were used to prioritize land use supply for the Infill/Redevelopment Scenario:

- Location within existing sewer service boundary
- Location within existing water service boundary
- Proximity to major rural highways

- Parcels greater than one acre
- Land use regulations restricting the location of development in the floodway
- Land use regulations restricting the location of development near wells servicing the City of Carlsbad
- Proximity to existing development
- Land use regulations restricting the location of development within the flood zone.

The same problem was encountered in the commercial supply model as the residential supply model in that there is an abundance of commercial land. In the case of the Trend Scenario, development priority was given to parcels along major rural highways. In the case of the Infill/Redevelopment Scenario, preference for commercial development sites was given to vacant land within the urban core on the West side of the river.

As the table shows, there is only a small amount of new commercial development in Carlsbad each year. For this reason the commercial demand analysis does not distinguish between the various types of commercial development and includes other employment based land uses such as office, wholesale warehouses (building value over $50,000), and industry.

The next step was to compute the total amount of commercial land required through 2020 by determining a minimum density assumption., see Table A.8 for more details.

	Annual Increase	2000-2020 Increase
Commercial Demand	8	160

Assumptions:

Average commercial building cost:	$630,000
Average cost per sq.ft.:	$65
Average building size:	9,692
Average FAR:	0.15

Average commercial building cost was computed by averaging building costs between 96-00.
Average cost per sq.ft. was estimated by CB Realty (Alburqurque, NM)
Average building size = Average commercial building cost/Average cost per sq.ft.
Average FAR was estimated from ULI 2000.

Minimum Commercial Density Assumption:
1 unit / 1.5 acres

$$\frac{0.15}{1} = \frac{9692}{x} \qquad x = 64{,}613 \text{sq.ft.}$$

$$\frac{64{,}613 \text{sq.ft.}}{43536 \text{ acres}} \qquad 1.5 \text{ acres}$$

Total Commercial Land Needed:
240 acres

Table A.8 Commercial Demand Assumptions

Appendix
Section A

APPENDIX 2A
HIGHWAY CAPACITY MANUAL

This section documents the Highway Capacity Manual evaluation process. Listed below find ideal conditions and level of service parameters for rural two-lane highways, multi-lane rural highways and level of service parameters for urban arterial roads found in the Highway Capacity Manual. The only traffic data available for Carlsbad were traffic counts for state highways. These included US 62/180 and US 285 in the City of Carlsbad. Levels of analysis required under the HCM are the most appropriate for evaluating the need for road expansion or improvements. Listed here are the parameters for which data must be collected to perform an HCM level of service analysis.

Rural Two-Lane Highways

Ideal Conditions:

- Design speed >60 mph.
- Lane widths >12 ft.
- Clear shoulder >6ft.
- No "no passing zones"
- 50/50 directional split
- All passenger cars in traffic stream.
- No impediments due to through traffic or turning vehicles.
- Level terrain

Level of Service Parameters:

- Average travel speed – average travel speed across the whole stretch of roadway.
- Percent time delay – average time spent without being able to pass
- Capacity utilization – ratio of demand to capacity.

Multi-Lane Rural Highways

Ideal Conditions:

- Level-terrain
- Lane-widths >12 ft.
- No direct access points.
- A divided highway
- All passenger cars in traffic stream.
- Free-flow speed >60 mph.

Level of Service Parameters:

- Maximum density
- Average speed
- Maximum service flow rate – passenger cars per hour per lane.

Urban Arterials*

Level of Service Parameters:

- Arterial environment – refers to geometric characteristics of facilities and adjacent land uses
- Interaction among vehicles – determined by traffic density, truck traffic, and turning movements.
- Traffic signals – stopped delay and speed changes as a result of traffic signal operation.

*Ideal conditions for urban arterials were not provided in the Highway Capacity Manual. Only methodologies that incorporate measurable characteristics of LOS parameters were included.

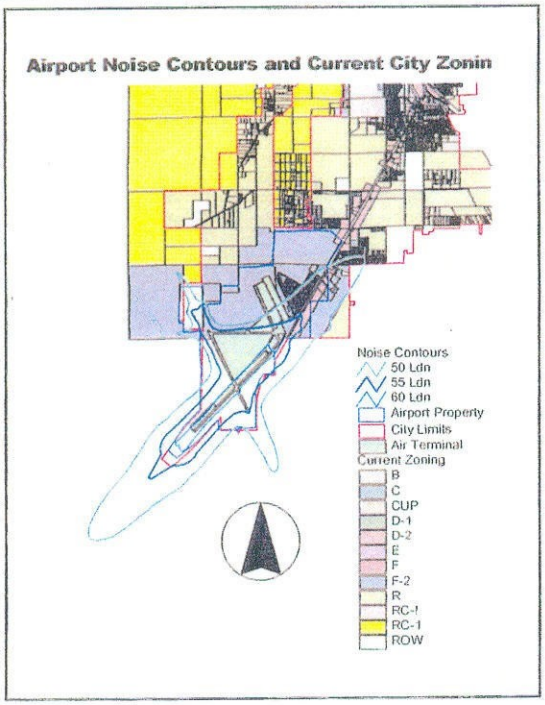
APPENDIX 2B
AIRPORT OVERLAY

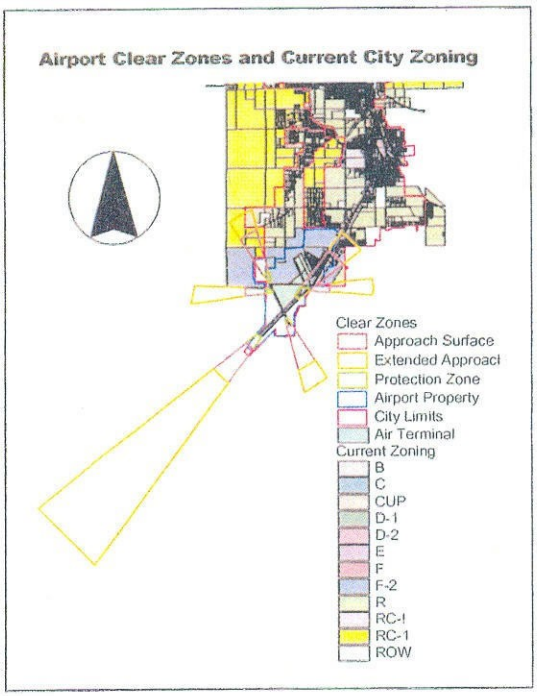
The following description reports the development of the airport overlay. The overlays illustrated in **Maps A.1 and A.2** include noise contours, airport property, aircraft clear zones, and current zoning for the City of Carlsbad.

The following maps had to be geo-rectified on to real world coordinates before coverages could be overlaid on Carlsbad's current zoning maps:

- 50Ldn contour map
- 55Ldn contour map
- 60Ldn contour map

Appendix
Section A





airport property. Clear zones are regulated through FAR Part 77. This section of the FAR states that objects that exceed 500 ft. at the site of the object are considered an obstruction to air travel. Further regulations on object heights can be found within this section of the FAR and should be consulted before any development is approved in the outlined areas.

Although the overlay is essentially a land-use analysis of surrounding land uses, it provides a visual tool for directing efforts for protecting airport operations. Airport officials can also make use of the analysis in the application of FAA regulations.

Appendix
Section A

Appendix 3A
The Needs Assessment Methodology

A needs assessment was conducted in order to determine the existing conditions of Carlsbad's community services and assess what needs or improvements the city needed in terms of level of service. There are two main activities in conducting a needs assessment identified by O'Day and Neumann in "Assessing Infrastructure Needs: The State of the Art." These are: one, an inventory and conditions assessment of existing facilities considering current usage and estimates of future usage; and two, identification of the desired level of maintenance and improvement.

The existing conditions assessment was completed by conducting interviews of managers of each facility. Questions asked were based on the level of service each facility provides currently and any needs that could be foreseeable. Service levels were determined for each service based on unit per capita indicators. Each of the tables in the Existing Conditions subsections shows the indicators for level of service. The tables also show Carlsbad in comparison to like cities in New Mexico. This comparison was done to determine if Carlsbad is delivering a sufficient amount of service for the community. The cities were chosen based on similarities to Carlsbad in terms of population, the type of economy, distance from a metropolitan area, and location. Table A.9 shows each of these factors for each city chosen. The population of similar cities was 15,000 and 35,000. Artesia has a population of 10,692, but was chosen because it is in Eddy County, where Carlsbad is located. Carlsbad is located in southeastern New Mexico, so the location of the cities chosen was central or southern New Mexico. The last criteria for choosing cities was their distance from a Carlsbad is 25,625 and the range chosen to select metropolitan area. Carlsbad is an isolated city, over 150 miles from the metropolitan area of El Paso, TX. All of the cities chosen are over 50 miles away from a metropolitan area.

The city comparison was also used to determine the desired level of service Carlsbad should be providing its citizens. However, O'Day and Neumann say that service levels should not be determined by simply bringing them up to standard levels without taking into consideration the values of the community. Several sources were used for input from the community. These include an economic survey conducted two years ago, interviews with stakeholders over the phone and during a site visit, and a survey conducted in 2000 by the non-profit organization Carlsbad Community Vision and funded by Ford Foundation's Rural Community College Initiative.

Appendix 3B
Sources of Community Input

First, Tripp, Umbach & Associates, Inc conducted an economic survey for Eddy County in 1999. Although the survey was conducted at the county level, the results can be interpreted for the city of Carlsbad because the majority of the residents of the county live in Carlsbad, and in addition the city

City	2000 Population	Distance from Carlsbad (miles)	Nearest Metro Area	Distance from nearest Metro Area (miles)	Major Economy
Carlsbad, NM	25,625	-	El Paso, TX	166	Extraction (potash), Agriculture
Artesia, NM	10,692	36	El Paso, TX	202	Extraction (oil, gas)
Clovis, NM	32,667	186	Lubock, TX	103	Agriculture
Deming, NM	14,116	266	Las Cruces, NM	60	Extraction (copper)
Gallup, NM	20,209	412	Albuquerque, NM	140	Extraction (molybendum)
Hobbs, NM	28,657	70	El Paso, TX	235	Extraction (oil, gas)
Las Vegas, NM	14,565	255	Santa Fe, NM	69	Agriculture

Table A.8 Characteristics of the Study Cities

is the county seat. Several of the questions related to recreational services and one question related to feelings of safety in the community. The scale of the available responses was not at all serious, somewhat serious, serious, very serious, extremely serious, and don't know.

The recreation related questions asked how serious a problem respondents felt to a shortage of recreational facilities for adults and to a shortage of recreational facilities for children. Nearly 50% of those surveyed responded that a shortage of recreation facilities for adults was not at all serious or somewhat serious. Twenty-two percent of those survey responded that a shortage of recreational facilities for children was extremely serious and 21% responded that it is not at all serious. In addition, almost 8% responded that they did not know how serious the problem was. It should be noted that the median age of those surveyed was 53. This brings into question the validity of this question relating to knowing how serious a problem a shortage of recreational facilities for children is. Another question related to recreation asked respondents whether they strongly disagreed, disagreed, agreed, strongly agreed, or didn't know if there was nothing to do in the community. Forty-eight percent strongly disagreed and disagreed that there is nothing to do in the community.

When asked if they felt their community was safe, 51% of respondents agreed that their community was safe. However, the next largest group of respondents was 32% who disagreed that their community was safe.

A second source of community input is from a visioning process completed by the non-profit organization Carlsbad Community Vision. In this process, citizens were asked to develop visions for Carlsbad based on community development, economic development, education, health, infrastructure and image, and services to citizens. This list of visions was further broken down into subtopics. The participants were then asked to vote for their top choices.

Of the voting results, the visions are broken down into the combined top 20 list of visions, and are also ranked according to their subtopic. Of the top combined top 20 visions, improving playgrounds received 14.7% of the votes, the most votes of all the visions. Also related to community services in the top 20 is construct/improve sports facility, with 4.3% of the top 20 votes.

In addition to these surveys, several interviews with key stakeholders were held during a site visit to Carlsbad. These interviews were conducted to find out more information about the community services and the issues surrounding them. Their statements are included in the existing conditions summaries.

Appendix
Section A

APPENDIX D
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Appendix
Section A

APPENDIX E
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