CITY OF COLTON

CIRCULATION ELEMENT

PREPARED FOR

THE CITY OF COLTON

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PREPARED BY

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INTRODUCTION TO THE CIRCULATION ELEMENT

Reliance on the private automobile, not only for commuting to work but for shopping, educational and social activities, is a necessity for a vast majority of Southern California residents. The unmatched freedom provided by the automobile and its associated system of freeways and arterial streets provides the expectation that timely and convenient access can be made of the far ranging assets of Southern California.

The analyses conducted as part of the City of Colton General Plan Update Study, together with regional studies being made within the San Bernardino County Area, clearly show that maintaining an adequate Level of Service on the transportation system is under extreme pressure and, therefore, the challenge of maintaining these expectations is very formidable. The fact that the population within the City of Colton General Plan Study Area is expected to grow from approximately 40,000 in 1992 to more than 80,000 by the Year 2010 clearly illustrates the transportation challenge to the City.

PURPOSE OF ELEMENT

The purpose of the Circulation Plan is to provide for a safe, convenient and efficient circulation system for the City. In order to meet this objective, the Circulation Element has been designed to accommodate the anticipated transportation needs based on the estimated intensities of various land uses within the region. This element describes the extent of physical improvements needed to accommodate anticipated population growth and also introduces other techniques (e.g., restricted street parking, transportation systems management plans and congestion management plans) which can be used to improve and maintain an acceptable Level of Service for the City's circulation system.

The element is also intended to serve as a basic plan for other infrastructure systems such as sewer lines. As the State's General Plan Guidelines indicate, the Circulation Element is actually an infrastructure plan which "concerns itself with the circulation of people, goods, energy, water, sewage, storm drainage and communications.

RELATED PLANS AND PROGRAMS

The City of Colton is directly impacted by urban development and growth in the area surrounding the City. The City of San Bernardino, which adjoins the northerly and easterly boundaries of Colton, is a rapidly growing industrial and residential community of over 170,000 people. Significant traffic volumes from San Bernardino and other cities outside the City of Colton will utilize both the north/south and east/west arterials, as well as Interstate 215 and Interstate 10.

The Cities of Loma Linda and Grand Terrace, which border Colton to the east and to the south, respectively, are growing communities as well and also significantly impact the Colton roadway system.

The City of Rialto is a very rapidly growing community of greater than 70,000 people to the west of Colton and is primarily residential in nature. Rialto and unincorporated San Bernardino County territory westerly of Colton impact the Colton roadway system to a significant degree as well.

On the southern boundary of the City of Colton, The City of Riverside, which has a population of over 200,000 people and unincorporated Riverside County territory has a very heavy impact on the City of Colton roadway system, primarily Interstate 215.

In addition to these rapidly growing urban areas immediately adjacent to the City of Colton, the City's two main backbone transportation components, I-10 and I-215, are heavily impacted by traffic originating outside the Colton area and driving through the area.

State Programs

The California Department of Transportation (Caltrans) is currently planing for the construction of high-occupancy vehicle (HOV) lanes on I-215 from the Riverside County line to proposed Route 30 north of the Colton city limits.

The HOV construction will be funded under Measure "I", a county program utilizing federal, state, and local revenue sources. Plans to construct HOV lanes on I-10 from I-15 to Route 30 are conceptual at this point and are not currently funded.

Preliminary plans are being made to improve both the Pepper Avenue at I-10 and Washington Street at I-215 Interchanges to provide more capacity.

County Programs

As the present time, the County's Measure "I" Program, which is administered by San Bernardino Associated Governments (SANBAG), is having a direct positive impact on the City circulation system by funding (on an equal basis with federal, state, and local revenue sources), the construction of HOV lanes on I-215 and potentially the construction of HOV lanes on I-10 within a Year 2010 time frame.

Bus Service

OMNITRANS provides bus service within Colton and throughout San Bernardino County. Although bus route and transit stop planning generally responds to identified transit needs, the City can work with OMNITRANS to include public transportation consideration in land use planning decisions.

South Coast Air Quality Management District

The South Coast Air Quality Management District (SCAQMD), the agency responsible for monitoring air quality in the south coast region, has adopted Regulation XV as part of its "Rules and Regulations." Intended to reduce pollutant emissions from vehicles commuting between home and the workplace, Regulation XV also serves to reduce vehicle trips and thereby may be considered a circulation program.

Regulation XV requires employers of 100 or more persons to prepare and implement trip reduction plans. Fines for non-compliance may be levied against employers.

In addition to Regulation XV, vehicle-miles traveled (VMT) reduction measures beginning in 1993 will be imposed on all local agencies within the South Coast Air Quality basin. These VMT reduction measures will mandate all local agencies to implement vehicle work trip reduction monitoring programs by the end of 1993. By the end of 1994, all local agencies must quantify that a 6% work vehicle trip reduction has been accomplished within the respective agency. Non-compliance with the VMT reduction measure will result in the loss of the respective agency's share of gas tax revenue.

Proposition 111

Approval of Proposition 111 by California voters in June 1990 made effective Assembly Bill No. 1791. This law will have a direct impact on the City of Colton in several ways which are enumerated within the bill. In general, the bill requires that in cooperation with the regional transportation agency, which in this case would be SANBAG, a Congestion Management Program (CMP) be developed, adopted and annually updated in order to ensure that the City of Colton does not lose its pro rata share of increased funding resulting from the gas tax increase of Proposition 111.

All member agencies of SANBAG, providing the agency is eligible for Proposition 111 funds, receives Proposition 111 funding to maintain designated facilities which are part of the agency's CMP. The facilities within the City of Colton selected to receive Proposition 111 funding as part of the City's CMP are as follows:

- Reche Canyon Road - south City limits to Washington Street (Barton Road)
- Mt. Vernon Avenue - Washington Street to north City limits
- La Cadena Drive - south City limits to Rancho Avenue
- Rancho Avenue - La Cadena Drive to north City limits
- Pepper Avenue - I-10 Fwy. to Randall Avenue
- Agua Mansa Road - south City limits to La Cadena Drive
- Barton Road - La Cadena Drive to Washington Street (portions)
- Washington Street - Mt. Vernon Avenue to Waterman Avenue
- Colton Avenue - Mt. Vernon Avenue to north City limits
- Mill Street - Rancho Avenue to Bordwell Avenue

Route 30, a proposed freeway which will have three travel lanes and one HOV lane in each direction, is a project funded by Proposition 111 and is expected to have an impact on the Colton circulation system. The proposed Route 30 will parallel I-10 in an east/west direction approximately three miles north of the Colton city limits and is scheduled for completion by Year 2000.

City Programs

At the present time, the City of Colton has an ordinance which requires land developers to pay into a fund for street improvement and traffic signal construction.

SCOPE AND FORMAT OF ELEMENT

This element is composed of four sections. The first section, the Introduction, includes a description of the Element's purpose and related plans and programs. The second section, which follows, contains the City's goals and policy statements for improving circulation in and around Colton. The third section is the Circulation Plan, which identifies standards for existing and future intersections and roadways, indicates where road and intersection upgrades are necessary, and defines the City's service level objectives to be achieved by the circulation system. Also included in the Circulation Plan is a discussion of alternate modes of transportation, the Bicycle Circulation Element and other infrastructure needs. The fourth section of the Circulation Element contains the implementation program which contains specific implementing measures to realize the Element's goals and policies.

The relationship of the Circulation Element to other elements of the General Plan is described in the Introduction to the General Plan.

CIRCULATION ELEMENT GOALS AND POLICIES

The City's primary circulation goal is to provide a circulation system that has adequate capacity to meet the demands of future development. Future development is defined to be that development occurring which is consistent with adopted land use policy.

For purposes of estimating traffic volumes for the Year 2010, land development projects such as tentative tracts, parcel maps, development plans, specific plans, etc. were reviewed and added to the traffic model's existing land use database to yield a Year 2010 land use database. This data in-turn was used to allocate the Year 2010 SCAG RIV-SAN socioeconomic data (SED) to the traffic model analysis zones. The current proposed (approved or not approved) projects within the Colton city limits will result in the addition of development which is listed as follows:

- 1,151 single family dwelling units
- 203 multi-family dwelling units
- 465,000 square feet of commercial/retail
- 120,000 square feet of professional offices
- 177,500 square feet of industrial
- 888,000 square feet of hospital
- 158,000 square feet of storage facilities

SAFE CONVENIENT AND EFFICIENT TRANSPORTATION SYSTEM

The City desires the development of a freeway and arterial system intended to provide for transportation needs generated by future development within the study area, and also to accommodate anticipated growth in the areas surrounding the Colton study area.

GOAL 1: Develop a transportation system that is safe, convenient, efficient and provides adequate capacity to meet local and regional demands.

Policy 1.1: Develop a circulation system of City streets, excluding freeway, that is capable of serving existing traffic and expected future increases in traffic.

Policy 1.2: Follow standards for circulation element roadways in designing and constructing future street improvements.

Policy 1.3: Include transportation system management techniques, such as park-and-ride lots, traffic signal synchronization, carpool/vanpool programs, flexible work hours and the creation of Transportation management Associations as requirements of development by major employers.

Policy 1.4: Take a leadership role in the preparation of a regional traffic mitigation program designed to resolve regional traffic issues.

Policy 1.5: Logically relate local street patterns to the overall network of arterial and collector streets as provided for in the Circulation Network. Driveway entrances onto surrounding arterial, secondary and major streets should be restricted when practical, and through traffic on interior residential streets should be minimized.

Policy 1.6: Establish a signalized arterial street system that will provide an acceptable Level of Service during peak hours under build-out conditions.

Policy 1.7: Develop a program for general mitigation fees for roads and traffic signals.

Policy 1.8: Require major employers to prepare Transportation Management Plans with provisions for carpooling and vanpooling, flexible work hours or other techniques.

ALTERNATE TRANSPORTATION MODES

Alternate modes of transportation, such as public transportation and bicycles are used by those who do not have access to automobiles and by those who choose to leave their cars at home. OMNITRANS provides bus service within Colton and throughout San Bernardino County. Rail transportation will also provide an alternate means of travel in the near future. Bicycle facilities, which will be installed in conjunction with circulation system improvements and separate trails for pedestrians, cyclists and equestrians, can reduce dependency on private automobiles.

GOAL 2: Encourage the use of alternate transportation modes.

Policy 2.1: Continue to cooperate with OMNITRANS for the provision of public bus service in the planning area.

Policy 2.2: Establish bus shelters at OMNITRANS stops to increase public recognition and use of the local and regional transit system.

Policy 2.3: Cooperate with Caltrans and the County of San Bernardino in providing sites and improvements for park-and-ride facilities.

Policy 2.4: Take a leadership role in regional planning efforts to provide community rail service throughout the planning area, while protecting railroad right-of-way.

Policy 2.5: Provide a system of bicycle facilities (paths, lanes and routes) in conjunction with circulation system roadway improvements.

Policy 2.6: Develop a system of pedestrian/equestrian/bicycle trails within the planning area, to meet the community needs.

SEPARATION OF TRAFFIC

Separating heavier non-residential traffic, particularly truck traffic, from residential areas preserves neighborhood character and safety. Higher capacity roadways are intended to accommodate this heavier traffic to reduce or avoid impacts on residential areas.

GOAL 3: Separate vehicular traffic associated with commercial, manufacturing and agricultural uses from residential neighborhoods.

Policy 3.1: Provide a circulation system for commercial and manufacturing areas to avoid traffic overflow into adjacent residential areas.

Policy 3.2: Provide safe and convenient pedestrian access between residential neighborhoods and the parks and open space and schools which serve those neighborhoods.

Policy 3.3: Establish a system of truck routes which reduces truck traffic on residential streets.

Policy 3.4: Design residential street systems to reduce through traffic.

Policy 3.5: Design local streets so as not to create "short-cuts" by linking arterial roads.

PARKING

Adequate and convenient parking is an essential part of an effective circulation system. The provision of suitable off-street parking can increase the overall efficiency of the circulation system by promoting freer and safer movement of traffic along roadways.

GOAL 4: Ensure the provision of adequate off-street parking for all land uses.

Policy 4.1: Require all new development to provide adequate off-street parking based on expected parking needs.

Policy 4.2: Provide adequate loading areas within off-street parking areas for all commercial and manufacturing land uses.

THE CIRCULATION PLAN

The implementation of General Plan land use policy will result in approximately a 100% increase of the current population and a proportionate increase in traffic volumes by Year 2010. A traffic model[1] has been developed that is used by the City to determine what improvements to the circulation system are needed to achieve the service level objectives anticipated below.

The traffic model enables land use and circulation alternatives to be examined in conjunction with one another to determine where future system deficiencies will occur. To develop a circulation plan that will accommodate future growth consistent with land use policy and will preserve service level objectives, many system components such as road widenings and extensions were tested. The analysis resulted in the development of the Circulation Plan.

The Circulation Plan consists of four main components: the Roadway Component, the Public Transportation Component, the Bicycle Component and the Infrastructure Component. Each component consists of the following sections:

Roadway Component

- Functional Roadway Classification System
- Roadway Cross Sections
- Freeways and Expressways
- Primary Arterials
- Secondary Arterials
- Collector Streets
- Local Streets
- Freeway Interchanges
- Freeway Crossings
- Service Levels
- Special Intersection Geometrics
- HOV Facilities
- Truck Routes
- Pedestrian Circulation

Public Transportation Component

- Rail Line/Stations
- Bus Service

Bicycle Component

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1. A description of the traffic model and other relative technical information pertaining to the updating of the Circulation Element is contained in Appendices "A" through "G" in the Technical Appendices section of this document.

- Regional Trails
- City Bicycle Routes

Infrastructure Component

- Water System
- Sewage System
- Storm Drain

ROADWAY COMPONENT

Functional Roadway Classification System

Streets and highways shown on the Circulation Roadway Plan are described and classified according to their primary function. This hierarchical system of roadways consists of five basic classifications as follows:

- Freeways and Expressways
- Primary arterials
- Secondary arterials
- Collector streets
- Local streets

Figure 1 titled "Functional Roadway Classifications and General Planning Guidelines" provides considerable detail concerning the functions for each of these street systems together with an overview of general planning criteria for each of the street categories.

The Circulation Plan is shown on Figures 2a and 2b.

Roadway Cross Sections

The facilities designated as arterials and collectors on Figures 2a and 2b have also been classified in terms of typical cross sections in addition to function. The cross section designations for the arterials and collectors are shown on figures 2c and 2d. The street section designations represent the following typical cross sections:

1) Six-lane roadway with single lane painted median
1a) Six-lane roadway with double lane raised median or painted median
2) Four-lane roadway with single lane raised median or painted median
2a) Four-lane roadway with double lane raised median or painted median
3) Four-lane roadway without median or two-lane roadway with single lane painted median
4) Four-lane roadway without median (industrial section)

The lane specifications and dimensions of the six standard cross sections are shown on Figure 2e. These standard sections should be followed as streets in the City of Colton are constructed or improved.

	Freeway and Expressway	Primary Arterial	Secondary Arterial	Collector	Local
Function	Traffic movement	Primary—longer-distance intercommunity and intra-metro area high-capacity traffic movement Secondary—land access	Primary—moderate distance intercommunity, intra-metro area traffic movement Secondary—land access	Primary—collect/distribute traffic between local streets and arterial system Secondary—land access Tertiary—inter-neighborhood traffic movement	Land access
Typical percent of surface street system mileage	NA	5 to 10%	10 to 20%	5 to 10%	60 to 80%
Continuity	Continuous	Continuous	Continuous	Not necessarily continuous; should not extend across arterials	None
Approximate spacing (miles)[1, 2]	4	1 to 2	½ to 1	½ or less	As needed
Typical portion of surface street system vehicle-miles carried	NA	40 to 65%	25 to 40%	5 to 10%	10 to 30%
Direct land access	None	Limited—major generators only	Restricted—some movements may be prohibited; number and spacing of driveways controlled	Safety controls; limited regulation	Safety controls only
Minimum roadway intersection spacing	1 mile	¼ mile	⅛ mile	300 feet	300 feet
Speed limit (mph)	45 to 55	35 to 45 in fully developed areas	30 to 35	25 to 35	20 to 30
Parking	Prohibited	Prohibited	Generally prohibited	Limited	Permitted
Comments	Supplements capacity of arterial street system and provides high-speed mobility	Backbone of street system		Through traffic should be discouraged	Through traffic should be discouraged

[1] Spacing determination should also include consideration of travel projections in the area or corridor based on ultimate anticipated development.

[2] Spacing will likely be greater in dense activity centers such as downtowns. Transit availability may also influence facility density and capacity by facility.

NA = Not applicable.

SOURCE: "Planning Urban Arterial & Freeway Systems," Institute of Transportation Engineers, 1988

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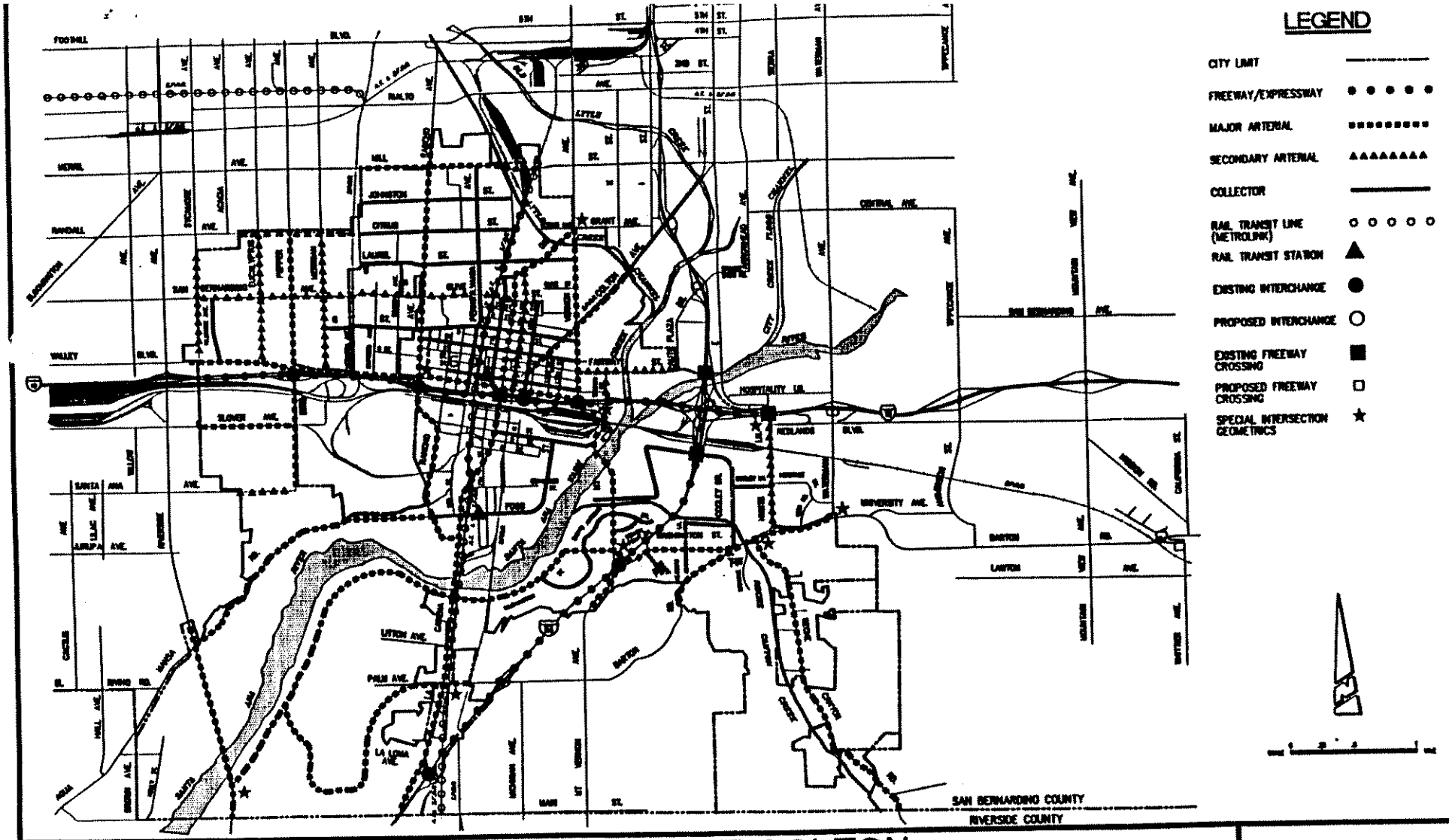
FUNCTIONAL ROADWAY CLASSIFICATIONS AND GENERAL PLANNING GUIDELINES

FIGURE 1



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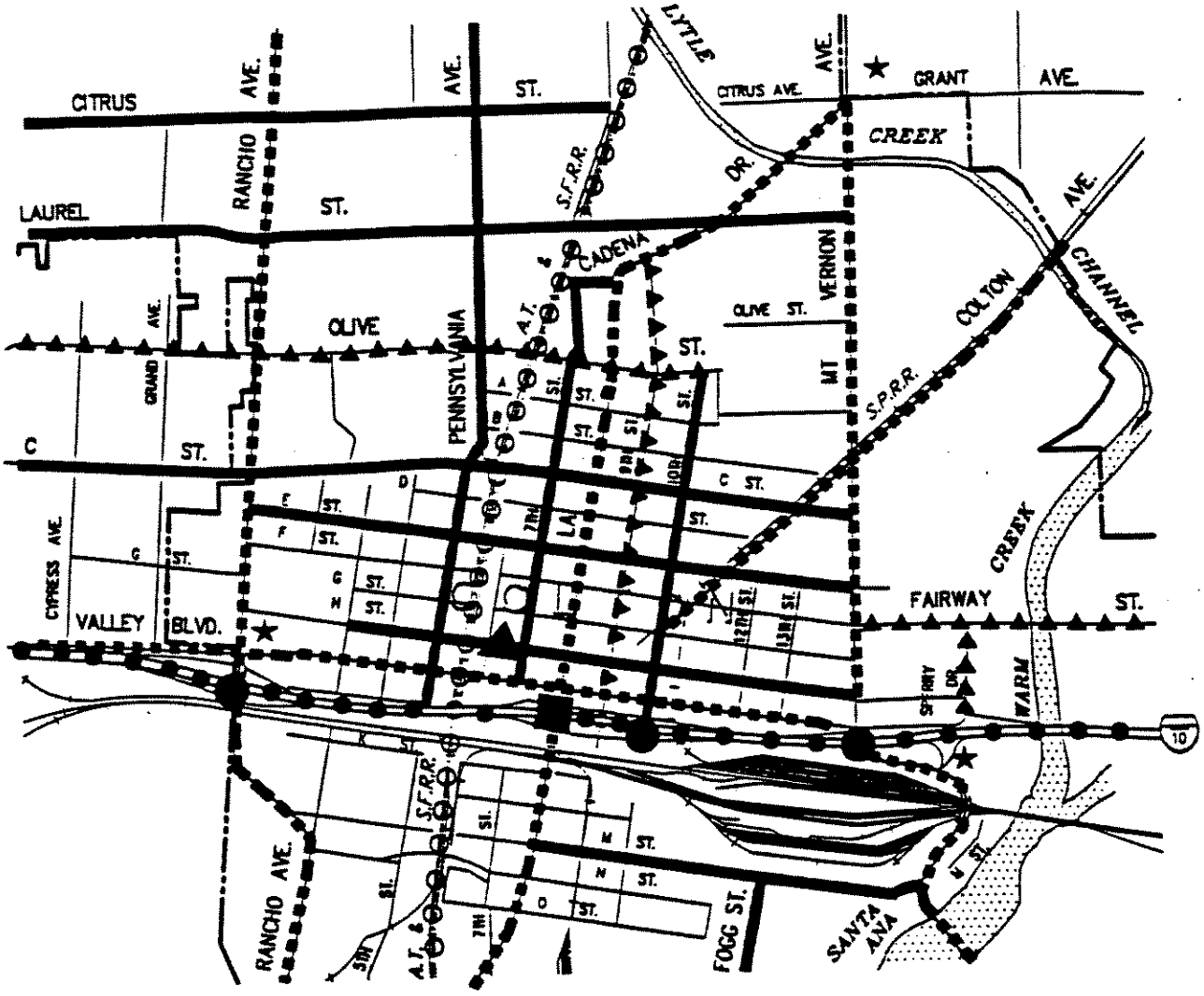
CITY OF COLTON
GENERAL PLAN CIRCULATION ELEMENT UPDATE
CIRCULATION PLAN

FIGURE 2a



CENTRAL BUSINESS DISTRICT

LEGEND

- CITY LIMIT
- FREEWAY/EXPRESSWAY
- MAJOR ARTERIAL
- SECONDARY ARTERIAL
- COLLECTOR
- RAIL TRANSIT LINE (METROLINK)
- RAIL TRANSIT STATION
- EXISTING INTERCHANGE
- PROPOSED INTERCHANGE
- EXISTING FREEWAY CROSSING
- PROPOSED FREEWAY CROSSING
- SPECIAL INTERSECTION GEOMETRICS

NOT TO SCALE

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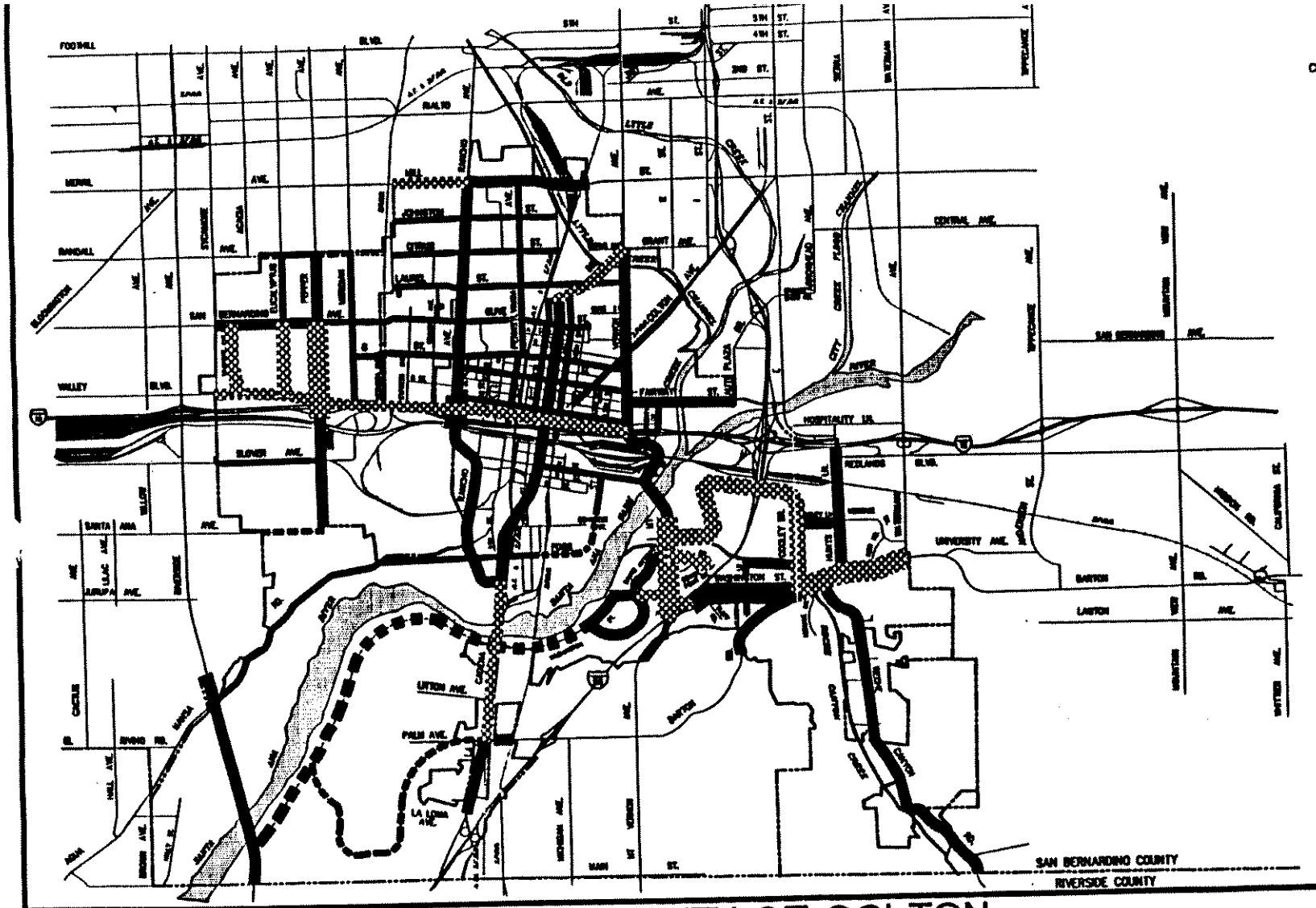
CITY OF COLTON
GENERAL PLAN CIRCULATION ELEMENT UPDATE
CIRCULATION PLAN

FIGURE 2b



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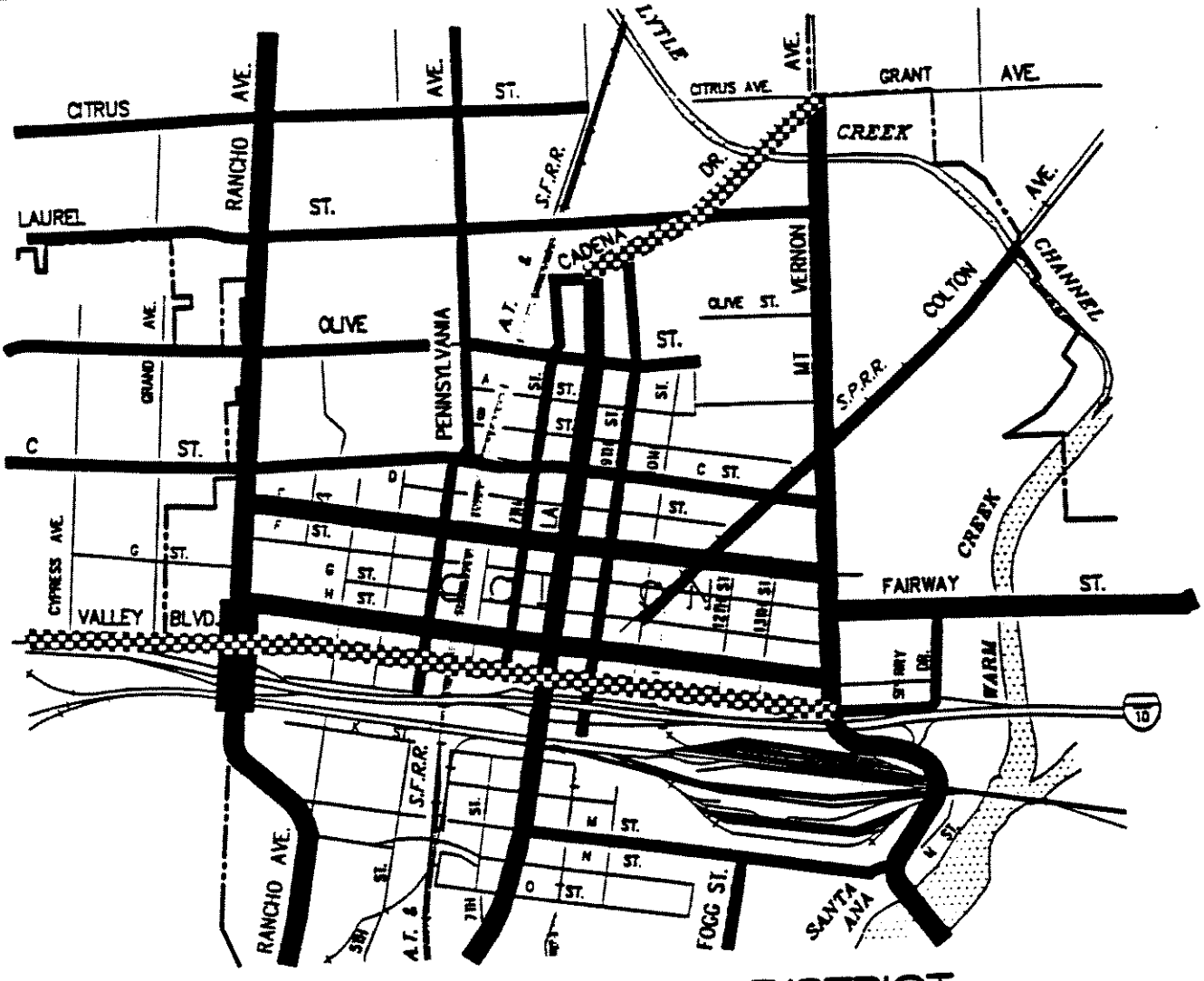
CITY OF COLTON
GENERAL PLAN CIRCULATION ELEMENT UPDATE
STREET CROSS SECTIONS

FIGURE 2c



CENTRAL BUSINESS DISTRICT

LEGEND

CITY LIMIT

1

1a

2

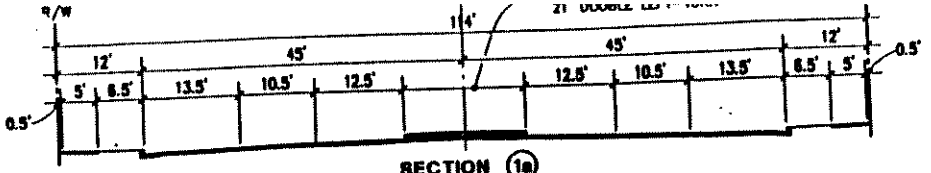
2a

3

4 (INDUSTRIAL)

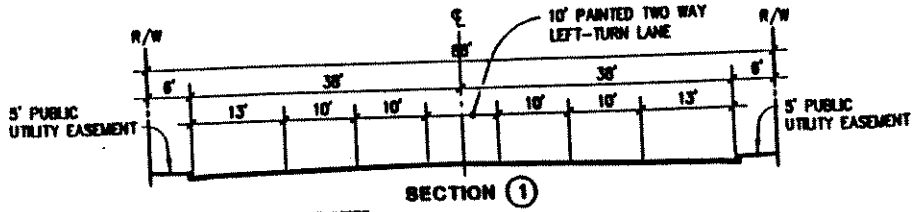
NOT TO SCALE

MGA	CITY OF COLTON GENERAL PLAN CIRCULATION ELEMENT UPDATE STREET CROSS SECTIONS	FIGURE 2d



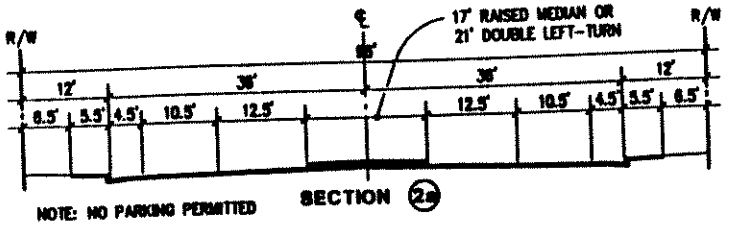
NOTE: NO PARKING PERMITTED

SECTION (1a)



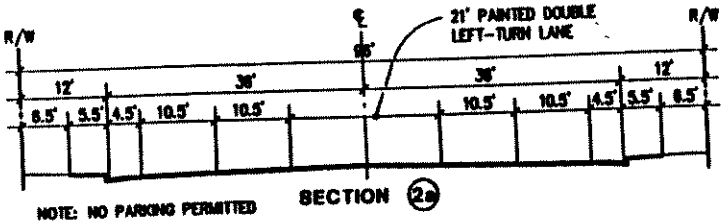
SECTION (1)

NOTES: (1) NO PARKING PERMITTED
(2) THE AREA DESIGNATED AS A PUBLIC UTILITY EASEMENT (OR PUBLIC ACCESS EASEMENT SHALL BE OBTAINED AS DEEMED NECESSARY BY THE CITY ENGINEER.



NOTE: NO PARKING PERMITTED

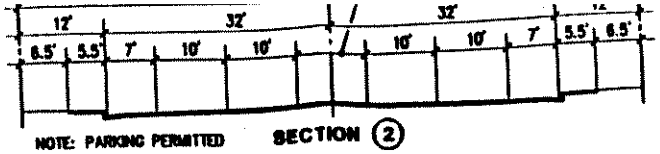
SECTION (2a)



NOTE: NO PARKING PERMITTED

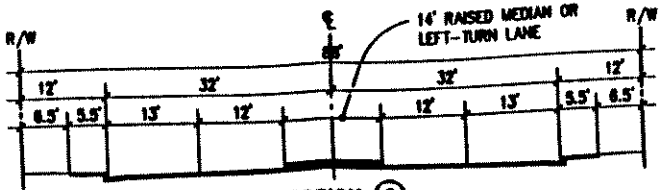
SECTION (2a)

NOTES: (1) FOR LOCAL STREETS, REFER TO CITY OF COLTON STANDARD DESIGN SPECIFICATIONS.
(2) SEE SPECIFIC PLANS FOR MODIFICATIONS TO THESE STANDARD CROSS SECTIONS.



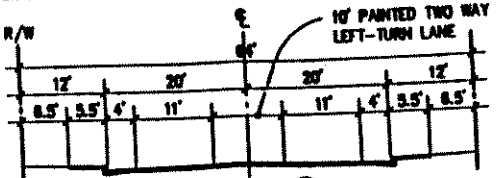
NOTE: PARKING PERMITTED

SECTION (2)



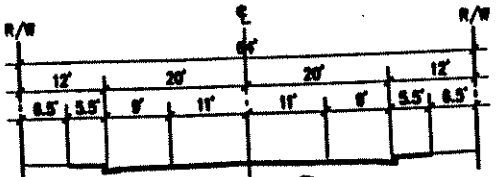
NOTE: ADD 6' TO R/W FOR PARKING

SECTION (2)



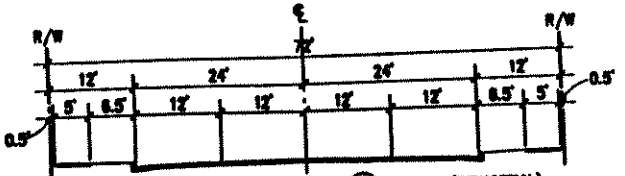
NOTE: NO PARKING PERMITTED

SECTION (3)



NOTE: PARKING PERMITTED

SECTION (3)



NOTE: PARKING PERMITTED

SECTION (4) (INDUSTRIAL)

TYPICAL STREET CROSS SECTIONS

FIGURE 2e

COLT_XS.DWG

The lane specifications and dimensions of the six standard cross sections are shown on Figure 2e. These standard sections should be followed as streets in the City of Colton are constructed or improved.

Freeways and Expressways: Two freeways are shown on the Circulation Plan - I-215, a north/south, eight-lane route. Caltrans currently is planning to construct one HOV lane in each direction on I-215 from the Riverside County line to the proposed Route 30, northerly of the Colton city limits.

The other freeway shown on the Circulation Plan is I-10, an east/west, eight-lane route. No plans currently exist for widening this facility, but HOV lanes may be installed in the near future..pa

Interchanges: The Circulation Plan shows the locations of existing interchanges on both I-10 and I-215 freeways. It is proposed to modify the I-215 at Washington Street Interchange in the near future by the Colton Redevelopment Agency. Complete re-construction of this interchange is being proposed by the San Bernardino County and Riverside County Metropolitan Planning Organizations (MPO's) depending on funding capability.

Freeway Crossings: The Circulation Plan shows the locations of existing freeway crossings along I-10 at Hunts Lane and along I-215 at Fairway Street and Cooley Drive. These crossings have the same number of through lanes as the adjoining street as shown on the plan. The crossings reduce traffic volumes on the arterials that have interchanges and are key elements in providing continuity of circulation across the I-10 and I-215 freeways.

Secondary and Primary Arterial Streets: The function of the arterial streets is to both provide access to the remainder of the region as well as the community and to serve as access to land establishments.

Collector Streets: The collector streets provide a connection between the arterial streets and the local streets. Collector streets also have the function of providing access to establishments and inter-neighborhood circulation.

Local Streets: Local streets serve only to provide the driver with access to and from establishments.

Service Levels

The Circulation Plan has been developed in the recognition of the need to relieve existing congestion and to provide a circulation system that can accommodate future anticipated growth. The plan also takes into account the fact that growth anticipated to occur in areas surrounding the planning area will use the street system in Colton. The goal of the system is to ensure that all signalized intersections operate at an acceptable peak hour Level of Service. The proposed definition of "accepted Level of Service" in traffic engineering terms is Level of Service "E" or better as defined in the 1985 Highway Capacity Manual.

The circulation system of the City of Colton will be composed primarily of a system of signalized arterials, and it is important to recognize that the signalized intersections are the locations within the system where the Level of Service must be satisfied. The vast majority of system vehicle delay occurs at the signalized intersections because vehicles are required to stop on one arterial to provide time to serve the vehicles on the crossing arterial.

The signalized Level of Service standards are in accordance with the current edition of the Highway Capacity Manual, as developed by the National Research Council of the National Academy of Sciences. The stop time delay methodology for signalized intersections as documented in the Highway Capacity Manual is the same methodology being recommended for adoption by San Bernardino County and its political subdivisions in accordance with the Special Committee Report published by the Riverside/San Bernardino Section of the Institute of Transportation Engineers.

Table 1 titled "Levels of Service for Signalized Intersections" indicates the ranges in the amounts of average stop time delay for a vehicle for the various Levels of Service ranging from "A" through "F".

For specific intersection evaluation, the delay figure used will be the weighted average of vehicular stop time delay for all movements of traffic entering the intersection during the A.M. and P.M. peak hours.

The degree to which a signalized intersection approaches capacity is also important. An ICU (Intersection Capacity Utilization) or "X" value of less than 1.00 represents the City's general policy guideline.

Special Intersection Geometrics

At the intersections of arterial streets shown on the Circulation Plan with a star symbol, special geometrics are needed to handle anticipated traffic volumes during the peak periods within the prescribed Level of Service. The geometrics at these special intersections may involve double and single instead of single left turn lanes only and special exclusive right turn lanes for one or more of the roadway approaches. The determination of the specific geometrics depends on the specifics on the traffic volumes anticipated for the particular intersection.

Provision of special geometrics at these highly used intersections are needed to keep average stop time vehicle delay within the limits adopted as a policy issue in the General Plan.

Certain legs of these intersections requiring special geometrics are expected to require lanes in addition to the numbers of lanes designated by the cross sections, shown on Figures 2c and 2d, in the form of right-turn lanes.

TABLE 1
LEVELS OF SERVICE FOR SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SECONDS)
A	5.0
B	5.1 to 15.0
C	15.1 to 25.0
D	25.1 to 40.0
E	40.1 to 60.0
F	60.0

Level-of-service A describes operations with very low delay, i.e., less than 5.0 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level-of-service B describes operations with delay in the range of 5.1 to 15.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level-of-service C describes operations with delay in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level-of-service D describes operations with delay in the range of 25.1 to 40.0 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level-of-service E describes operations with delay in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

Level-of-service F describes operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

These special intersections are listed as follows:

▪ Exclusive right-turn lane	Washington Street @ Cooley Drive/Barton Road (west, north, and south legs)
▪ Exclusive right-turn lane	Washington Street @ Reche Canyon Road (west leg)
▪ Exclusive right-turn lane	Redlands Boulevard/Steel Road @ Hunts Lane (east leg)
▪ Exclusive right-turn lane	Washington Street @ Waterman Avenue (north and east legs)
▪ Exclusive right-turn lane	Valley Boulevard @ Rancho Avenue (south leg)
▪ Exclusive right-turn lane	Barton Road @ La Cadena Drive (west leg)
▪ Exclusive right-turn lane	La Cadena Drive/Grant Avenue @ Mt. Vernon Avenue (north leg)
▪ Exclusive right-turn lane	Mt. Vernon Avenue @ I-10 E/B (east leg)
▪ Exclusive right-turn lane	Mt. Vernon Avenue @ Washington Street (W/O I-215) (all legs)
▪ Exclusive right-turn lane	Washington Street @ Cooley Drive/Barton Road (west, north and south legs)

HOV Facilities

Ultimately, HOV lanes will be constructed along both I-10 and I-215, providing an alternate mode of transportation for the City of Colton.

These facilities will help work commuters living in the City of Colton to reach their places of employment without having to battle freeway congestion, and will help the City of Colton to satisfy stringent air quality regulations which will have to be dealt with when the City of Colton undergoes preparation of its Congestion Management Plan.

Truck Routes

The implementation of a truck route master plan may become necessary in the future with increasing traffic volumes which will be impeded heavily by the presence of large trucks.

Pedestrian Circulation

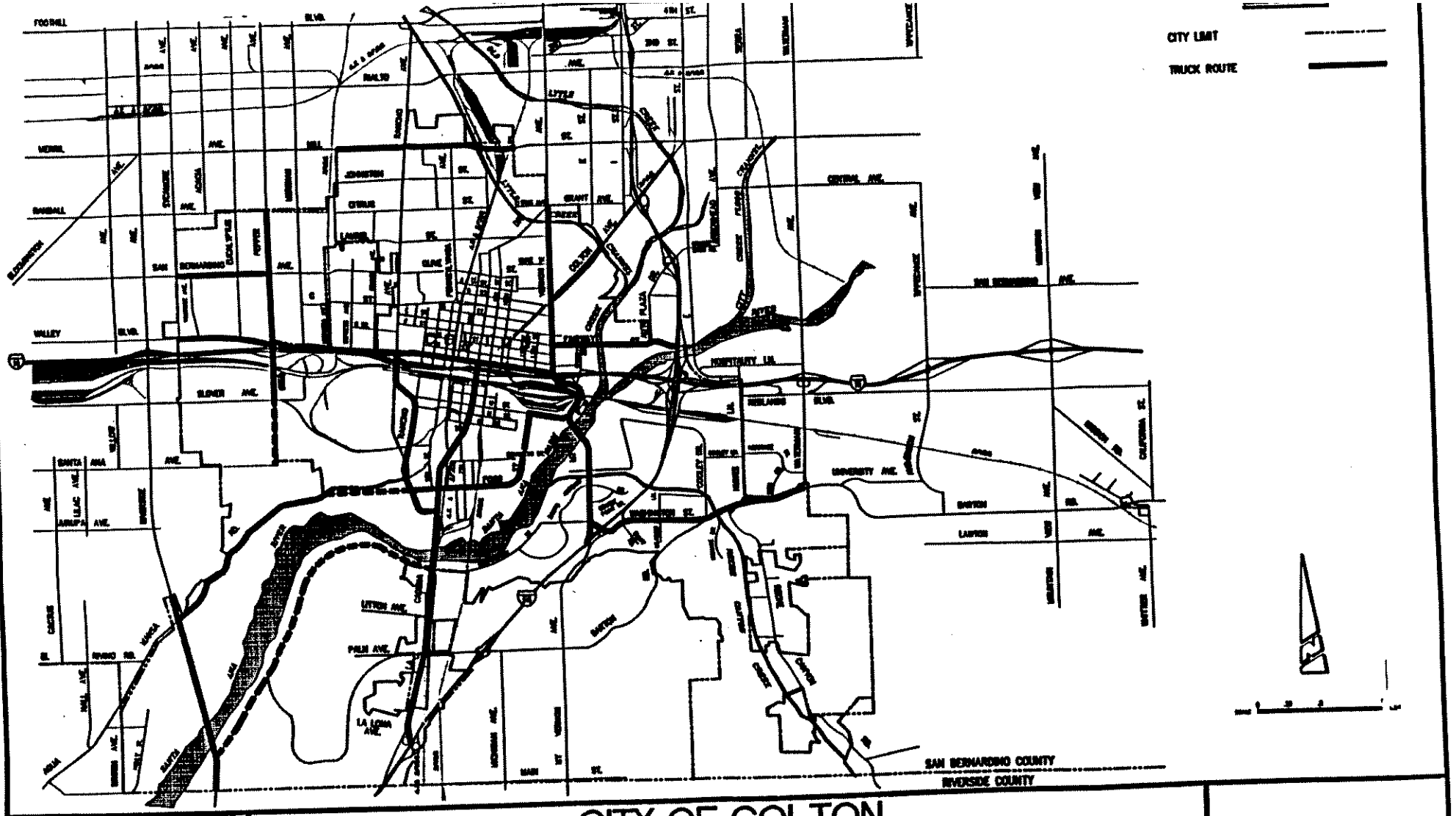
An essential component of the circulation system is a safe, efficient pedestrian circulation system. The provision of sidewalks and pedestrian street crossings will provide inter-neighborhood non-motorized circulation for the community.

Locations which generate a significant amount of pedestrian traffic, such as schools, should be evaluated for safe pedestrian circulation. In places of exceptionally high pedestrian traffic, special pedestrian crossings with a painted crosswalk accompanied by a flashing amber signal should be considered when warranted.

The designated truck routes will restrict heavy trucks from using residential streets and will provide for a safe and efficient means of access for trucks between the City of Colton and the remainder of the region.

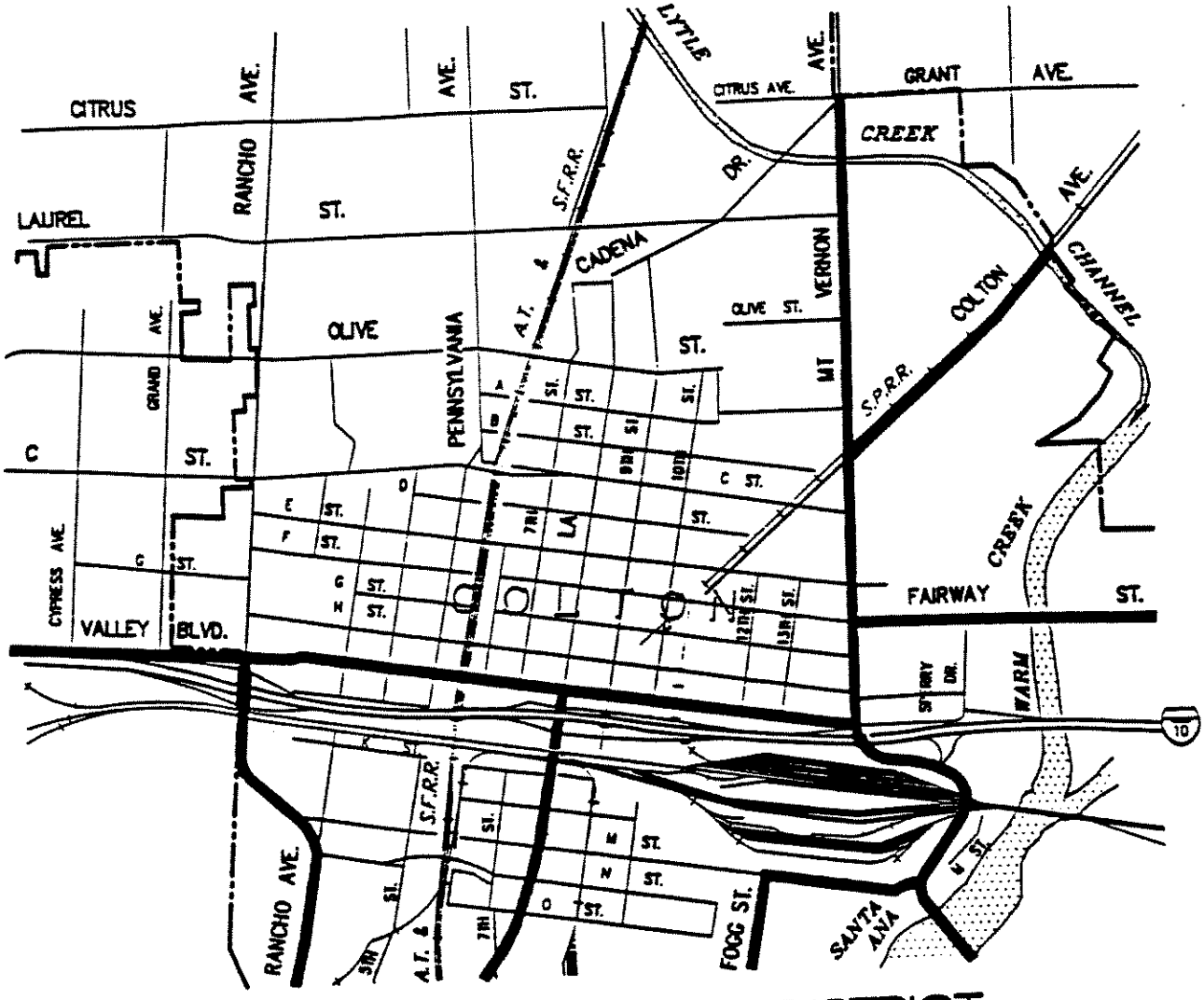
Streets which are designated truck routes should be constructed with adequate sub-base in order to support the heavy trucks, should have the minimum required curb radii for truck movement and should be free of any obstacles (trees, overhead wires, signs, luminaires, etc.) which may interfere with truck movement.

Figures 3a and 3b show the Truck Route Master Plan.



CITY OF COLTON
GENERAL PLAN CIRCULATION ELEMENT UPDATE
TRUCK ROUTE MASTER PLAN

FIGURE 3a



CENTRAL BUSINESS DISTRICT

LEGEND

CITY LIMIT

TRUCK ROUTE

NOT TO SCALE

MGA	CITY OF COLTON GENERAL PLAN CIRCULATION ELEMENT UPDATE TRUCK ROUTE MASTER PLAN	FIGURE 3b

BICYCLE CIRCULATION COMPONENT

Regional Trails

Currently, there are two proposed regional multi-purpose trails which will ultimately pass through the Colton City limits. These trails are classified as Class I bikeways per Caltrans standards and will be commissioned by the San Bernardino County Department of Parks and Recreation. These multi-purpose trails will accommodate bicycle, equestrian and pedestrian usages.

The primary regional trail which will pass through Colton is the Santa Ana River regional trail. This trail, shown on Figure 4a, will ultimately link the San Bernardino National Forest with the Pacific Ocean and will run immediately parallel to the Santa Ana River. Two locations at which cyclists will be able to access the Santa Ana River trail from Colton surface streets or vice-versa will be along both Riverside Avenue and La Cadena Drive where these two streets intersect the Santa Ana River. The location at Riverside Avenue will be a connection point only, while the location on La Cadena Drive will be a staging area, where cyclists will be able to drive their vehicles to this area, park and access the Santa Ana River trail on bicycle. The staging area will also have a restaurant, restrooms and bicycle facilities such as air compressors for tires.

The other regional trail proposed to pass through the City of Colton is the Reche Canyon trail. This trail will pass from Riverside County through Reche Canyon and will follow Reche Canyon Creek through Cooley Ranch and connect to the Santa Ana River Trail. This trail will be at-grade and will be more accessible to surface streets than the Santa Ana River Trail. The Reche Canyon Trail is shown on Figure 4a.

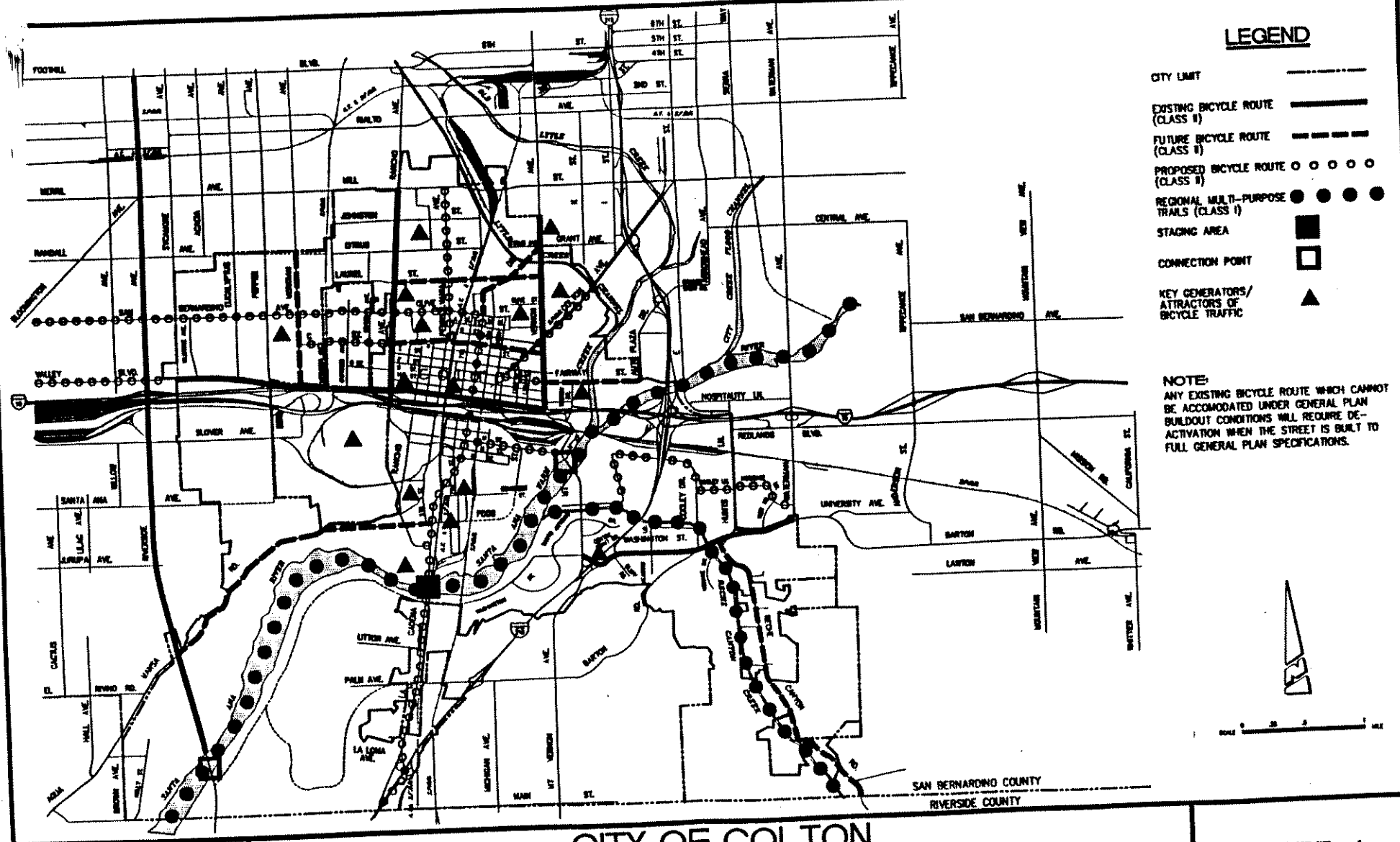
City Bicycle Routes

Figures 4a and 4b show the City of Colton bicycle routes. These bicycle routes are all on city surface streets as opposed to natural entities which the regional trails follow. The City of Colton bicycle routes are classified as follows:

- Existing bicycle routes
- Future bicycle routes
- Proposed bicycle routes

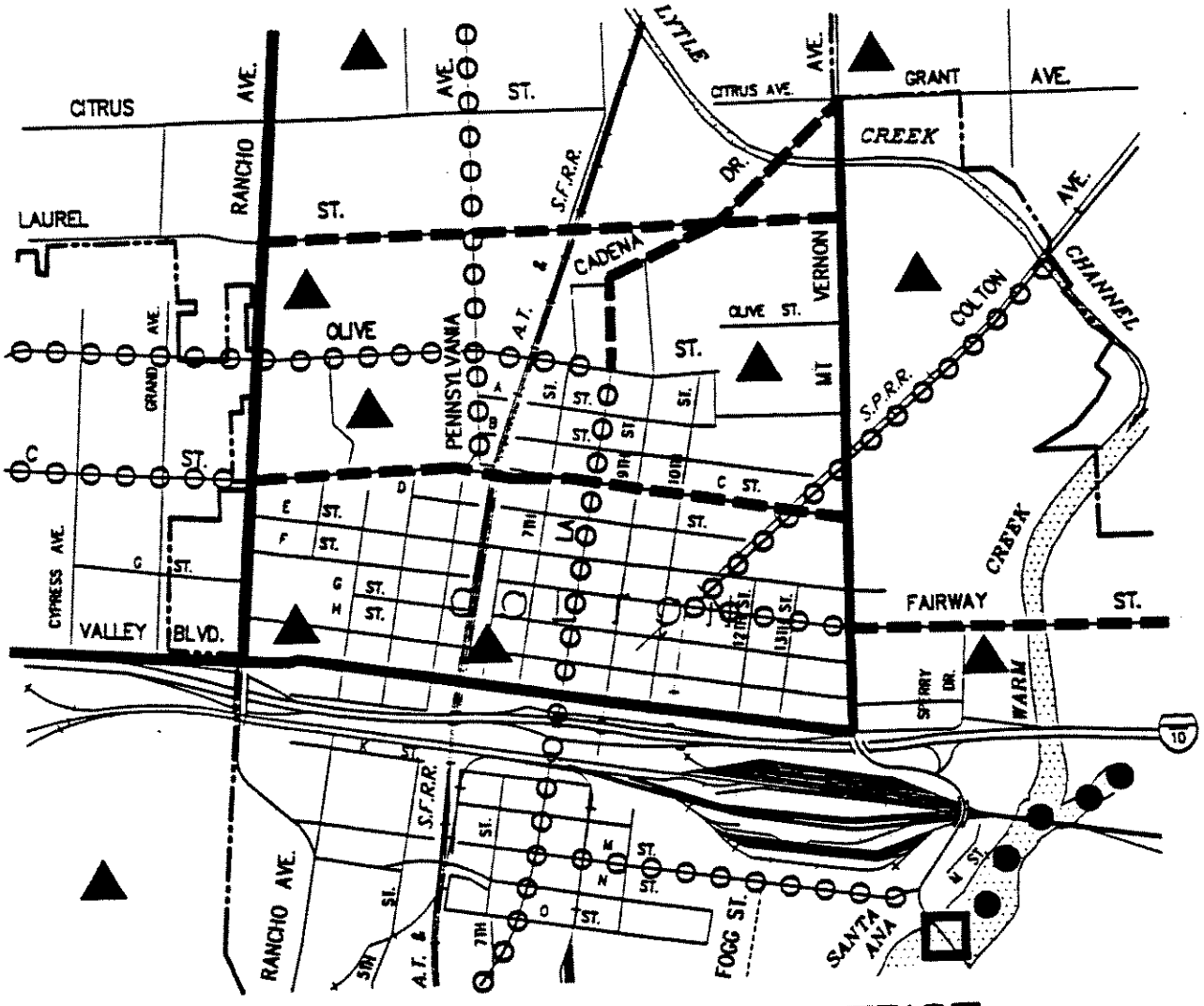
All City of Colton bicycle routes will be established as bicycle lanes which will be striped and signed on the surface streets shown on Figures 4a and 4b. These bicycle routes are classified as Class II bikeways per Caltrans standard.

Currently, the bicycle traffic in the City of Colton is minimal and is not anticipated to increase by a significant amount. The bicycle route system, once fully developed, should adequately serve the key generators/attractors of bicycle traffic shown on Figures 4a and 4b.



CITY OF COLTON
GENERAL PLAN CIRCULATION ELEMENT UPDATE
BICYCLE ROUTE MASTER PLAN

FIGURE 4a



CENTRAL BUSINESS DISTRICT

LEGEND

- CITY LIMIT
- EXISTING BICYCLE ROUTE (CLASS II)
- FUTURE BICYCLE ROUTE (CLASS II)
- PROPOSED BICYCLE ROUTE (CLASS II)
- REGIONAL MULTI-PURPOSE TRAILS (CLASS I)
- STAGING AREA
- CONNECTION POINT
- KEY GENERATORS/ ATTRACTORS OF BICYCLE TRAFFIC

NOT TO SCALE

NOTE:
ANY EXISTING BICYCLE ROUTE WHICH CANNOT BE ACCOMODATED UNDER GENERAL PLAN BUILDOUT CONDITIONS WILL REQUIRE DE-ACTIVATION WHEN THE STREET IS BUILT TO FULL GENERAL PLAN SPECIFICATIONS.

MGA

CITY OF COLTON
GENERAL PLAN CIRCULATION ELEMENT UPDATE
BICYCLE ROUTE MASTER PLAN

FIGURE 4b

These key generators/attractors of bicycle traffic include all schools, major employment centers and shopping centers within the City. The most significant key locations in the Colton vicinity are expected to be:

- San Bernardino Valley College
- Colton High School
- Colton Plaza
- Santa Ana River Trail staging area

Bicycle racks should be provided at these and other key bicycle traffic locations in order to stimulate an interest in bicycle ridership in the City of Colton.

The provision of bicycle facilities in the City of Colton will aid the community in making short trips by bicycle rather than automobile. This reduction in reliance on the automobile will also help the City of Colton satisfy the strict air quality standards being imposed on jurisdictions.

PUBLIC TRANSPORTATION COMPONENT

Rail Line/Stations

The Southern California Regional Rail Authority, in cooperation with SANBAG and the Los Angeles County Transportation Commission, is currently establishing a commuter rail service line which will utilize the existing Southern Pacific Rail line, shown on the Circulation Plan, that parallels I-10. This commuter line is part of the Metrolink program and will provide service between San Bernardino and downtown Los Angeles. There is no planned stop in Colton along this line, but there will be passenger terminals in both San Bernardino and Rialto. The proposed start-up date for this commuter line is fall of 1992.

Another Metrolink route is planned to pass through Colton along the Santa Fe Rail line adjacent to La Cadena Drive. This rail line will link the Colton vicinity with Riverside County and Orange County. Two stops are proposed in Colton along this line, the first stop near the La Cadena and Fogg intersection, the second near the intersection of 6th Street and "H" Street.

These rail commuter lines will also benefit Colton residents who work in Los Angeles or Orange Counties, and will aid the City of Colton deal with the strict air quality regulations.

These two proposed commuter rail lines along with the rail stations are shown on the Circulation Plan.

Bus Facilities

Existing bus routes as shown on Figures 5a and 5b will be expanded by OMNITRANS as required by new development

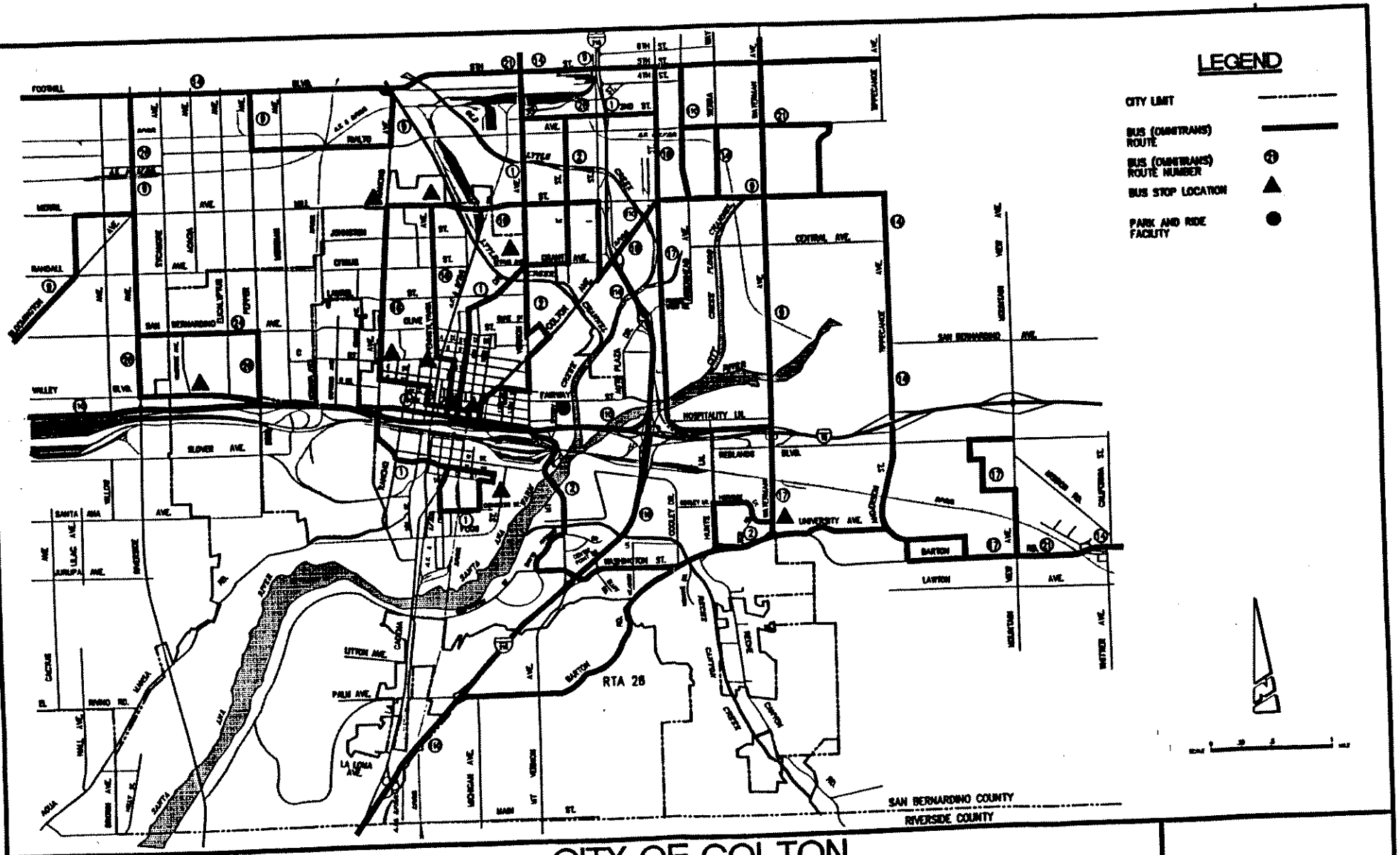
INFRASTRUCTURE COMPONENT

Water System

Domestic and irrigation services are provided through the City's Water Department, a division of the City of Colton Public Utilities Department. Major off and on-site extension of the water facilities along with payment of appropriate fees are required to provide delivery of the required domestic and fire flow. Installation of dual irrigation systems for all projects is required in order to utilize reclaimed water for irrigation of parks, landscaped medians and planters, etc. The current water master plan for the City of Colton indicates that the City's water demand under buildout conditions can be adequately served.

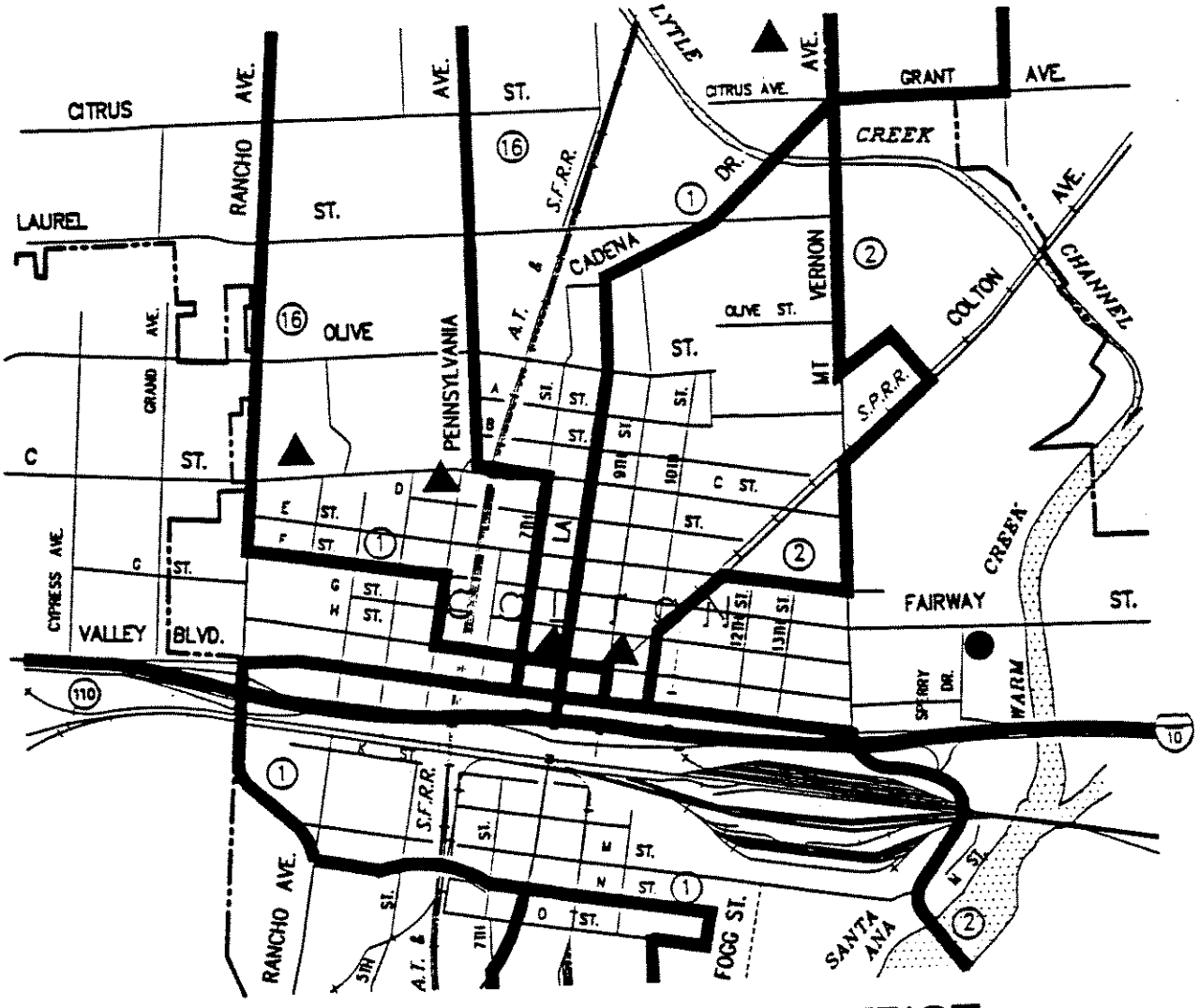
Sewage System

The City of Colton Public Utilities Department provides and maintains the City's sewage system. Construction of dry sewage facilities is required for those projects constructing on-site septic systems as provided for by local and State health specifications and standards.



CITY OF COLTON
GENERAL PLAN CIRCULATION ELEMENT UPDATE
BUS ROUTES

FIGURE 5a



CENTRAL BUSINESS DISTRICT

LEGEND

CITY LIMIT

BUS (OMNITRANS) ROUTE

BUS (OMNITRANS) ROUTE NUMBER (21)

BUS STOP LOCATION

PARK AND RIDE FACILITY

NOT TO SCALE

MGA	CITY OF COLTON GENERAL PLAN CIRCULATION ELEMENT UPDATE BUS ROUTES	FIGURE 5b

Major on and off-site construction of sewage systems including lift stations and rehabilitation and upsizing of existing sewer mains and treatment plant along with payment of appropriate fees will be required to provide for sufficient Level of Service.

The waste discharge throughout the city is monitored by the City's Public Utilities Department.

The current sewer master plan for the City of Colton indicates that the City's sewer system usage demand under buildout conditions can be accommodated.

Storm Drain

The storm drain system is provided and maintained by the City of Colton Public Works Department.

The current storm drain master plan for the City of Colton indicates that the City's storm drains will be able to adequately serve the runoff demand expected under buildout conditions.

IMPLEMENTATION PROGRAM

IMPLEMENTATION MEASURES

The City's Circulation Element addresses a range of circulation-related issues areas including the provision of a safe and efficient street system, development of the regional roadway network, efficiency of the circulation system, development of the public transportation system, special intersection geometrics, adequate off-street parking, truck circulation routes, bicycle considerations, and public infrastructure associated with water, sewer, and storm drain systems. Implementation measures are summarized as follows:

MASTER PLAN OF STREETS

1. **City/Regional Circulation:** Arterial streets within the planned street system will be constructed and maintained according to the Circulation Plan based on standards related to their function and traffic capacity.

Responsible Agency: Public Works/Engineering/Department of Community Development.

Funding Source: Development Fees/Exactions, Redevelopment Funds, City Capital Improvements Program and Maintenance Program.

Time Frame: Ongoing.

Related Circulation Element Policies: 1.1, 1.2, 1.4, 1.5, 1.6, 3.1

2. **Transportation System Management (TSM):** To maximize the capacity of the existing and planned traffic system. Capital improvements such as restriping, spot widening, and traffic signal coordination will be made.

Responsible Agency: Public Works Department/Engineering.

Funding Source: Development Fees/Exactions, Redevelopment Funds, City Capital Improvements Program and Maintenance Program, federal, state, and local (Measure I) funding.

Time Frame: Ongoing.

Related Circulation Element Policies: 1.3, 1.8

3. **Transportation Demand Management (TDM):** Following the Air Quality Management Plan for the South Coast Air Basin, employers of over 100 employees will be involved in a program aimed at reducing the number of vehicles using the roadway system during peak hours through vanpooling, ride-sharing, staggered work hours and other methods.

Responsible Agency: Community Development Department

Funding Source: Development Fees/Exactions, City Capital Improvements Program and Maintenance Program

Time Frame: Within two years

Related Circulation Element Policies: 1.3, 1.8, 2.3

PUBLIC TRANSPORTATION PLAN

4. Bus Service: OMNITRANS will offer fixed route service on local and express routes. Park-and-ride facilities will be provided to promote additional express bus service along the freeway corridors.

Responsible Agency: OMNITRANS/Caltrans

Funding Source: OMNITRANS

Time Frame: Ongoing

Related Circulation Element Policies: 2.1, 2.2, 2.4

5. Commuter Rail: A commuter rail line will be established in the near future in the Colton vicinity to support regional commuting trips.

Responsible Agency: SANBAG

Funding Source: State rail bond measures/County sales tax proceeds

Time Frame: 1992

Related Circulation Element Policy: 2.4

NON-MOTORIZED TRANSPORTATION

6. pedestrian Circulation: Sidewalks exist along most City arterial streets and will be constructed as part of the improvements to new arterial roadways to facilitate safe and convenient pedestrian movement.

Responsible Agency: Public Works Department/Engineering

Funding Source: Development Fees/Exactions, City Capital Improvements Program and Maintenance Program

Time Frame: Ongoing

Related Circulation Element Policies: 1.2

7. Bicycle Facilities: Class I (paths) and Class II (lanes) bikeways will be maintained and provided along most major streets within the City to promote the use of bicycles. These bikeways will be integrated into the overall County bikeway system.

Responsible Agency: Public Works Department/Engineering

Funding Source: Development Fees/Exactions, City Capital Improvements Program and Maintenance Program, federal, state and local funds.

Time Frame: Ongoing

Related Circulation Element Policies: 2.4, 2.6

PARKING

8. Off-Street Requirements: The City's Zoning Ordinance includes off-street parking requirements for various types of development, allowances for parking reductions of development incentives where effective demand management programs are utilized, and allowances for joint use of parking facilities where an appropriate mix of land uses exists.

Responsible Agency: Department of Community Development/Public Works Department/Engineering

Funding Source: Development Fees/Exactions

Time Frame: Ongoing

Related Circulation Element Policies: 4.1, 4.2

TRUCK ROUTES

9. Truck Route Designation: Planned primary truck routes will be identified, signed and improved to accommodate truck travel.

Responsible Agency: Department of Community Development/Public Works Department/Engineering

Funding Source: City Capital Improvements Programs and Maintenance Program/Development Fees/Exactions

Time Frame: Ongoing

Related Circulation Element Policies: 1.11

INFRASTRUCTURE

10. Water System: The City's Public Utilities Department provides domestic and irrigation service, including use of reclaimed water.

Responsible Agency: Public Utilities Department

Funding Source: User Fees/Development Fees

Time Frame: Ongoing

Related Circulation Element Policies: None

11. Sewage System: The City of Colton Public Utilities Department provides sewage collection and treatment services for the City of Colton.

Responsible Agency: Public Utilities Department

Funding Source: User Fees/Development Fees

Time Frame: Ongoing

Related Circulation Element Policies: None

12. Storm Drain System: The City's Public Works Department is responsible for storm drain master planned facilities.

Responsible Agency: Public Works Department

Funding Source: Drainage Fees

Time Frame: Ongoing

Related Circulation Element Policies: None

TECHNICAL METHODOLOGY

METHODOLOGY UTILIZED FOR THE CIRCULATION ELEMENT UPDATE

INTRODUCTION

The Year 2010 traffic volume forecasts necessary to update the Circulation Element were performed using the Riverside-San Bernardino (RIV-SAN) traffic volume forecasting model developed and maintained by the Southern California Association of Governments (SCAG). This transportation planning model is a sub-area model used for conducting traffic forecasts for the metropolitan areas of Riverside and San Bernardino Counties. The detail of this model is very broad and traffic volume forecasts for the City of Colton required a great deal of modifications to this model in order to achieve greater accuracy for city level planning. In fact, the requirements of this project mandated that traffic volumes be predicted for all intersections within the City from collector level on up.

Aspects of the traffic volume forecasting for this project were in total conformity with SCAG planning policies. Since the RIV-SAN model was used, and the forecasting methodology was entirely within the limits of the RIV-SAN model, SCAG determined that the City of Colton traffic forecasting model was in entire conformity with the regional model.

YEAR 2010 TRAFFIC VOLUME FORECASTING

Land Use

A land use database was obtained from San Bernardino County through the county's Geographical Information System (GIS). This land use database represented 1990 conditions within the City of Colton and outlying areas. The traffic analysis zone map shown in Appendix "A", shows the limits of the study area for the City of Colton Circulation Element Update. As shown on the traffic analysis zone map, there are 27 "large" regional zones outlined by the thick boundaries, and there are 222 "small" traffic analysis zones outlined by the thinner boundaries. The 27 regional zones were disaggregated into 222 local traffic analysis zones in order to achieve greater accuracy within the Colton vicinity. The land use database obtained from San Bernardino County contained the land use database listing of all land use categories and sizes in terms of acreage for each of the 222 local traffic analysis zones. This land use database was compiled according to the policies of the current City of Colton General Plan.

The existing land use database was used for purposes of validating the traffic forecast model. For the Year 2010 forecast model, the existing land use database was converted into a Year 2010 land use database for the 222 local traffic analysis zones. Land use totals were added to the existing land use database in order to compile the Year 2010 build-out land use database in accordance with the policies of the existing City of Colton General Plan. The Year 2010 land use database subsequently was used in developing the socio-economic data used for performing the Year 2010 traffic volume forecasts.

Socioeconomic Data

The RIV-SAN model utilizes socioeconomic data (SED), as opposed to land use data, for purposes of estimating trips within the model. In order to remain consistent with SCAG planning policies, the land use variables within the land use database required conversion into SED format.

For purposes of validating the traffic model, the existing land use database was first converted to reflect 1987 conditions by conducting a check for land developments which occurred between 1987 and 1990. The land use developments which occurred within this three year span were deducted from the existing land use database. Once the 1987 land use database was compiled, the land use data was converted into SED through conversion factors provided by SCAG. The SED was subsequently run through the RIV-SAN model to validate the model.

The Year 2010 SED database utilized the Year 2010 SCAG SED forecast directly. The SED variables forecasted by SCAG for the 27 RIV-SAN regional zones shown on the traffic analysis zone map in Appendix "A" were disaggregate into the 222 local traffic analysis zones by means of the Year 2010 land use database. The 2010 land use totals for each of the 222 zones were first converted to SED through the conversion factors provided by SCAG. The SED totals for the 222 zones were then added up for each local zone within each regional zone. The compiled SED totals for the 27 regional traffic analysis zones were compared to the original SED totals forecasted by SCAG for the 27 regional zones, and any major discrepancies between the two data sets were examined. The converted SED for each of the 222 zones was then divided by the converted SED totals for each of the 27 regional zones to calculate weights for each of the 222 regional zones. The SED forecasted by SCAG for the 27 regional zones was then disaggregated into the 222 zones per the weights which were computed based on the SED data set which was converted from the land use database. This resulting SED base was subsequently run through the RIV-SAN model to forecast the Year 2010 traffic volumes. The SED for the 222 traffic analysis zones is shown in Appendix "A".

Network

A local network for the City of Colton and outlying areas shown on the traffic analysis zone map in Appendix "A" was coded through the TRANPLAN software. This network was much more detailed in scope as compared to the original network representing the study area which was contained in the RIV-SAN model. This local network contained more street detail and included all major and secondary arterials as well as all collectors, within the City of Colton. The central business district of Colton was especially detailed due to its density, and in addition to surface streets, all freeways and freeway interchanges were given increased detail as well. All connectors of the Interstate 10/Interstate 215 were coded accurately within the network, in addition to the exact detail of all interchange/surface street interchanges along Interstate 10 and Interstate 215, for purposes of forecasting turning volumes at these interchanges. The high-occupancy vehicle (HOV) lanes were added to the freeways as well in a high level of detail.

The local network was also coded to a high level of detail to include the 222 centroids representing the 222 traffic analysis zones. Each of the 222 traffic analysis zones were studied on maps to determine where all access locations were located which connect the traffic analysis zones to the remainder of the network. Local streets and drive approaches in particular were located for purposes of positioning centroid connectors within the local network.

Once the local Colton networks were coded for both existing conditions and Year 2010, the networks were appended to the regional model by first erasing the Colton portion of the RIV-SAN model. The Colton study area model was then appended to the regional model through TRANPLAN software functions and subsequently connected to the remainder of the regional network. This process was done for both the 1987 base year and for Year 2010. Additional elements to the Year 2010 model were added to reflect future street conditions such as the construction of HOV lanes and additional surface streets.

Trip Generation

The Year 2010 SED base shown in Appendix "A" for the 222 local traffic analysis zones was used as the final trip generation data base for conducting the Year 2010 traffic analysis and traffic forecast. Shown on this listing in Appendix "A" are the group quarter population, total single family dwelling units, occupied single family dwelling units, total multi-family dwelling units, total occupied multi-family dwelling units, retail employment, total employment, population and income (in 1967 dollars) for each of the 222 local traffic analysis zones.

The data slightly deviates from the Year 2010 forecasted SED for the 27 regional zones to account for differences in the Year 2010 SED based on SCAG projections versus City projections. These differences account for major projects such as the construction of the county hospital, which may not have been reflected in these SCAG projections. However, when adding up the totals for the 222 traffic analyses zones, the totals very nearly match the totals of the SED variables of the 27 regional zones. The slight variation was still within the tolerances allowed by SCAG planning policies.

The Trip Generation procedure contained within the RIV-SAN model generates person trips as opposed to vehicle trips. Person trips were generated for five trip purposes that were later converted to vehicle trips for three purposes, after the mode choice procedure and a series of matrix functions through the TRANPLAN software were performed. The resulting Year 2010 calculated vehicle trips for the 222 traffic analysis zones for a.m. peak, p.m. peak, and off peak periods are shown in Appendix "A". The a.m. peak period is for two hours and the p.m. peak period is for three hours, in conformance with SCAG transportation planning policies and procedures.

Trip Distribution

The trip distribution process was performed through the use of the gravity model TRANPLAN function. The trip distribution process reads in the person trips generated by the trip generation phase and determines the trip interactions which are expected to occur in Year 2010 between the 222 local traffic analysis zones and the remainder of the traffic analysis zones within the region model. The gravity model utilizes a travel time matrix, productions and attractions from the trip generation phase, friction factors and "K" factors in performing the trip distribution. The same parameters and data were used for the trip distribution phase of the Colton model as were used in the RIV-SAN model. The only differences between the two gravity models are the productions and attractions and travel time matrix, to account for modifications made to the RIV-SAN model to increase the accuracy within the Colton area.

Trip length calculations were performed through TRANPLAN functions and compared to the RIV-SAN trip length statistics to make sure that the gravity model process was functioning properly. The resulting trip length statistics were found to be consistent with the RIV-SAN model trip length statistics. The Year 2010 trip length statistics for the with and without circulation element scenarios for the 222 Colton local traffic analysis zones are shown in Appendix "B". These Year 2010 trip length statistics for both time and distance were used in performing the environmental analysis for the environmental impact report which accompanies this planning document.

Mode Choice

The Mode Choice function within the RIV-SAN model utilizes computer routines which are independent of the TRANPLAN Software and were fabricated specifically for the RIV-SAN model. The mode choice step determines, for all trip interchanges of the person trip table computed by the gravity model function, the person trips which are expected to travel by automobile and the person trips which are expected to travel by transit.

The mode choice function further divides the vehicle-person trip table for the home-based work purpose and estimates how many trips will be made by drive-alone vehicle trips and how many person vehicle trips will be made by carpool trips. The mode choice function for the Year 2010 RIV-SAN traffic forecast model performs one further step than the does the 1987 mode choice function, in that the Year 2010 function uses congested travel times on links from the model. When estimating the carpool trips versus drive-alone trips to account for the presence of HOV lanes, a special SED data set, highway travel time matrix, transit travel time matrix, and transit fare matrix are all utilized by the mode choice function.

The product of the mode choice function is two person trip tables, one being the person-vehicle trip table, the other being the person-transit trip table. These trip tables have been consolidated from five to three trip purposes at this point.

Vehicle Trip Table Conversion

The person-vehicle trip table obtained from the mode choice phase was subsequently converted into a six-purpose vehicle trip table through TRANPLAN matrix functions. The person-vehicle trips were first converted into vehicle trips through the use of auto occupancy factors. The resulting vehicle trips were next converted into origin-destination (O/D) format for the a.m., p.m., and off-peak periods through the use of directional split and time-of-day factors. O/D format refers to the number of one-way trips which are made from one zone to another zone. Production-attraction (P/A) format, on the other hand, refers to the number of two-way trips which are made from one zone to another zone and eventually return to the production zone in the 24 hour period.

The resulting vehicle trip table was compiled for six trip purposes: a.m. peak drive-alone vehicle trips, a.m. peak carpool vehicle trips, p.m. peak drive-alone trips, p.m. peak carpool trips, off peak drive-alone trips and off peak carpool trips.

Trip Assignment

The final step in the transportation modeling process involves taking the trips within the trip table and assigning the trips from origin zones to destination zones along logical paths from the origin zone to the destination zone. Once trip interchanges within the trip table have been assigned along paths determined by the TRANPLAN software as the most logical paths from the given origin zones to the given destination zones, each vehicle trip is subsequently assigned to each link along the logical path. The process is repeated for each O/D interchange within the trip table to arrive at a total traffic volume forecast for each link within the model.

The RIV-SAN model utilizes the equilibrium highway load TRANPLAN function to perform the a.m. peak and p.m. peak period traffic assignments while the stochastic highway load function is used to assign the off peak period drive-alone trips. The Year 2010 traffic assignment process is complex and requires a great deal of time to execute. In the first phase of the Year 2010 traffic assignment process, the drive-alone trips for each time period are loaded on the highway network with the HOV facilities blocked off. The second phase of the traffic assignment process loads the carpool trips for each period onto the network already containing the drive alone trips for each period. The HOV facilities are opened to load the carpool trips. The equilibrium highway load TRANPLAN function is used to perform the carpool trip assignments for each peak period since the carpool trips during the off peak period occur for a short duration only within the 19-hour off peak period. The equilibrium highway load function is more appropriate for traffic assignments of a short duration versus the stochastic highway load function, which is more appropriate for traffic forecasts of a longer duration.

The results of the traffic assignment process includes three loaded networks for each of the time periods. These networks contain both the drive-alone and carpool trips for Year 2010. The trips which are loaded onto the HOV facilities are carpool trips only.

Traffic Model Validation

Prior to running the Year 2010 forecasts, the traffic model required a validation process, a trial and error procedure in which the base year traffic model is run repetitively in order to force the traffic model to simulate actual traffic volumes.

The Colton base year model resembles 1987 conditions. Therefore, 24 hour volume machine counts were gathered for the City of Colton and outlying areas for 1987. All available 1987 counts were collected in addition to other counts which were recorded within other years and were adjusted to reflect 1987 traffic volume conditions. Screenline checks were performed during the validation phase on all major surface street and freeway facilities at certain locations. At the conclusion of each 1987 validation model run, the 24 hour volumes from the 1987 model were extracted from the model output for these screenline check locations and compared to the actual traffic volume recorded at the particular screenline location. Appendix "C" contains a table which shows the resulting ground count and model volumes at the screenline locations for the final validation run. During each validation run, links carrying traffic model volumes which exceeded the maximum desirable percentage difference error for the given link were adjusted in terms of speed and capacity in order to force the model to simulate the actual traffic model volume as closely as possible. The maximum desirable percentage difference errors for the screenline locations where taken from the graph, shown in Appendix "C", entitled "Maximum Desirable Error for Link Volumes". This graph was taken from NCHRP (National Cooperative Highway Research Program) Report 255 and is used for determining if the model volumes are acceptable per NCHRP Report 255 Methodology. If a model volume along a given link exceeded the maximum desirable deviation in terms of percentage difference, the link was adjusted by giving the link a new area type index, a number used by the RIV-SAN model as an index for obtaining a speed capacity for the links within the model. The base year model was then re-ran with the changes included, and the volumes once again were compared to the base year ground counts. If there were screenline links exceeding the maximum desirable deviation, the links were adjusted and the model was re-ran. Approximately 14 validation runs were made for the Colton model and the resulting validation results are shown in Appendix "C". A review of Appendix "C" shows that all screenline links were within 9% on average of the base year actual ground counts.

TRAFFIC VOLUME ADJUSTMENT

Since traffic modeling results are usually subject to error, the traffic model volume results from the Year 2010 traffic model required adjustment before the volumes could be analyzed for capacity analyses purposes.

Intersection volumes for approximately 88 intersections within the City of Colton were extracted from the Year 2010 model for capacity analysis purposes. These intersection volumes were adjusted once they were extracted from the TRANPLAN software before they were used for capacity analysis purposes. The volumes were adjusted to account for inaccuracies within the traffic model. The process for adjusting the intersection volumes involved observing the differences between the actual volumes for 1987 conditions for the 88 intersections during a.m. and p.m. peak hours and the volumes generated by the 1987 traffic model for the 88 intersections. The differences for all 88 intersections were stored in computer files for purposes of adjusting the Year 2010 intersection volumes. Once the intersection volumes were extracted from the TRANPLAN software at the conclusion of each Year 2010 model run, the intersection model volumes were adjusted with the difference files which were compiled based on the intersection volume differences observed while running the validation model. The Year 2010 intersection volumes are then adjusted by these files and subsequently entered into the MONITOR program, a program developed by MGA for intersection capacity analyses purposes.

The resulting adjusted Year 2010 intersection volumes for a.m. and p.m. peak hours were also used for conducting the Year 2010 arterial capacity analysis. The approaches at the intersections were added to derive the two-way street volumes between intersections for conducting the arterial capacity analysis. Appendix "D" shows the resulting 2010 average daily and peak hour adjusted to traffic volumes along major facilities in the City of Colton.

INTERSECTION CAPACITY ANALYSIS

The intersection capacity analysis for this project was conducted through the use of the MONITOR package. MONITOR is a program developed by MGA for purposes of traffic growth monitoring and traffic operational database purposes.

The MONITOR program has a built-in interface which enables the user import intersection volumes from the TRANPLAN Software. Included within this routine is an adjustment algorithm which reads in the intersection volume difference files which were compiled during the validation phase of the project. Both a.m. and p.m. peak hour volumes are adjusted by separate files both containing intersection volume differences for both peak hours. The user executes this interface within the MONITOR software. While the volumes are being transferred from the TRANPLAN software to the MONITOR package electronically, the volumes are also being adjusted based on the volume difference files. Once adjusted, the MONITOR software stores the intersection volumes within the intersection database in the MONITOR package.

Also including in the MONITOR program is a intersection capacity analysis program known as LOSSYS, which is an intersection capacity analysis program for running capacity analysis for several intersections at a time. This performs the intersection capacity analysis based on stop delay methodology as contained in the 1985 Highway Capacity Manual. LOSSYS also performs Intersection Capacity Utilization (ICU) analysis for all intersections. Intersection capacity analysis was performed on all study intersections for this project within the City of Colton for a.m. and p.m. peak hours for both the with and without circulation element scenarios. The existing intersection delay Level of Service and ICU values for the selected study intersections during a.m. and p.m. peak hours are shown in Appendix "E". The resulting 2010 delay Level of Service and ICU values for the study intersections for both scenarios during a.m. and p.m peak hours are shown in Appendix "F".

Appendix "G" contains output from the MONITOR program for both a.m. and p.m. peak hours for both without and with circulation element scenarios. Also contained in Appendix "G" is a description of the MONITOR program in addition to a brief explanation of delay Level of Service per the 1985 Highway Capacity Manual.

ARTERIAL CAPACITY ANALYSIS

In addition to capacity analysis for study intersections, capacity analysis was performed for arterials as well. The arterial Level of Service analysis was performed along sections of major arterials and freeways within the City of Colton. The methodology used for the arterial capacity analysis is the same methodology used in the San Bernardino County Congestion Management Plan (CMP). This methodology was first developed by the State of Florida Department of Transportation.

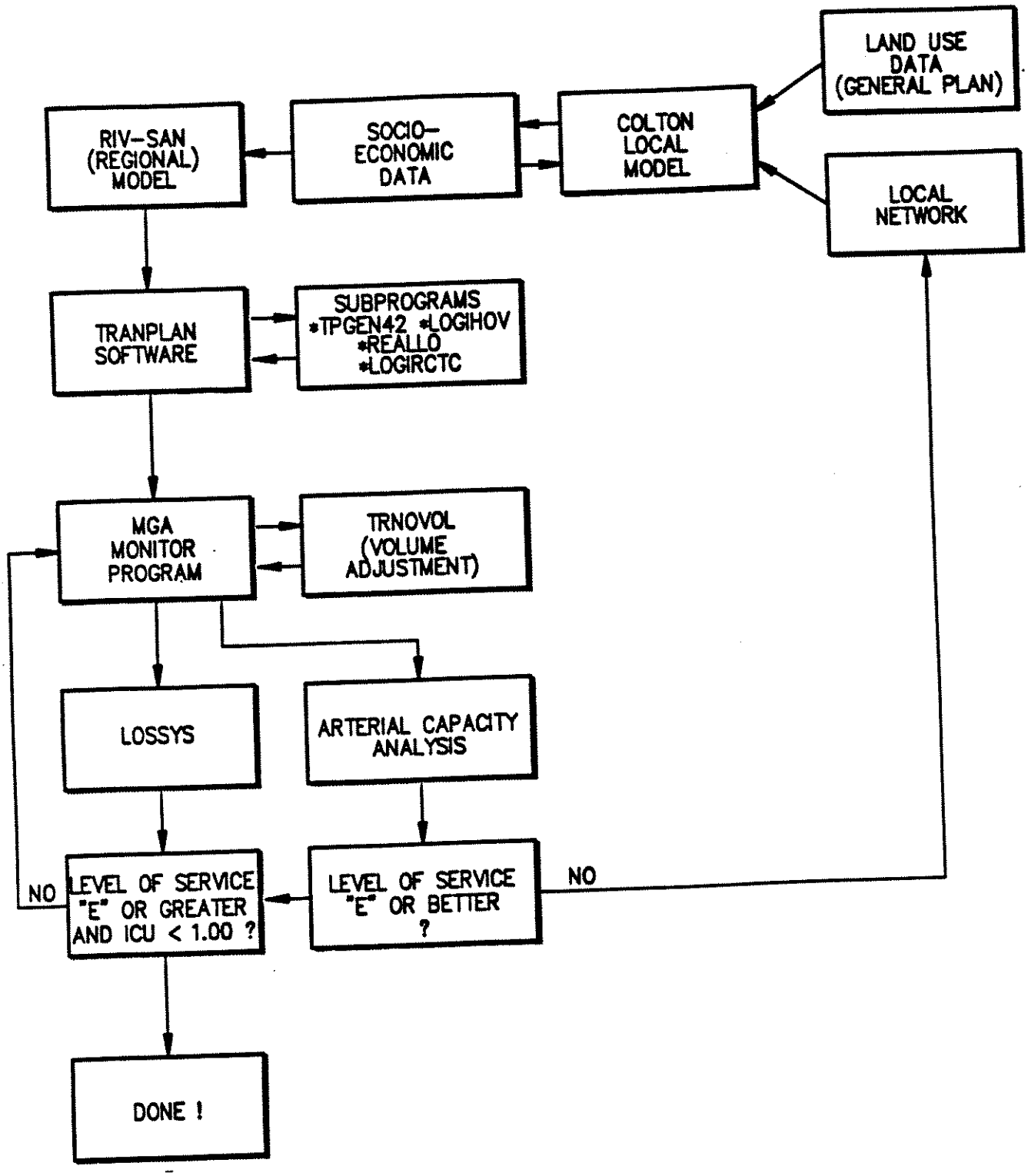
Appendix "H" contains a table developed by the Florida Department of Transportation which shows how arterial Levels of Service are determined. As shown on the table, arterial capacity analysis methodology is based on the peak hour/peak directional flow along the given stretch of the facility. This peak hour/peak directional flow is then adjusted depending on if it is a two-lane or a multi-lane facility and if the facility is divided or undivided. This adjusted volume, along with the number of signalized intersections per mile and the numbers of lanes of the arterial section, is subsequently used to determine the peak hour Level of Service for the given stretch of the arterial. For the freeway Level of Service computations, the adjusted volume along with the population of the greater area in which the freeway is located and the numbers of lanes of the freeway is used to determine the Level of Service of the freeway segment.

Appendix "H" contains the arterial Level of Service output sheets which is based on the Florida methodology for the without and with circulation element scenarios. The Year 2010 a.m. peak hour/peak directional adjusted volumes and Levels of Service for the arterial segments are shown in the fourth-to-last and third-to-last, respectively, columns on the table. The Year 2010 p.m. peak hour/peak directional adjusted traffic volumes and corresponding Levels of Service are shown on the second-to-last and last columns, respectively, of the table.

RECOMMENDATION OF CIRCULATION PLAN

The recommendation of the final circulation plan of the circulation element involved a trial and error process. This process involved testing many scenarios for Year 2010 in terms of the highway system of the greater Colton vicinity.

Various scenarios tested included street widenings, intersection improvements, and the testing of proposed street extensions. During the process of testing each scenario, capacity analysis on both the study intersections and study arterials was necessary. All intersections are required to operate at a Level of Service of "E" or better and an ICU of below 1.00. The study arterials were required to operate at Level of Service of "E" or better as well. The capacities for the Colton model are determined by the numbers of lanes of all arterials. In reality, the intersections govern the capacity of arterials. However, the TRANPLAN software currently does not contain traffic assignment algorithms which determine street capacity from the adjacent intersection capacities. Arterial Level of Service analysis was conducted before the intersection Level of Service analysis for each Year 2010 scenario tested. If during a scenario any of the study arterials failed to operate at Level of Service "E" or better, the arterial was given more lanes and the Year 2010 model was rerun. Once all the study arterials operated at a Level of Service of "E" or better, the intersection capacity analysis was subsequently performed. If any of the study intersections failed to operate at a Level of Service of "E" or better and/or above a ICU value of 1.00, the study intersection was mitigated by providing more approach lanes, altering the intersection's phasing sequence or adjusting the intersection's cycle length by trial and error procedures until all intersections operated adequately. Once it was determined that all study arterials and study intersections justified the Level of Service criteria of "E" or better and ICU of below 1.00, a final circulation plan was recommended. The flow chart entitled "Colton Traffic Modeling Process" on the following page diagrammatically shows the trial and error process involved in the testing the various circulation scenarios used in devising the final recommended circulation plan.



mga

COLTON TRAFFIC MODELLING PROCESS

COLTTMP.DWG

Figures 2A - 2E of the Circulation Element contain the final recommended circulation plan. Figures 2A and 2B show the functional classifications of the recommended circulation plan. Figures 2C - 2E show the typical street cross sections for all major facilities classified as arterials or collectors within the City of Colton. The typical street cross sections of these facilities shown on Figure 2E are deemed necessary in order to provide adequate capacity for the anticipated Year 2010 infrastructure demand for the City of Colton. These recommended typical street cross sections will fit within the existing rights of way for all the respective facilities requiring improvements. Therefore, right of way acquisition is not expected to be necessary.

fln: colcir.met

RESOLUTION NO. R-48-93

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF COLTON ADOPTING AN AMENDMENT TO THE CITY'S GENERAL PLAN BY UPDATING THE CIRCULATION ELEMENT (FILE INDEX NUMBER D-52-92).

WHEREAS, staff has coordinated the preparation of an update to the City's Circulation Element and an Environmental Impact Report to address impacts that may be generated by the update and an update to the schedule of developer impact fees; and

WHEREAS, the City Council of the City of Colton did consider the Amendment to the General Plan and accompanying Environmental Impact Report and fee schedule proposed for the City of Colton, File Index Number D-52-92; and

WHEREAS, a public hearing, as required by law, was held on the proposed amendment and Environmental Impact Report by the City Council on June 15, 1993.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Colton does hereby adopt a General Plan amendment to update the Circulation Element and the accompanying Environmental Impact Report and adoption of the 50% category of traffic impact fees outlined in the Long Range Developer Impact fee program.

PASSED, APPROVED, AND ADOPTED this 15th day of June, 1993.

Frank A. Gonzales

FRANK A. GONZALES
Mayor
City of Colton

ATTEST:

Helen A. Ramos

HELEN A. RAMOS
City Clerk
City of Colton

STATE OF CALIFORNIA)
COUNTY OF SAN BERNARDINO) **ss.**
CITY OF COLTON)

I, **HELEN A. RAMOS,** City Clerk of the City of Colton, California, DO HEREBY CERTIFY that the foregoing Resolution was duly adopted by the City Council of said City, and was approved by the Mayor of said City, at a regular meeting of said City Council held on the 15th of June, 1993, and that it was so adopted as follows:

AYES: COUNCILMEMBER: BENNETT, SANDOVAL, RIOS, CISNEROS, COOK, BELTRAN AND MAYOR GONZALES

NOES: COUNCILMEMBER: NONE

ABSENT: COUNCILMEMBER: NONE

(SEAL)

Teresa S. Delgado, Deputy
Teresa Delgado
for HELEN A. RAMOS, CMC
City Clerk
City of Colton

STATE OF CALIFORNIA)
COUNTY OF SAN BERNARDINO) **ss.**
CITY OF COLTON)

I, **HELEN A. RAMOS,** City Clerk of the City of Colton, California, DO HEREBY CERTIFY that the above and foregoing is a full, true and correct copy of Resolution No. R-48-93 and that the same has not been amended or repealed.

DATED: June 17, 1993.

(SEAL)

Teresa S. Delgado, Deputy
Teresa Delgado
for HELEN A. RAMOS, CMC
City Clerk
City of Colton