

City of Seal Beach



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## ***Circulation Element***



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## Summary

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This section summarizes the existing traffic conditions, future traffic impacts, and future circulation recommendations.

### Existing Traffic Conditions

The study area roadway links currently operate within acceptable Levels of Service, except for the following study area roadway links that operate at Level of Service F:

- Pacific Coast Highway, North City Limits to 1st Street
- Pacific Coast Highway, 1st Street to 5th Street
- Pacific Coast Highway, 5th Street to Marina Drive
- Pacific Coast Highway, Marina Drive to Bolsa Avenue
- Pacific Coast Highway, Bolsa Avenue to Seal Beach Boulevard
- Pacific Coast Highway, South of Seal Beach Boulevard

The study area intersections currently operate at Level of Service D or better during the peak hours, except for the following study area intersections that currently operate at Level of Service E/F during the peak hours:

- Pacific Coast Highway (NS) at:
  - 5th Street (EW)
- Seal Beach Boulevard (NS) at:
  - I-405 Freeway NB Ramps (EW)
  - I-405 Freeway SB Ramps (EW)
  - Westminster Avenue (EW)

### Future Traffic Impacts

For Year 2025 traffic conditions, the roadway links in the vicinity of the site are projected to operate within acceptable Levels of Service, except for the following study area roadway links that are projected to operate at Level of Service F:

- Pacific Coast Highway, North City Limits to 1st Street
- Pacific Coast Highway, 1st Street to 5th Street
- Pacific Coast Highway, 5th Street to Marina Drive



- Pacific Coast Highway, Marina Drive to Bolsa Avenue
- Pacific Coast Highway, Bolsa Avenue to Seal Beach Boulevard
- Pacific Coast Highway, South of Seal Beach Boulevard

For Year 2025 traffic conditions, the study area intersections are projected to operate at Level of Service D or better during the peak hours, except for the following study area intersections which are projected to operate at Level of Service E/F during the peak hours, without improvements:

- Pacific Coast Highway (NS) at:
  - 1st Street (EW)
  - 5th Street (EW)
  - Marina Drive (EW)
  - Main Street/Bolsa Avenue (EW)
  - Seal Beach Boulevard (EW)
- Seal Beach Boulevard (NS) at:
  - I-405 Freeway NB Ramps (EW)
  - I-405 Freeway SB Ramps (EW)
  - Westminster Avenue (EW)

The study area intersections that are projected to operate worse than Level of Service D (with improvements) are all located along Pacific Coast Highway (SR 1). The relatively high levels of traffic along this corridor are a direct result of increased development outside of the City of Seal Beach and the congestion along the San Diego (I-405) Freeway. The City of Seal Beach General Plan Circulation Element and Orange County Master Plan of Arterial Highways (MPAH) depict Pacific Coast Highway (SR 1) as a Primary highway (4 lanes divided). As a Primary highway (4 lanes divided), there is insufficient capacity along Pacific Coast Highway (SR 1) to accommodate the existing as well as future traffic volumes.

## Future Circulation Recommendations

The following measures are recommended in the study area:

1. Amend the Orange County Master Plan of Arterial Highways (MPAH) to delete 1<sup>st</sup> Street as a Primary (100 foot right-of-way) between Pacific Coast Highway (SR 1) and Westminster Avenue.



2. Amend the Orange County MPAH to delete the Edinger Avenue extension as a Primary (100 foot right-of-way) from its existing terminus to Pacific Coast Highway.
3. The following study area intersection improvements should be included within the City of Seal Beach Capital Improvement Program (CIP):
  - Seal Beach Boulevard (NS) at Lampson Avenue (EW):
    - Additional Southbound Through Lane
  - Seal Beach Boulevard (NS) at I-405 Freeway NB Ramps (EW):
    - Additional Northbound Through Lane – Bridge Widening
    - Additional Southbound Through Lane – Bridge Widening
  - Seal Beach Boulevard (NS) at I-405 Freeway SB Ramps (EW):
    - Additional Northbound Through Lane – Bridge Widening
    - Additional Southbound Left Turn Lane
    - Additional Southbound Through Lane – Bridge Widening
  - Seal Beach Boulevard (NS) at Westminster Avenue (EW):
    - Northbound Left Turn Lane and Three Through Lanes
    - Additional Southbound Left Turn Lane
    - Additional Eastbound Left Turn Lane
    - Additional Eastbound Through Lane
    - Additional Westbound Left Turn Lane
4. It should be noted that all of the improvements above have previously been included as recommendations within recent studies conducted in the study area. The City of Seal Beach should periodically review traffic operations in the study area to assure that the traffic operations are satisfactory and environmental impacts are minimized and/or mitigated.



# Purpose and Scope

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## Statutory Requirements

Government Code §65302(b) requires a Circulation Element in all city general plans, as follows:

“...a circulation element consisting of the general location and extent of existing and proposed major thoroughfares, transportation routes, terminals, and other local public utilities and facilities, all correlated with the land use element of the plan.”

The Circulation Element of the City of Seal Beach General Plan serves as the City’s primary guide for transportation planning. The Circulation Element is concerned with accommodating the transportation needs of those living, working, and visiting the City. Its objective is to articulate the City’s vision and plans for the ongoing development and maintenance of a comprehensive circulation network that will efficiently move people and goods throughout the City of Seal Beach and the surrounding region.

The Circulation Element focuses on roadways and other transportation modes, including public transit, railroads, and bicycle paths, that provide a full range of travel options. Also included is an assessment of the City’s current roadway system and recommendations for the improvements necessary to maintain acceptable Levels of Service on this system throughout the Year 2025.

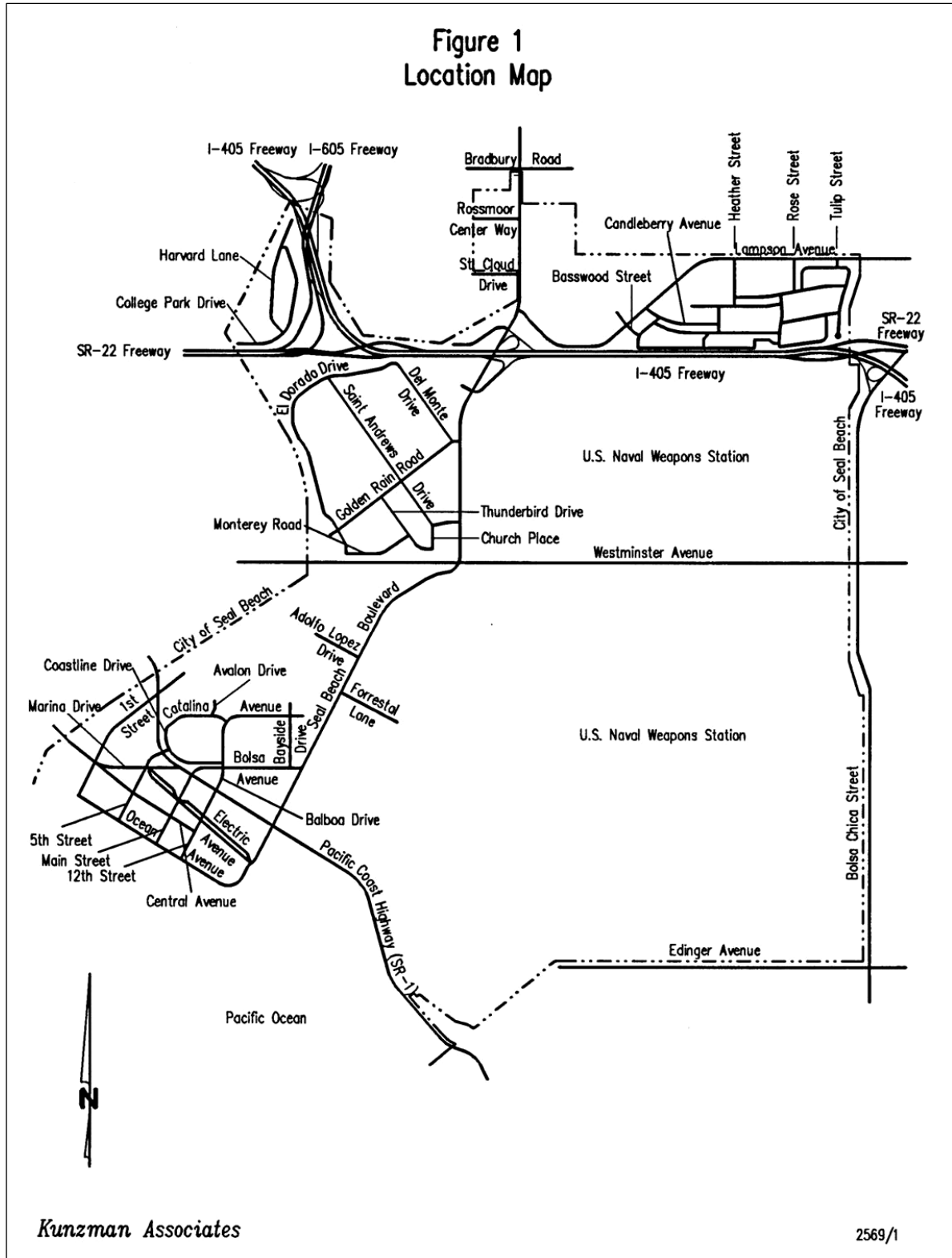
## Planning Areas

The City of Seal Beach (see Circulation - Figure 1) has been divided into five planning areas, as follows (see Circulation - Figure 2):

- Planning Area 1 - Old Town, Surfside
- Planning Area 2 - Hellman Ranch, Boeing, The Hill
- Planning Area 3 - Leisure World
- Planning Area 4 - College Park, Rossmoor, Bixby
- Planning Area 5 - U.S. Naval Weapons Station

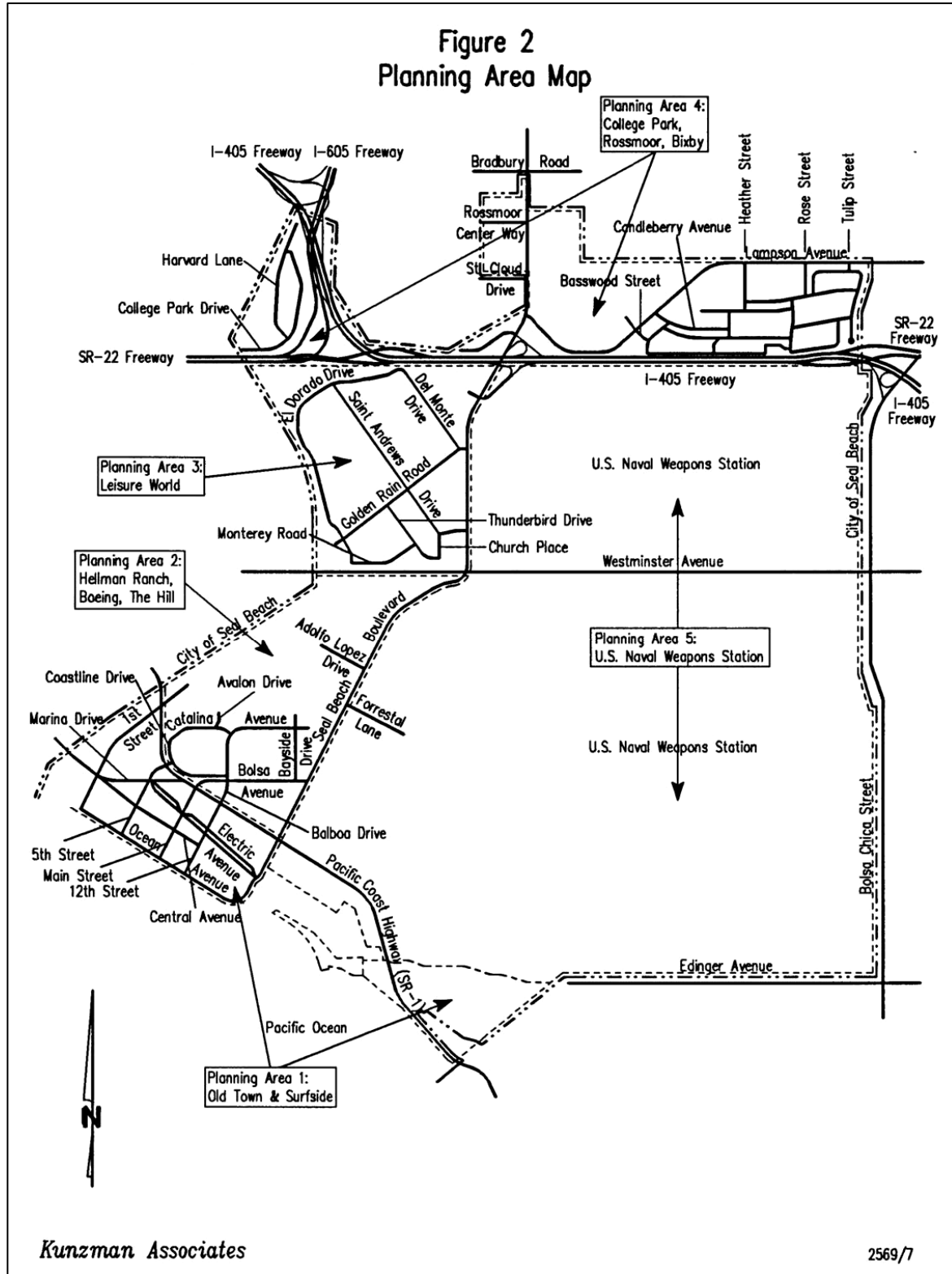






Circulation - Figure 1 - Location Map





Circulation - Figure 2 - Location Map



### Related Plans and Programs

Several transportation plans prepared by the County of Orange focus on the regional transportation system. Strategies to handle anticipated traffic levels from future development are discussed. Plans and programs related to the Circulation Element include the following:

- County of Orange Master Plan of Highways (MPAH)

The County of Orange Master Plan of Arterial Highways (MPAH) forms a part of the Orange County General Plan and designates the arterial system in the Circulation Element of the General Plan. Defined according to specific arterial functional classifications, the MPAH defines the intended future roadway system for the County. Cities within the County are expected to achieve consistency with the MPAH in individual General Plan circulation elements. The Seal Beach Circulation Element proposes no further extension to First Street as a Primary Highway and no extension of Edinger Avenue. To implement this change to the MPAH, approval from the Orange County Transportation Authority (OCTA) is required.

- County of Orange Congestion Management Plan (CMP)

Urbanized areas such as Orange County are required to adopt a Congestion Management Plan (CMP). The goals of the CMP are to reduce traffic congestion and to provide a mechanism for coordinating land use development and transportation improvement decisions. For the most part, the Orange County CMP is a composite of local agency submittals in which each local jurisdiction develops the required data in accordance with the guidelines established by the Orange County Transportation Authority (OCTA). The OCTA compiles the data and submits the results to the Southern California Association of Governments (SCAG) for a finding of regional consistency. Pacific Coast Highway is the only road in Seal Beach that is a component of the Congestion Management Plan system.

- County of Orange Growth Management Plan (Measure M)

Measure M, the revised Traffic Improvement and Growth Management Ordinance, authorized by the imposition of a one-half percent sales tax to fund needed transportation improvements. To be eligible to receive Measure M funds, local jurisdictions must satisfy a variety of requirements as



set out in the Orange County Local Transportation Authority (LTA) Ordinance No. 2. LTA Ordinance No. 2 requires local jurisdictions to adopt a traffic circulation plan consistent with the MPAH, adopt and adequately fund a local transportation fee program, satisfy maintenance requirements, adopt a Growth Management Element, and adopt a seven-year capital improvement program that includes all transportation projects funded either partially or fully by Measure M funds.

- County of Orange Master Plan of Countywide Bikeways

Also part of the County of Orange General Plan, the Master Plan of Countywide Bikeways designates various classes of bike routes throughout the County. One of the primary considerations of this plan is to provide continuity throughout the County and to provide consistency between countywide and local jurisdiction bikeway plans. The Circulation Element contains a bikeway plan that utilizes the countywide classification system and links to County routes.



## Existing Traffic Conditions

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The traffic conditions as they exist today are discussed below and illustrated on Circulation - Figure 3 through Circulation - Figure 1.

## Existing Travel Lanes and Intersection Controls

Circulation - Figure 3 through Circulation - Figure 12 identify the existing roadway conditions for arterials within the City of Seal Beach. The number of through lanes for existing roadways, by Planning Area, are illustrated on Circulation - Figure 3 through Circulation - Figure 7. The existing intersection controls are identified by Planning Area on Circulation - Figure 8 through Circulation - Figure 12.

## Existing Average Daily Traffic (ADT) Volumes

All tables and figures in the Circulation Element reflect information obtained by conducting a detailed traffic analysis prepared by Kunzman Associates in March 2003 for the City. Where daily traffic counts were not available and where peak hour counts were available, daily traffic counts were estimated by Kunzman Associates from the peak hour counts.

## Existing Volume to Capacity Ratios

Roadway capacity is generally defined as the number of vehicles that can be reasonably expected to pass over a given section of road in a given time period. Congestion, high accident rates, the quality of traffic flow (Level of Service), and environmental acceptability all come into play in defining a particular roadway's effective capacity. It is possible to identify maximum desirable volumes for typical roadway types based on the number of roadway travel lanes. These daily volumes reflect estimates of the amount of daily traffic that will result in peak hour traffic volumes equal to the maximum desirable capacity of each roadway type. In the City of Seal Beach, Level of Service D is the minimum acceptable condition that should be maintained along roadway segments.



**Circulation - Table 1 - Existing Average Daily Traffic (ADT) Volumes and Volume to Capacity Ratios**

Roadway	Segment	No. of Lanes	Capacity	ADT	V/C Ratio	LOS
1st Street	Marina Dr. to Pacific Coast Hwy	2U	12,500	2,400	0.19	A
	East of Pacific Coast Hwy.	2U	12,500	200	0.02	A
5th Street	Marina Drive to Pacific Coast Hwy.	4U	25,000	5,200	0.21	A
	Pacific Coast Hwy to Coastline Dr.	2U	12,500	3,100	0.25	A
Adolfo Lopez Dr	West of Seal Beach Blvd.	2U	12,500	1,400	0.11	A
Basswood St.	South of Lampson Ave.	2U	12,500	3,900	0.31	A
Bolsa Ave.	Pacific Coast Hwy to Seal Beach Blvd.	2U	12,500	5,900	0.47	A
Golden Rain Rd.	West of Seal Beach Blvd.	4D	37,500	13,200	0.35	A
Lampson Ave.	Seal Beach Blvd. to Basswood St.	4D	37,500	17,500	0.47	A
	Basswood St. to East City Limits	4D	37,500	11,000	0.29	A
Main St.	Electric Ave. to Pacific Coast Hwy	2U	12,500	5,500	0.44	A
Marina Ave.	West City Limits to Pacific Coast Hwy	4D	37,500	5,400	0.14	A
Pacific Coast Hwy	North City Limits to 1st St	4D	37,500	46,500	1.24	F
	1st St. to 5th St.	4D	37,500	46,000	1.23	F
	5th St. to Marina Dr.	4D	37,500	45,300	1.21	F
	Marina Dr. to Bolsa Ave.	4D	37,500	44,700	1.19	F
	Bolsa Ave. to Seal Beach Blvd.	4D	37,500	45,400	1.21	F
	South of Seal Beach Blvd.	4D	37,500	41,900	1.12	F
Rossmoor Center Way	West of Seal Beach Blvd.	2U	12,500	3,800	0.30	A
Seal Beach Blvd.	Bradbury to St. Cloud Dr.	6D	56,300	35,100	0.62	B
	St. Cloud Dr. to Lampson Ave.	6D	56,300	46,300	0.82	D
	Lampson Ave. to I-405 Fwy	6D	56,300	45,400	0.81	D
	I-405 Fwy to Golden Rain Rd.	6D	56,300	40,000	0.71	C
	Golden Rain Rd. to St. Andrews Dr.	6D	56,300	33,800	0.60	B
	St. Andrews Dr. to Westminster Ave.	6D	56,300	32,200	0.57	A
	Westminster Ave. to Adolfo Lopez Dr.	6D	56,300	28,000	0.50	A
	Adolfo Lopez Dr. to Bolsa Ave.	6D	56,300	26,800	0.48	A
	Bolsa Ave. to Pacific Coast Hwy.	6D	56,300	21,100	0.37	A
	Pacific Coast Hwy. to Electric Ave.	2U	12,500	7,500	0.60	A
St. Cloud Dr.	West of Seal Beach Blvd.	4U	25,000	9,300	0.37	A
Westminster Ave.	West City Limits to Road A	4D	37,500	23,100	0.62	B
	Road A to Seal Beach Blvd.	4D	37,500	23,200	0.62	B
	East of Seal Beach Blvd.	4D	37,500	22,500	0.60	A
	West of Bolsa Chica St.	4D	37,500	24,100	0.64	B



By dividing existing ADT volumes by the daily roadway capacities listed in Circulation - Table 2, existing volume-to-capacity ratios have been calculated and are shown in Circulation - Table 1. As may be seen in Circulation - Table 1, the study area roadway links currently operate within acceptable Levels of Service, except for the following study area roadway links that operate at Level of Service F:

- Pacific Coast Highway, North City Limits to 1st Street
- Pacific Coast Highway, 1<sup>st</sup> Street to 5<sup>th</sup> Street
- Pacific Coast Highway, 5<sup>th</sup> Street to Marina Drive
- Pacific Coast Highway, Marina Drive to Bolsa Avenue
- Pacific Coast Highway, Bolsa Avenue to Seal Beach Boulevard
- Pacific Coast Highway, South of Seal Beach Boulevard

### Existing Intersection Capacity Utilization

The technique used to assess the operation of an intersection is known as Intersection Capacity Utilization (ICU). To calculate an ICU value, the volume of traffic using the intersection is compared with the capacity of the intersection. An ICU value is usually expressed as a percent. The percent represents that portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity.

The ICUs for the existing traffic conditions have been calculated and are shown in Circulation - Table 3. Existing ICU values are based upon manual morning and evening peak hour turning movement counts made for the City of Seal Beach and Kunzman Associates in January/March/June/ September/ November, 2002 (see Circulation - Figure 13 through Circulation - Figure 14). Traffic count worksheets are provided in Appendix B of the Circulation Analysis.

There are two peak hours in a weekday. The morning peak hour is between 7:00 a.m. and 9:00 a.m., and the evening peak hour is between 4:00 p.m. and 6:00 p.m. The actual peak hour within the two-hour interval is the four consecutive 15-minute periods with the highest total volume when all movements are added together. Thus, the evening peak hour at one intersection may be 4:45 p.m. to 5:45 p.m. if those four consecutive 15-minute periods have the highest combined volume.



**Circulation - Table 2 - Roadway Capacities**

Facility Type	Number of Lanes	Capacity				
		LOS A	LOS B	LOS C	LOS D	LOS E
Principal	8 lanes divided	45,000	52,500	60,000	67,500	75,000
Major	6 lanes divided	33,900	39,400	45,000	50,600	56,300
Primary	4 lanes divided	22,500	26,300	30,000	33,800	37,500
Secondary	4 lanes undivided	15,000	17,500	20,000	22,500	25,000
Commuter	2 lanes undivided	7,500	8,800	10,000	11,300	12,500

Note: These are generalized capacities to be used for planning purposes only, and do not consider specific measures such as peak hour factors.

**Circulation - Table 3 - Existing Intersection Capacity Utilization (ICU) and Level of Service (LOS)**

Intersection	Traffic Control <sup>3</sup>	Intersection Approach Lanes <sup>1</sup>												Peak Hour ICU-LOS <sup>2</sup>	
		Northbound			Southbound			Eastbound			Westbound			AM	PM
		L	T	R	L	T	R	L	T	R	L	T	R		
Pacific Coast Hwy at:															
1st St. (EW)	TS	1	2	1	1	2	1	1.5	0.5	1	0	1	0	88.9-D	83.3-D
5th St. (EW)	TS	1	2	1	1	2	1	1	1	1	0	1	0	90.5-E	92.6-E
Marina Dr. (EW)	CSS	1	2	0	0	2	1	0	0	1	0	0	0	67.1-B	83.7-D
Main St./Bolsa Ave. (EW)	TS	1	2	1	1	2	1	1	1	1	1	1	1>	62.3-B	72.4-C
Seal Beach Blvd. (EW)	TS	1	2	1>	1	2	1	1	2	0	2	1	1	76.8-C	76.7-C
Seal Beach Blvd. (NS) at:															
Rossmoor Center Way (EW)	TS	1	3	0	1	3	0	1	1	0	0	1	0	39.9-A	60.2-B
St. Cloud Dr. (EW)	TS	1	3	0	1	3	0	1	0.5	1.5	1	1	0	63.9-B	76.2-C
Lampson Ave. (EW)	TS	0	3	1>	2	2	0	0	0	0	2	0	1>	73.6-C	63.1-B
I-405 Fwy NB Ramps (EW)	TS	2	2	1>>	1	2	1	1	1	1	1.5	0.5	1	68.9-B	101.3-F
I-405 Fwy SB Ramps (EW)	TS	1	2	1	1	2	0	0.5	0.5	1	1.5	0.5	1>>	92.6-E	100.0-E
Golden Rain Rd. (EW)	TS	1	3	0	0	3	1	2	0	1	0	0	0	45.4-A	51.4-A
Westminster Ave. (EW)	TS	1	3	0	1	3	1	1	2	1	1	2	1	92.6-E	90.7-E
Adolfo Lopez Dr. (EW)	CSS	1	3	0	0	3	1	1	0	1	0	0	0	30.0-A	31.0-A
Bolsa Ave. (EW)	TS	1	3	1	1	3	1	1	1	0	1	1	0	34.4-A	32.6-A
Basswood St. (NS) at:															
Lampson Ave. (EW)	TS	1	1	0	0	1	0	1	2	0	1	2	0	47.0-A	42.5-A

<sup>1</sup> When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane, there must be sufficient width for right turning vehicles outside the through lanes.

L=left, T=through, 4=right, >=right turn overlap, >>=free right turn

<sup>2</sup> ICU-LOS=Intersection Capacity Utilization-Level of Service

<sup>3</sup> TS=traffic signal

CSS=cross street stop





The technique used to calculate Intersection Capacity Utilization (ICU) is as follows. Lane capacity is 1,700 vehicles per lane per hour of green time for through and turn lanes. A total yellow clearance time of 5% is added. In the City of Seal Beach, Level of Service D is the minimum acceptable condition that should be maintained during the peak hours.

The study area intersections currently operate at Level of Service D or better during the peak hours, except for the following study area intersections that currently operate at Level of Service E/F during the peak hours:

- Pacific Coast Highway (NS) at:
  - 5th Street (EW)
- Seal Beach Boulevard (NS) at:
  - I-405 Freeway NB Ramps (EW)
  - I-405 Freeway SB Ramps (EW)
  - Westminster Avenue (EW)

Existing ICU worksheets are provided in Appendix C of the Traffic Analysis.

Comparison of volume to capacity ratios and corresponding Level of Service, and peak hour Intersection Capacity Utilization and corresponding Level of Service reveals significant differences. The differences between link volume to capacity ratios and peak hour ICU values is particularly pronounced when cross traffic is light. Volume to capacity ratios assume that all cross streets require 50% of the time to satisfy their demand, and assume that the subject street has 50% of the time available to it. The link volume to capacity ratios are a generalized indicator, while peak hour ICU actually represents what can be expected in the peak hour at intersections. Of the two indicators, the peak hour ICU value and corresponding LOS is by far the best measure of roadway performance.

## Existing Master Plan of Arterial Highways

Circulation - Figure 15 exhibits the City of Seal Beach General Plan Circulation Element. Existing roadways and future roadways are included in the Circulation Element of the General Plan and are graphically depicted on Circulation - Figure 15. This figure shows the nature and extent of arterial highways that are needed to serve adequately the ultimate development depicted by the Land Use Element of the General Plan.



### Existing and Proposed Bicycle Facilities

The bicycle facilities within the study area are depicted on Circulation - Figure 16 through Circulation - Figure 20 by Planning Area. The City of Seal Beach has established the following three classifications of bikeways that generally correspond with the Orange County Transportation Authority (OCTA) bikeway classifications:

- Class I Bikeway – Provides for bicycle travel on a right-of-way completely separated from the street.
- Class II Bikeway – Provides for a striped lane for one-way travel within the street right-of-way.
- Class III Bikeway – Provides for on-road, signed only bikeway.

The City of Seal Beach also has a Class III Bikeway designation. Class III Bikeways provide for on-road, signed only bikeways. These are special locations and are not included on the bike trail map.

### Existing Transit Service

The study area is currently served by Orange County Transportation Authority (OCTA) Routes 1, 21, 42, 60, 70, 164, and 701. In addition, Long Beach Transit Route 131 serves the study area. Circulation - Figure 21 through Circulation - Figure 1 illustrate the existing transit routes by Planning Area.

- Route 1 currently provides service along Pacific Coast Highway (SR-1).
- Route 21 currently provides service along Bolsa Chica Street and Edinger Avenue.
- Route 42 currently provides service along Seal Beach Boulevard, Electric Avenue, Main Street, Bolsa Avenue, Balboa Drive, and Pacific Coast Highway (SR-1).
- Route 60 currently provides service along Westminster Avenue.
- Route 70 currently provides service along Bolsa Chica Street and Edinger Avenue.
- Route 131 currently provides service along Pacific Coast Highway (SR-1), Main Street, Electric Avenue, and 5th Street.



- Route 164 currently provides service along Lampson Avenue, Seal Beach Boulevard, and Golden Rain Road.
- Route 211 currently provides service along Lampson Avenue and Seal Beach Boulevard.
- Route 701 currently provides service along Lampson Avenue and Seal Beach Boulevard.

A park-and-ride facility that allows commuters to meet and park their personal vehicles at one location and utilize carpools, vanpools, or commuter bus service is located along Lampson Avenue (Planning Area 4).

### Existing Rail Service

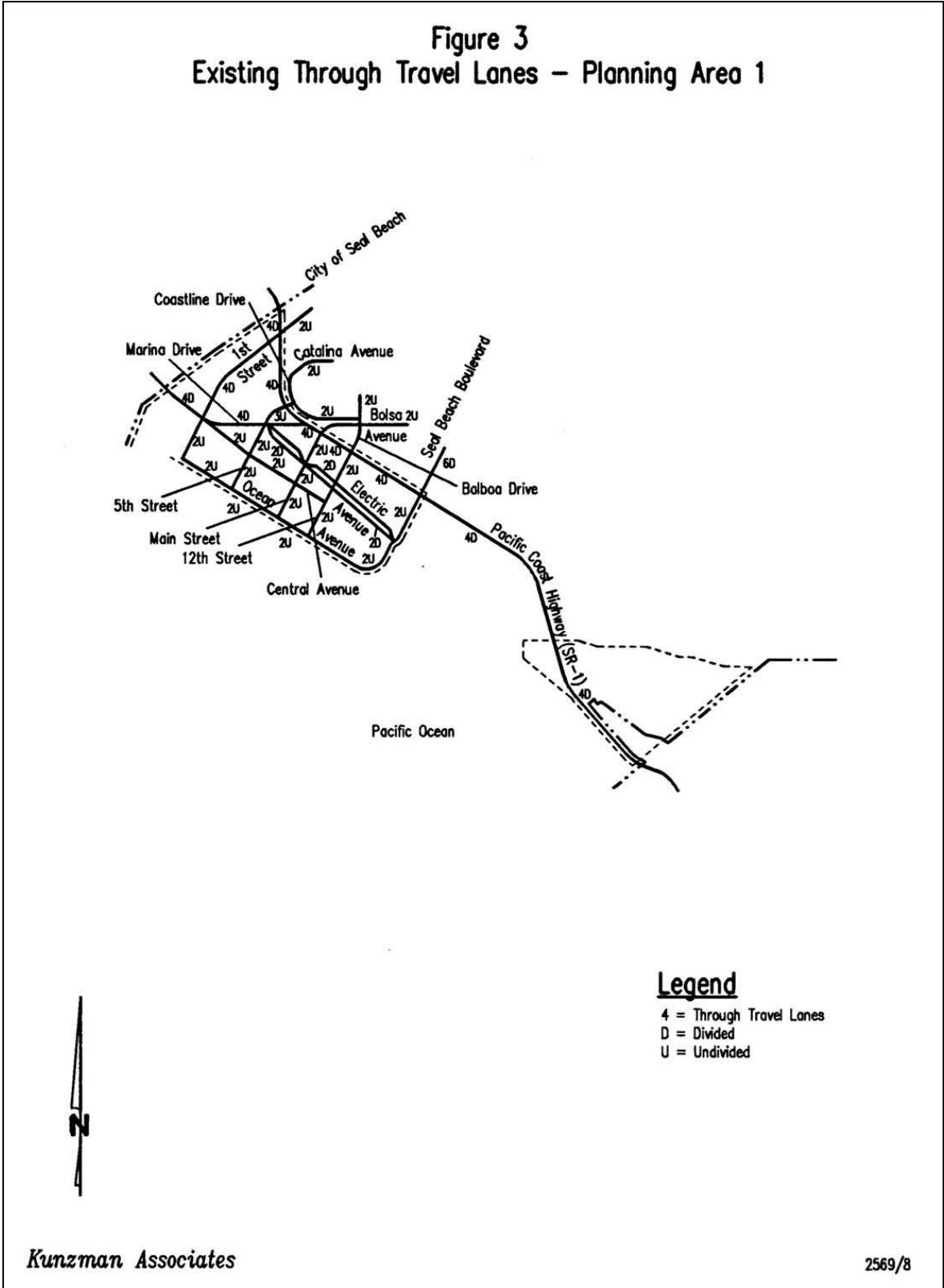
The U.S. Navy currently operates rail service generally within Planning Area 5 in the U.S. Naval Weapons Station.

### Existing Truck Routes

Designated truck routes in the City of Seal Beach are illustrated on Circulation - Figure 26.



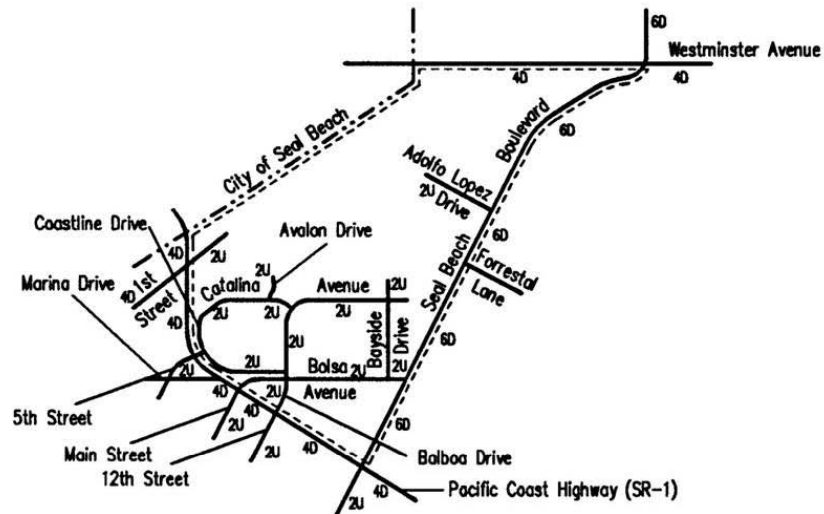
Figure 3  
Existing Through Travel Lanes – Planning Area 1



Circulation - Figure 3 - Existing Through Travel Lanes – Planning Area 1



**Figure 4**  
**Existing Through Travel Lanes – Planning Area 2**



**Legend**

- 4 = Through Travel Lanes
- D = Divided
- U = Undivided

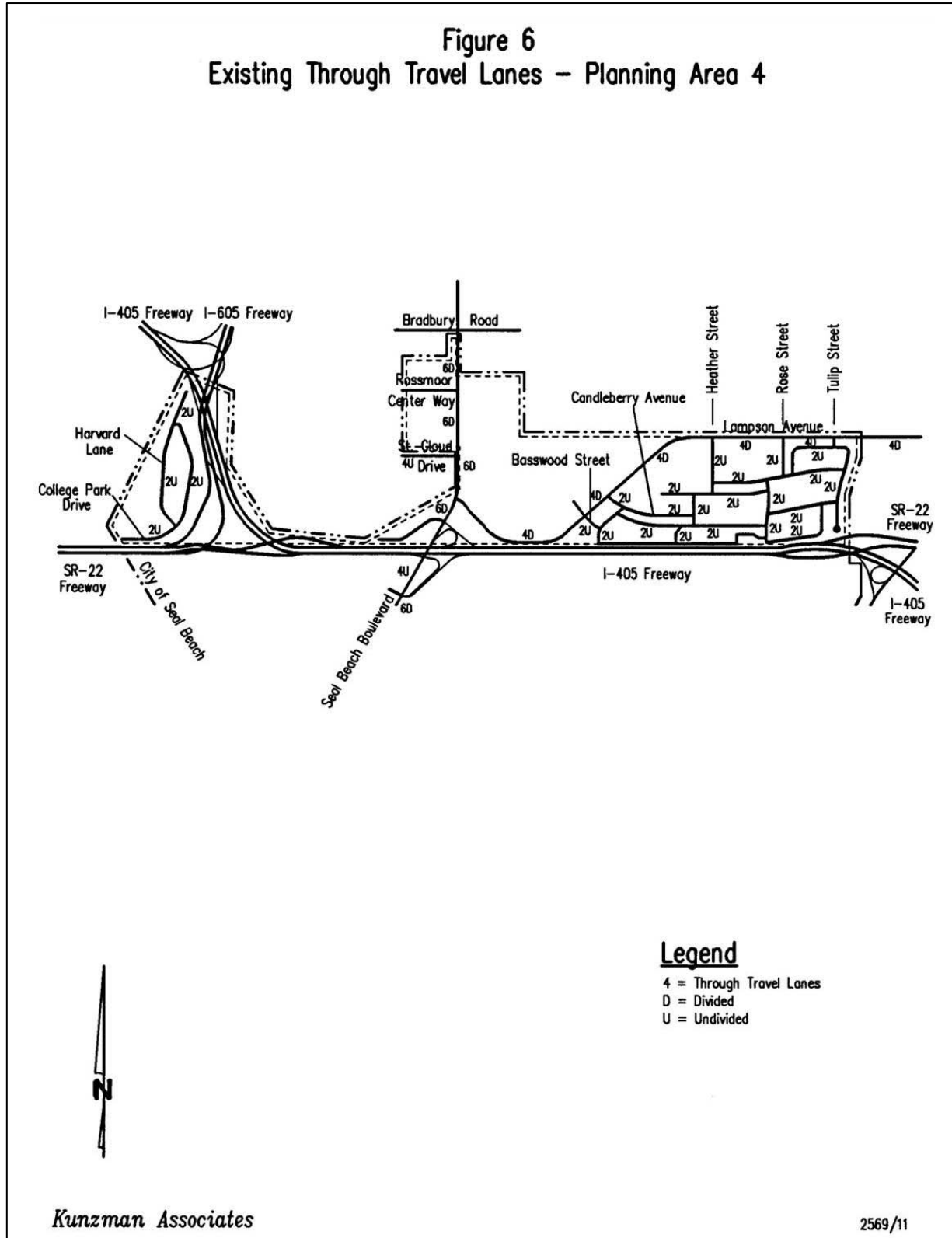
*Kunzman Associates*

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**Circulation - Figure 4 - Existing Through Travel Lanes – Planning Area 2**

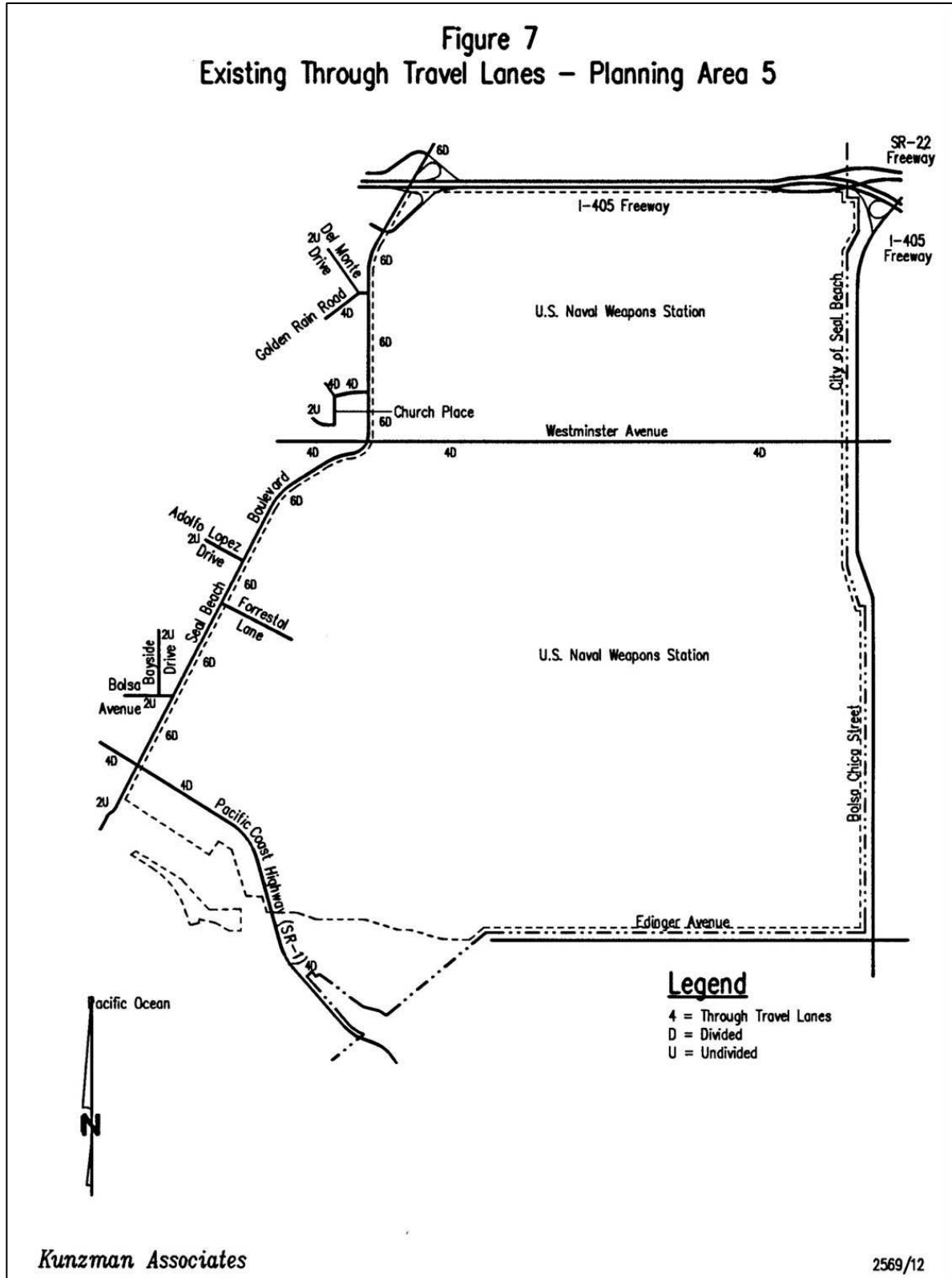


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Circulation - Figure 6 - Existing Through Travel Lanes – Planning Area 5

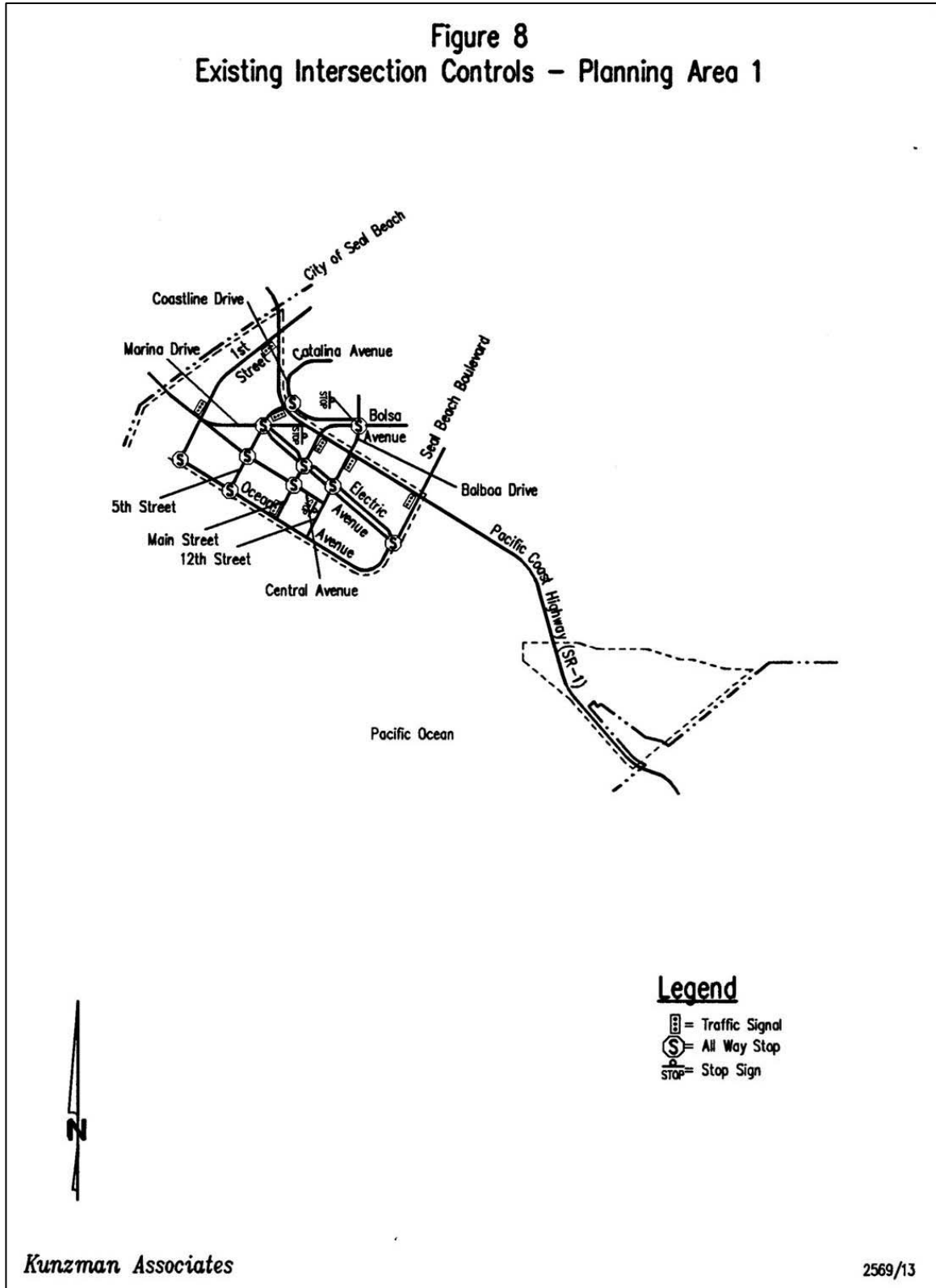




Circulation - Figure 7 - Existing Through Travel Lanes – Planning Area 5



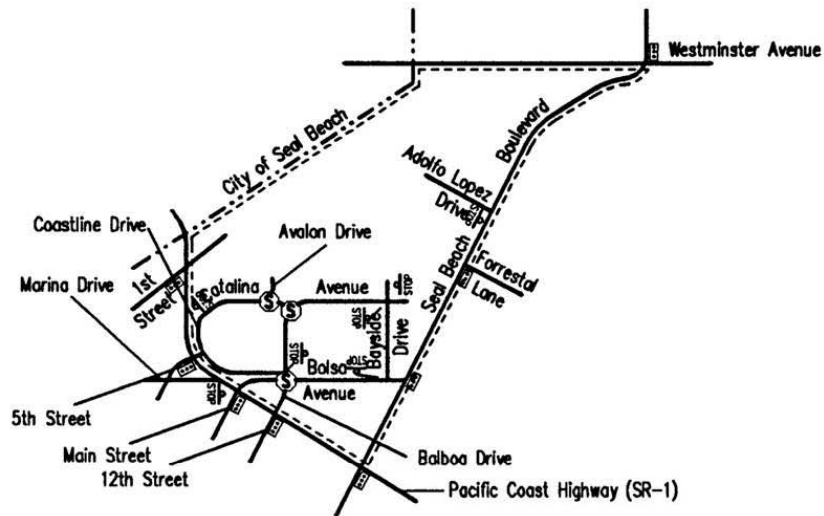







Circulation - Figure 8 - Existing Intersection Controls – Planning Area 1



**Figure 9**  
**Existing Intersection Controls – Planning Area 2**



**Legend**

-  = Traffic Signal
-  = All Way Stop
-  = Stop Sign

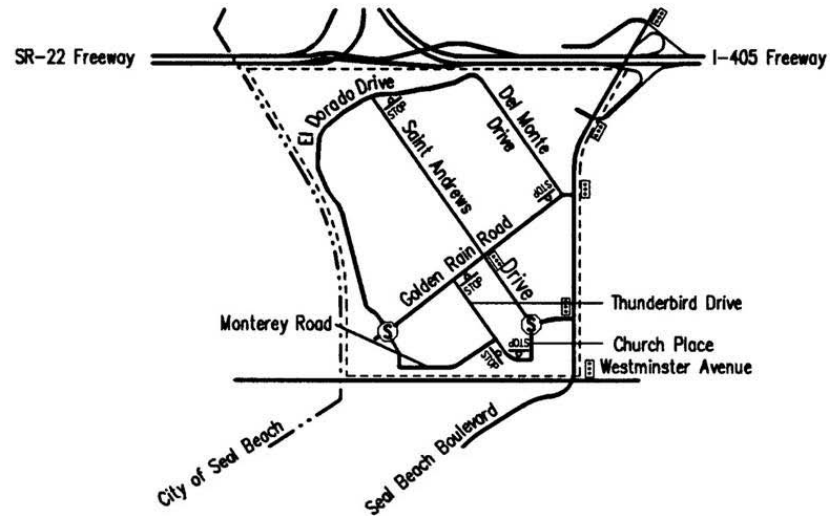
*Kunzman Associates*

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**Circulation - Figure 9 - Existing Intersection Controls – Planning Area 2**



**Figure 10**  
**Existing Intersection Controls – Planning Area 3**



**Legend**

-  = Traffic Signal
-  = All Way Stop
-  = Stop Sign

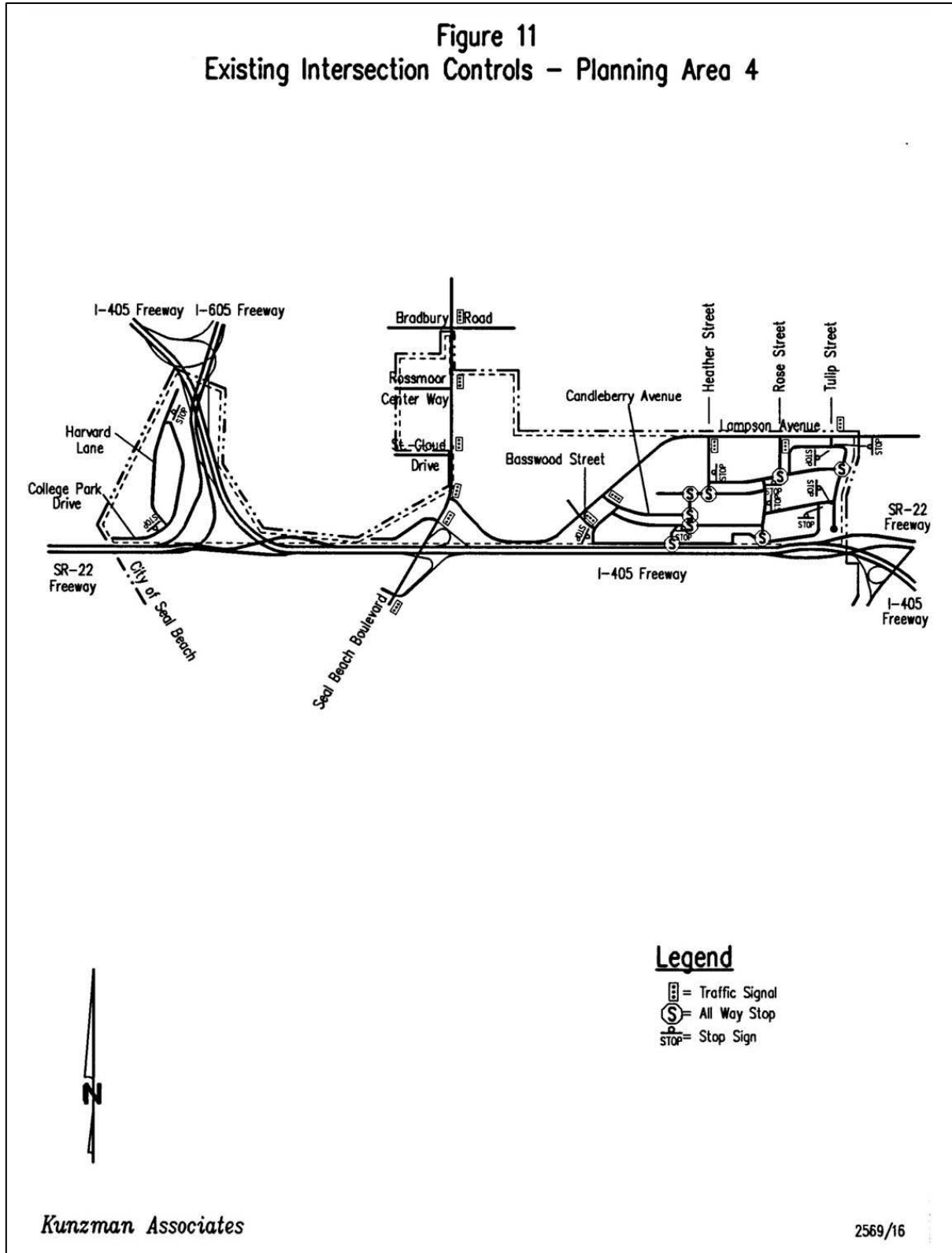
*Kunzman Associates*

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**Circulation - Figure 10 - Existing Intersection Controls – Planning Area 3**

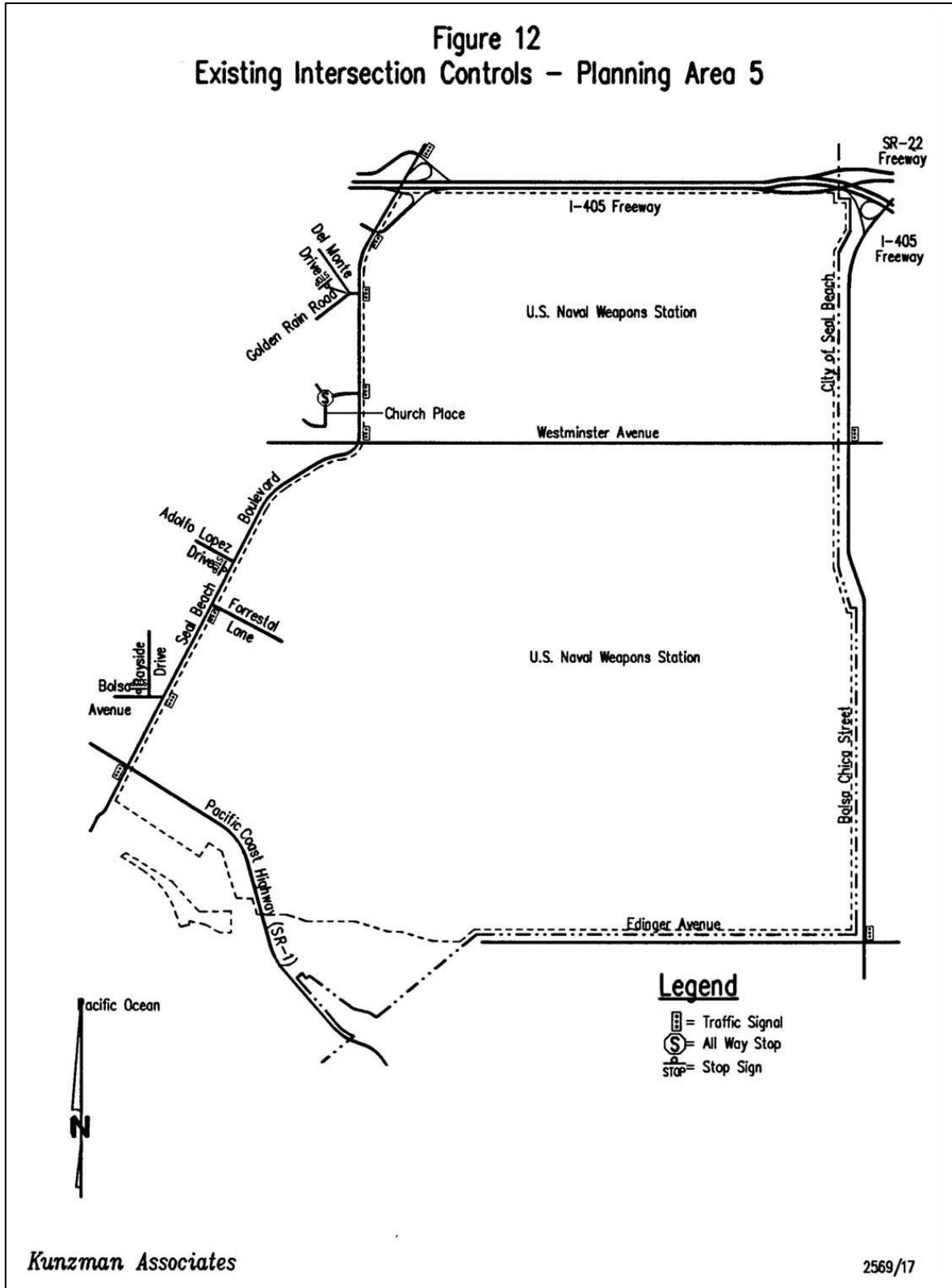


Figure 11  
Existing Intersection Controls – Planning Area 4



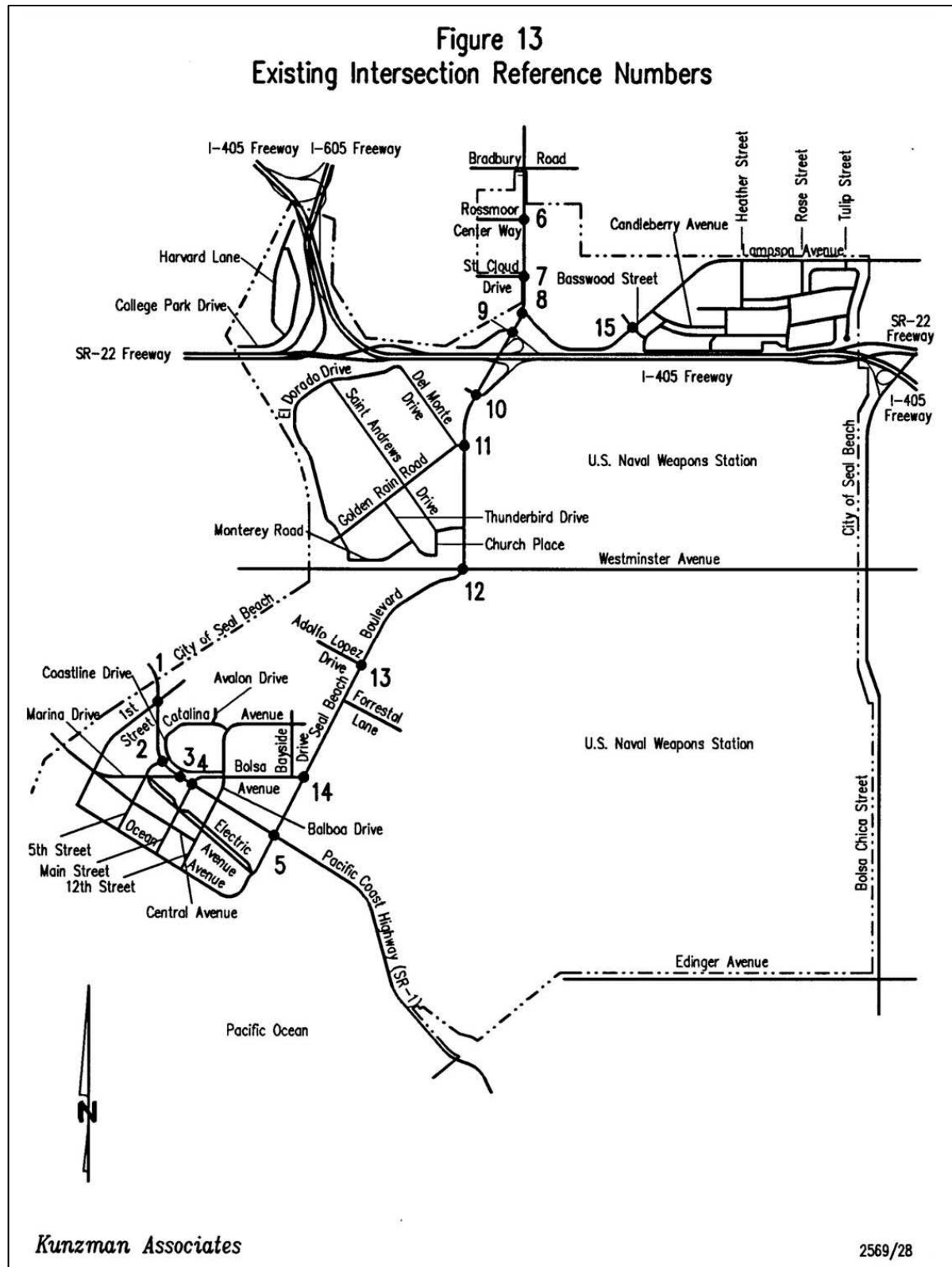
Circulation - Figure 11 - Existing Intersection Controls – Planning Area 4





Circulation - Figure 12 - Existing Intersection Controls – Planning Area 5



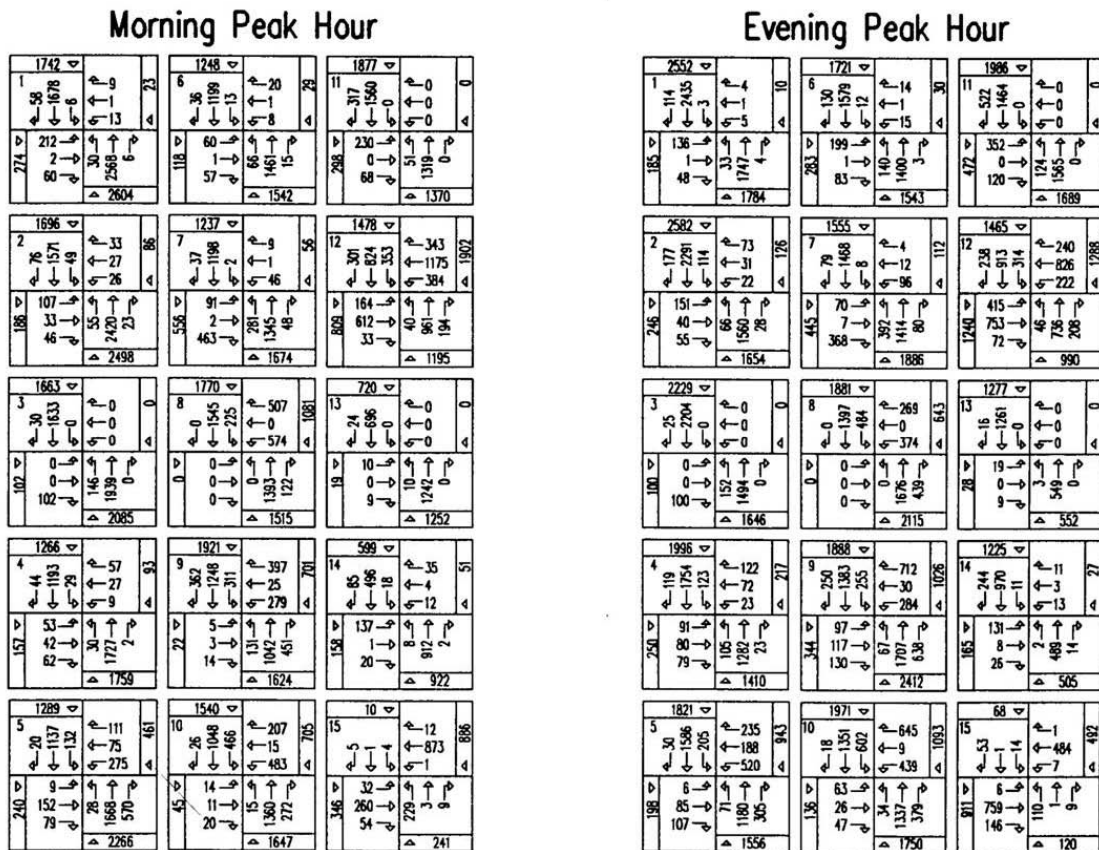


Circulation - Figure 13 - Existing Intersection Reference Numbers





Figure 14  
Existing Peak Hour Turning Movement Volumes

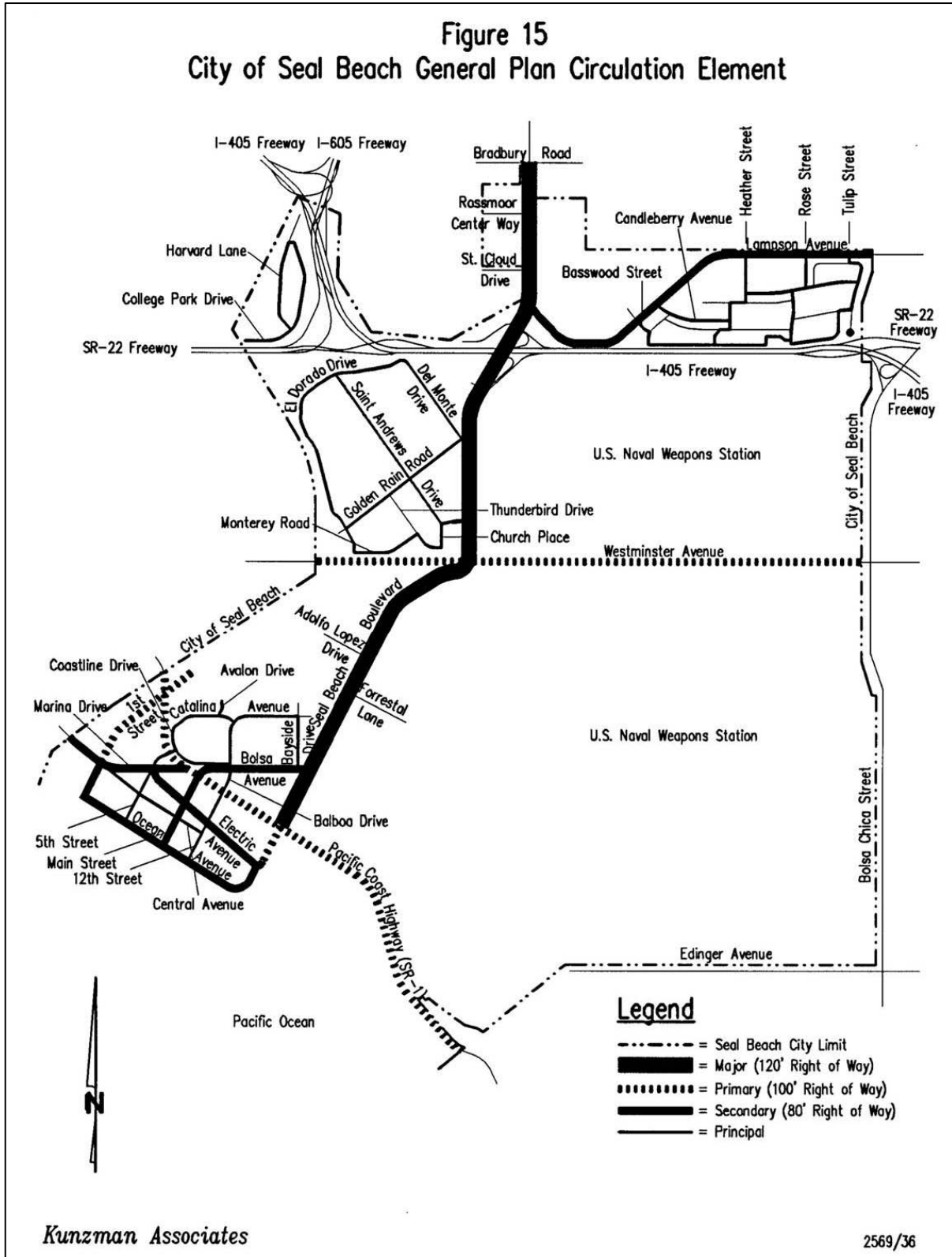


*Kunzman Associates*

Intersection reference numbers are in upper left corner of turning movement boxes.

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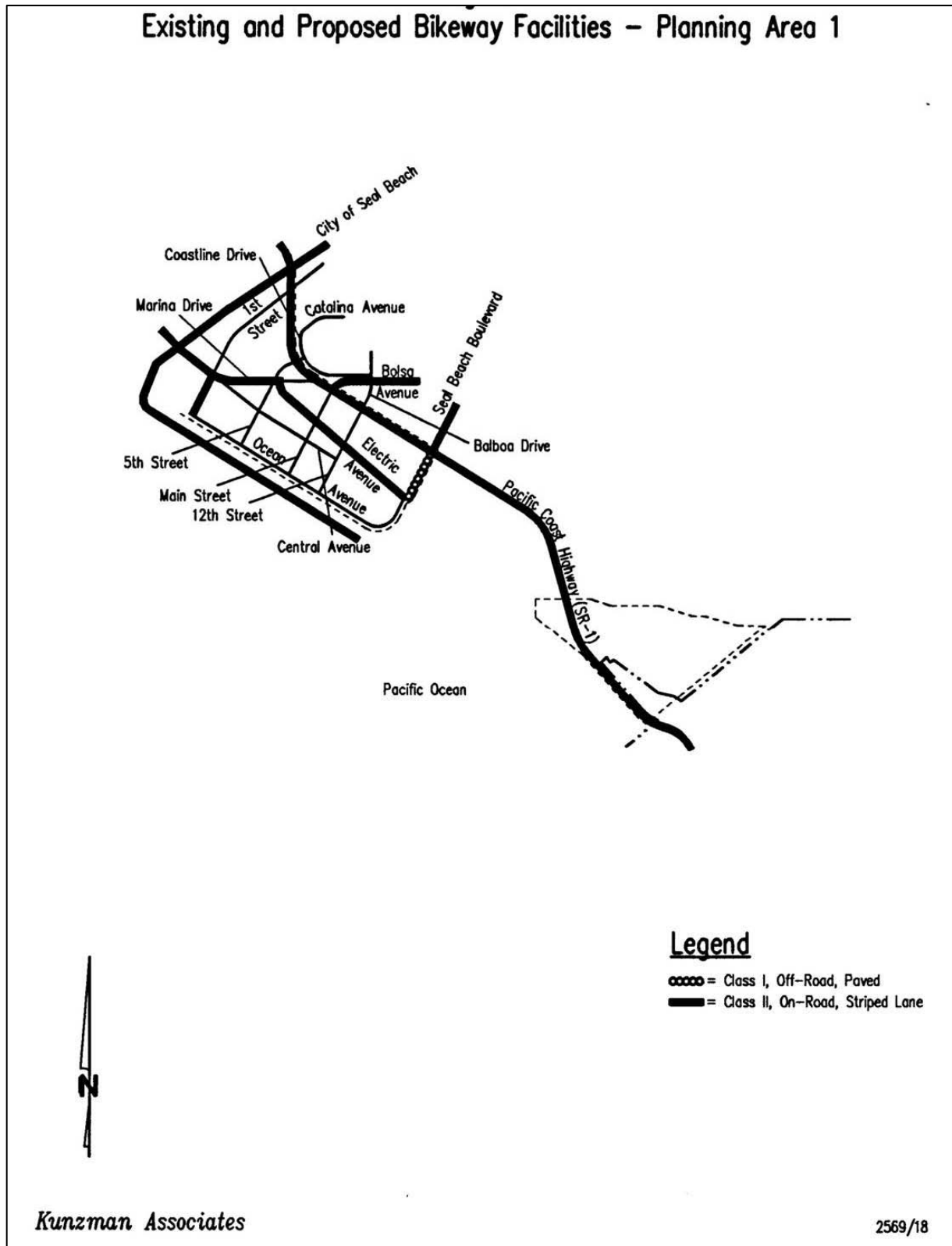
**Figure 15**  
**City of Seal Beach General Plan Circulation Element**



**Circulation - Figure 15 - General Plan Circulation Element**

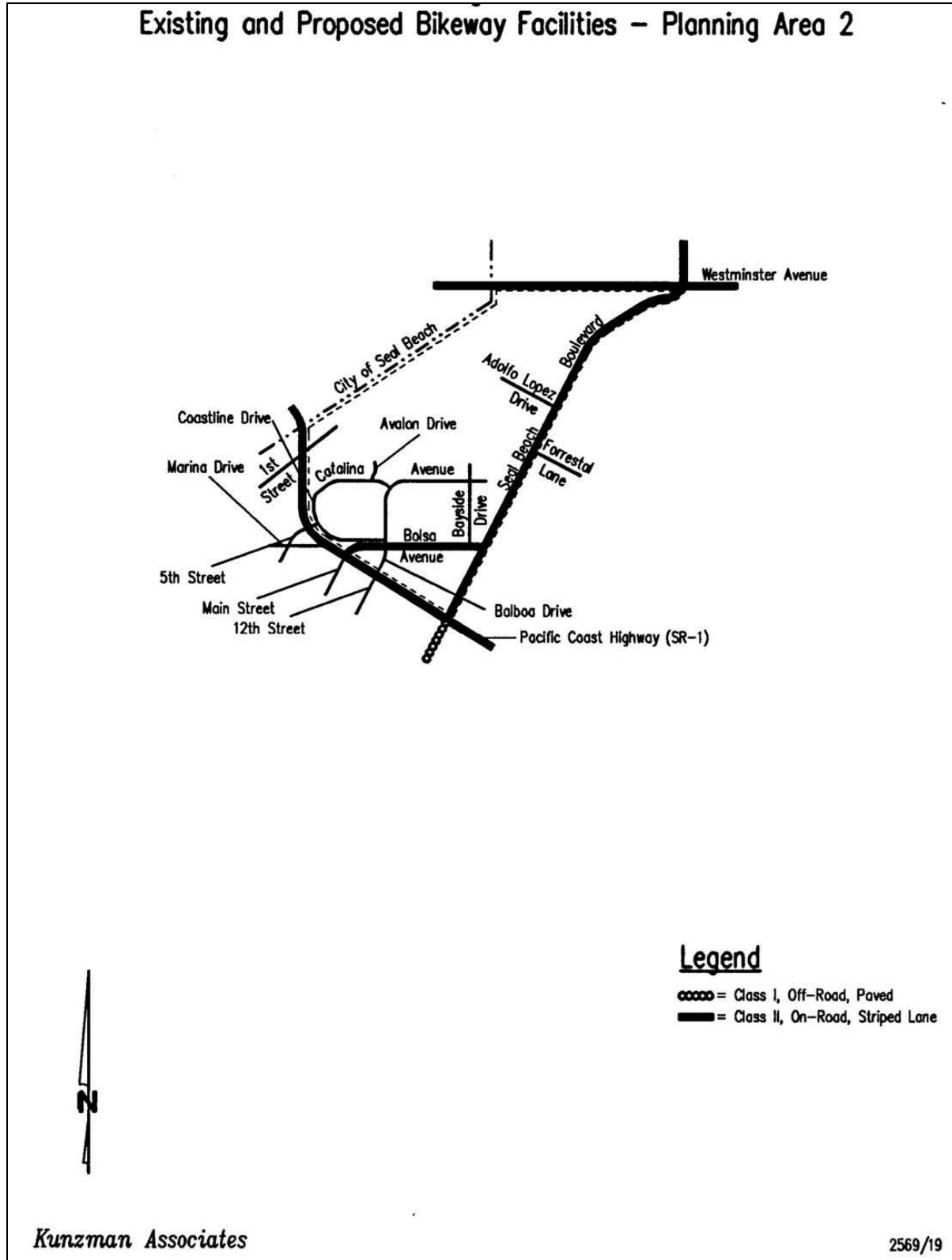






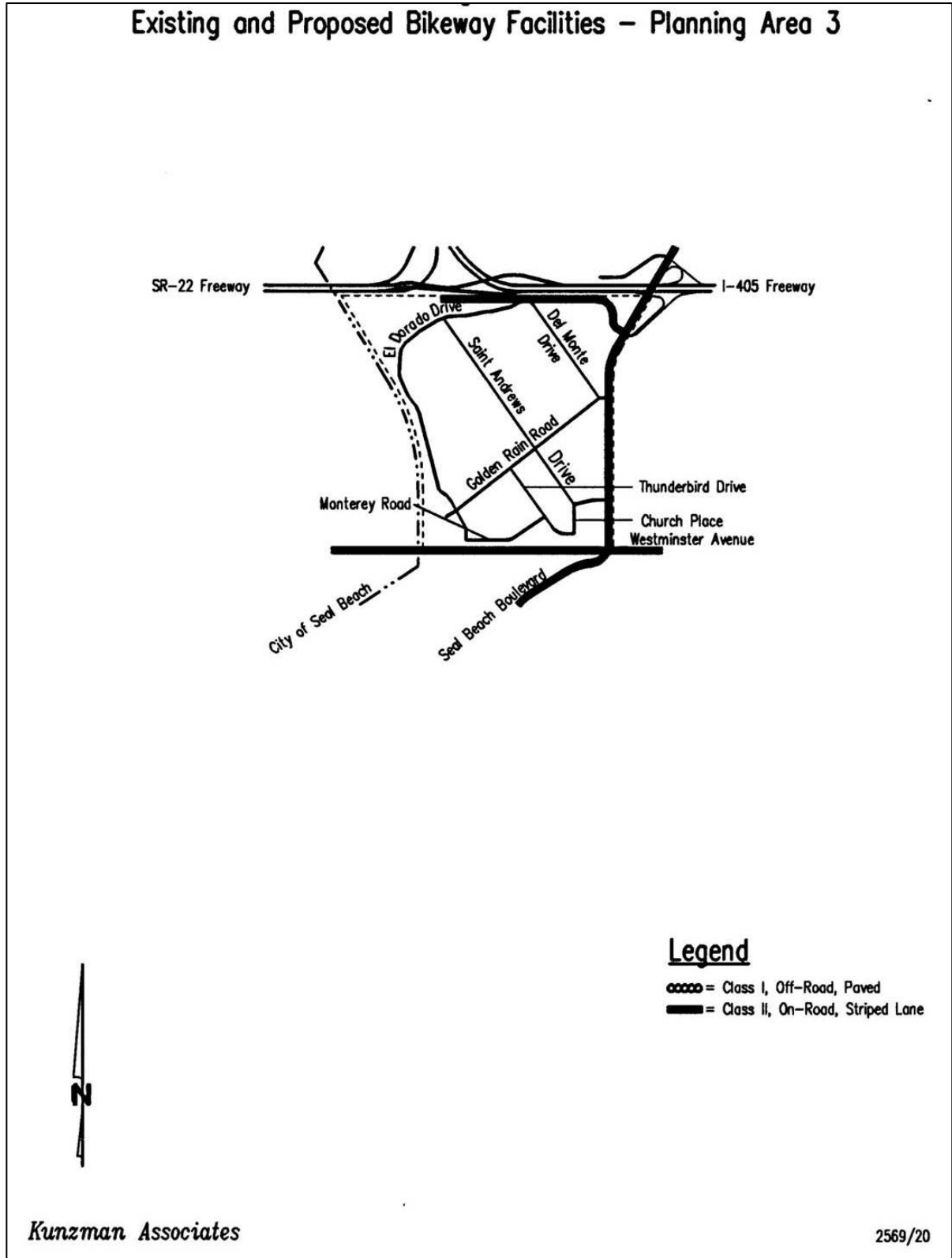
Circulation - Figure 16 - Existing and Proposed Bikeway Facilities – Planning Area 1





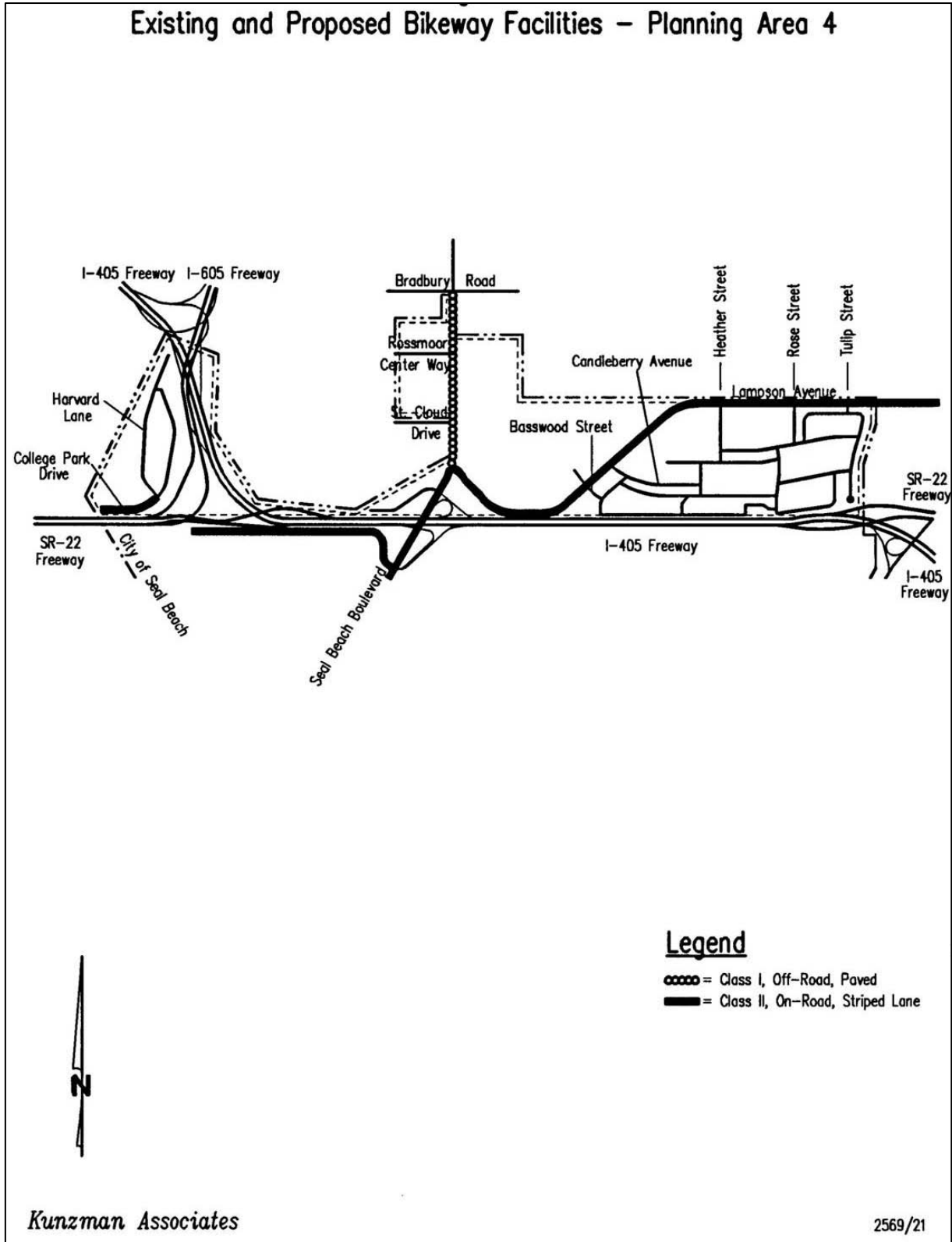
Circulation - Figure 17 - Existing and Proposed Bikeway Facilities – Planning Area 2





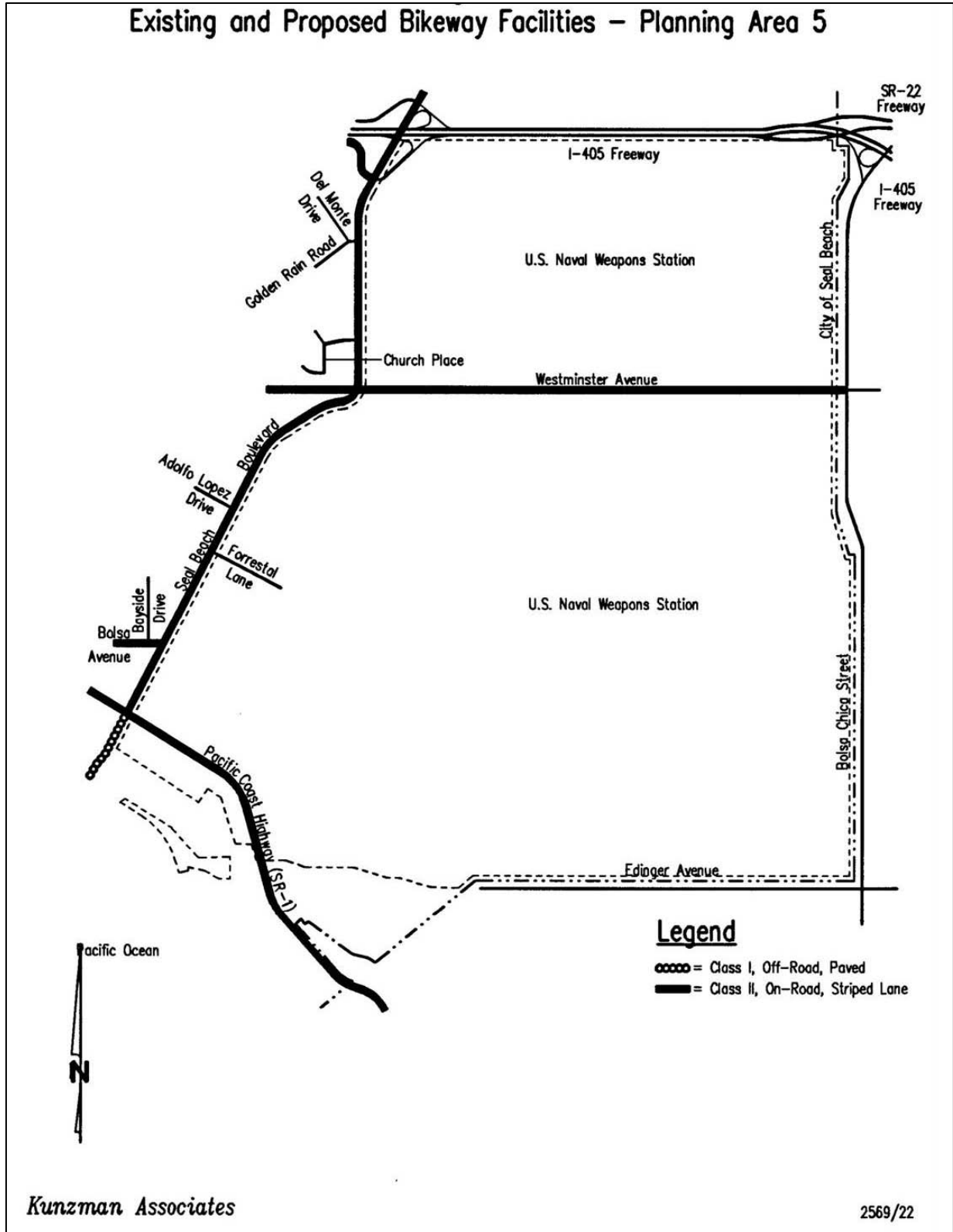
Circulation - Figure 18 - Existing and Proposed Bikeway Facilities – Planning Area 3





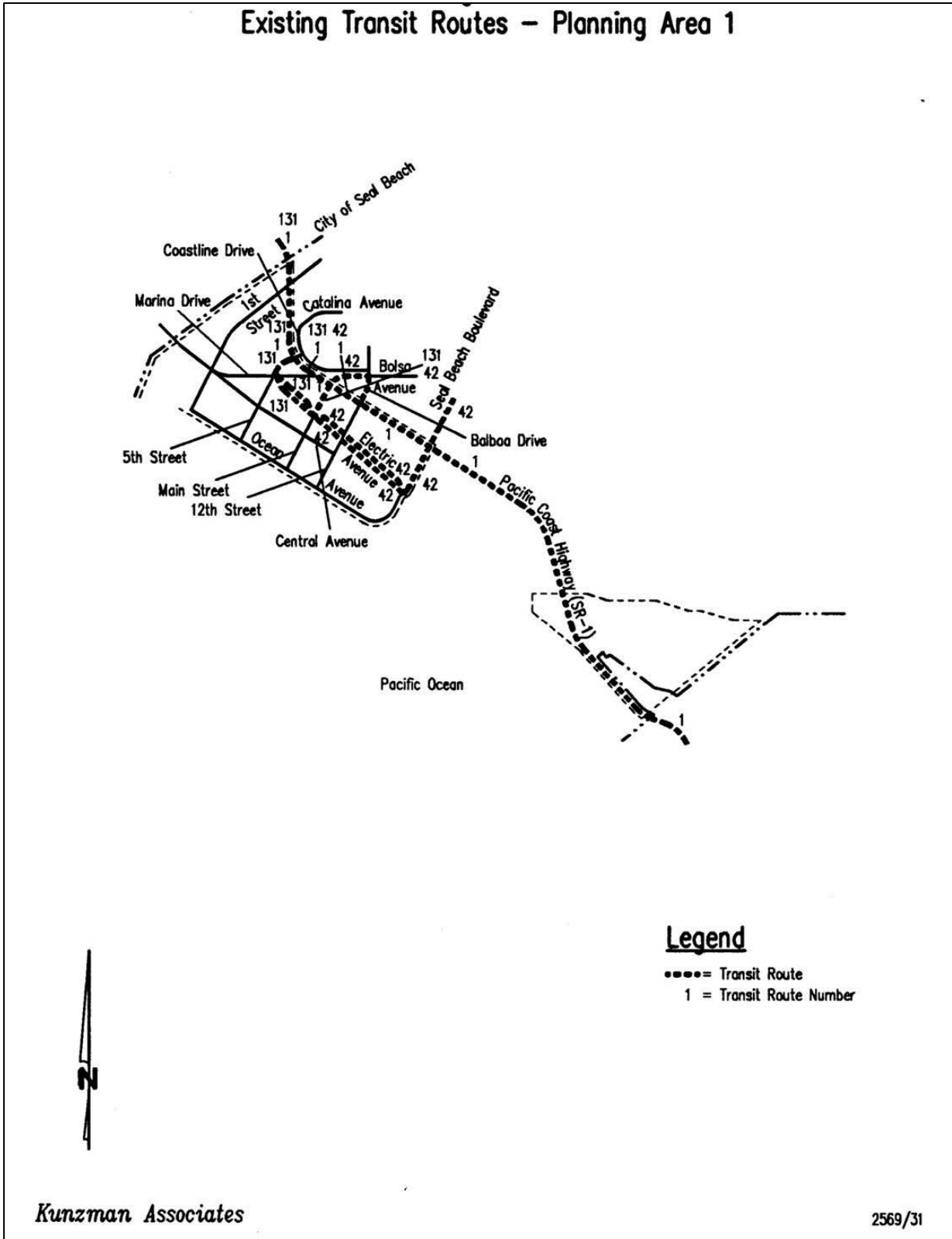
Circulation - Figure 19 - Existing and Proposed Bikeway Facilities – Planning Area 4





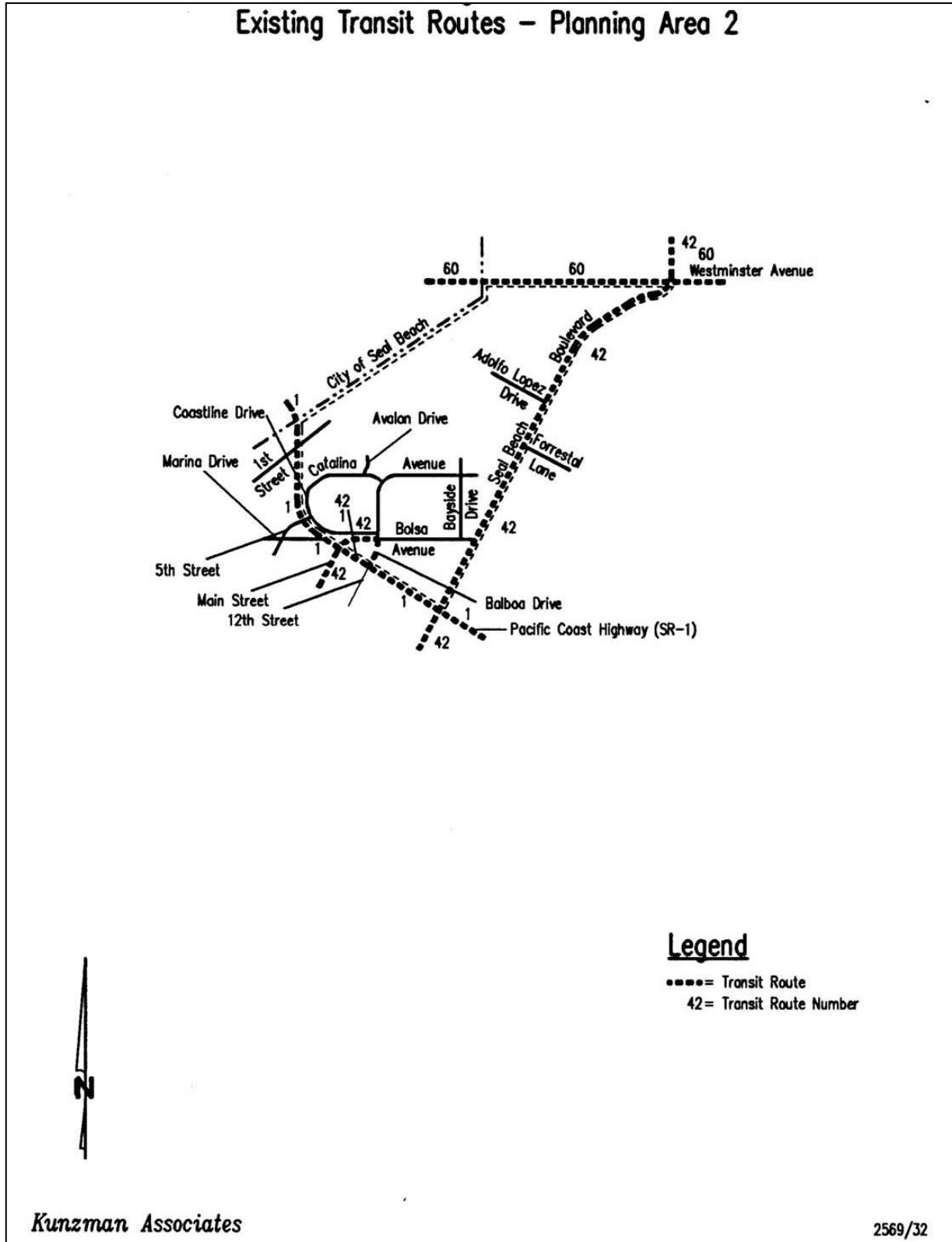
Circulation - Figure 20 - Existing and Proposed Bikeway Facilities – Planning Area 5





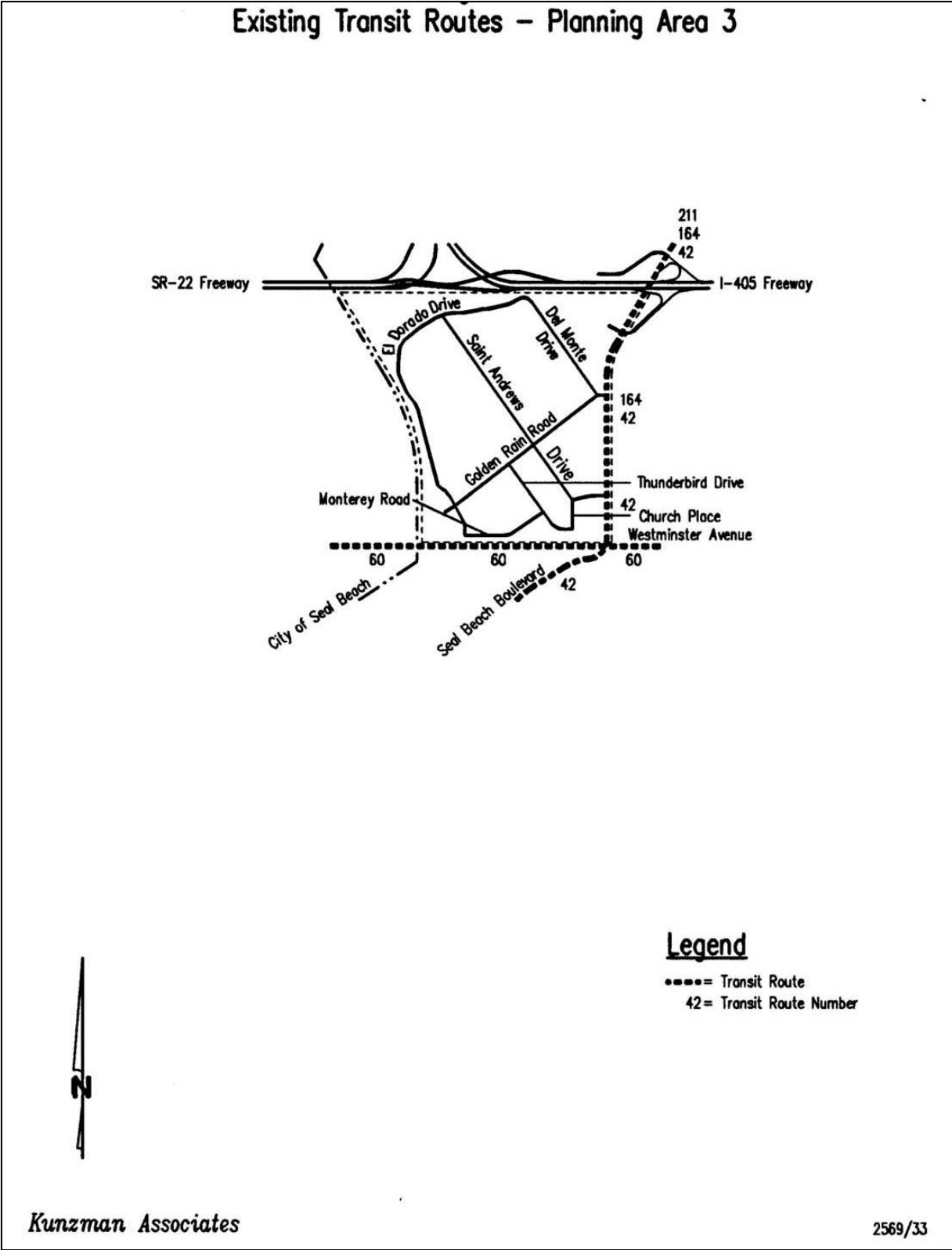
Circulation - Figure 21 - Existing Transit Routes – Planning Area 1





Circulation - Figure 22 - Existing Transit Routes – Planning Area 2

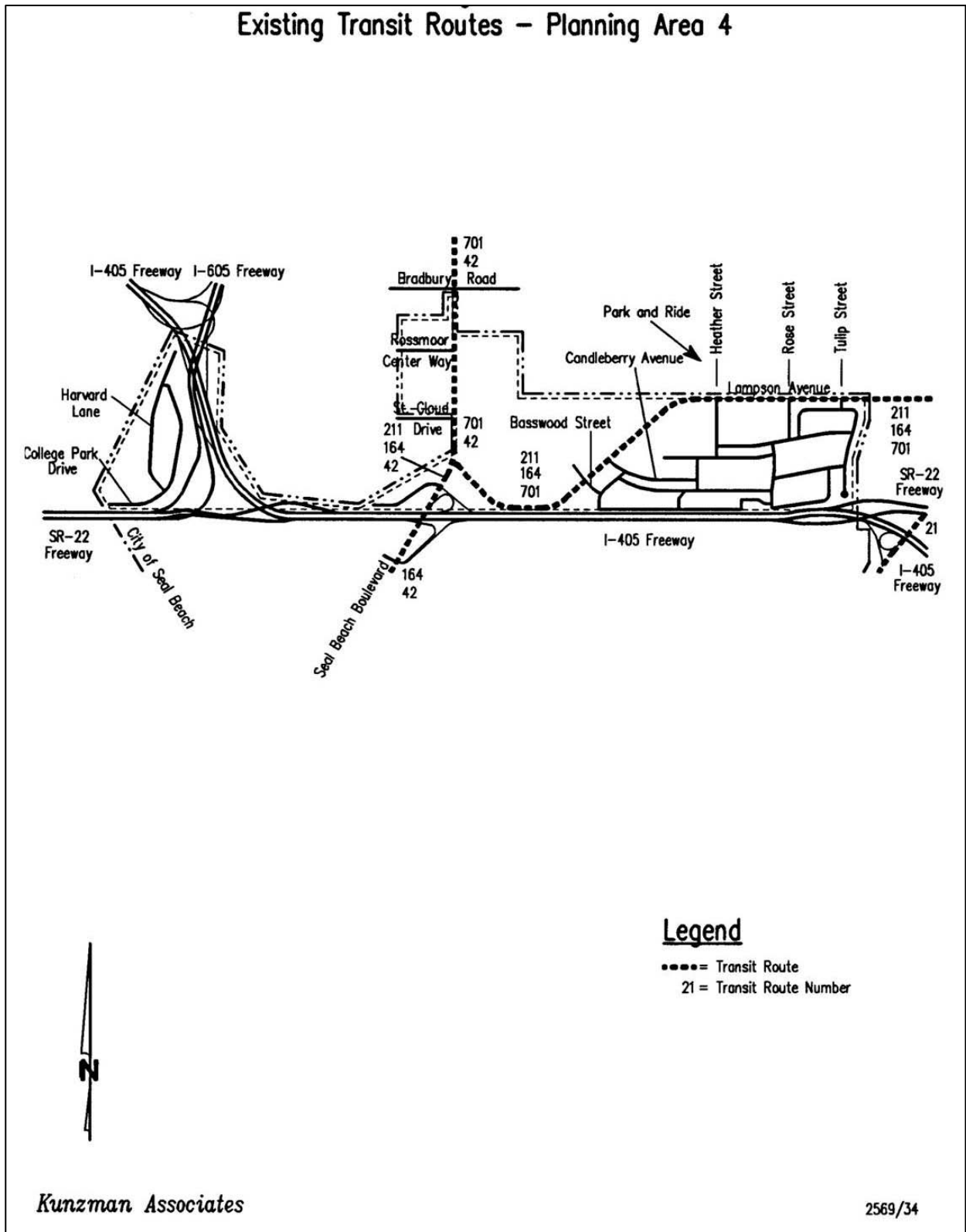




Circulation - Figure 23 - Existing Transit Routes – Planning Area 3

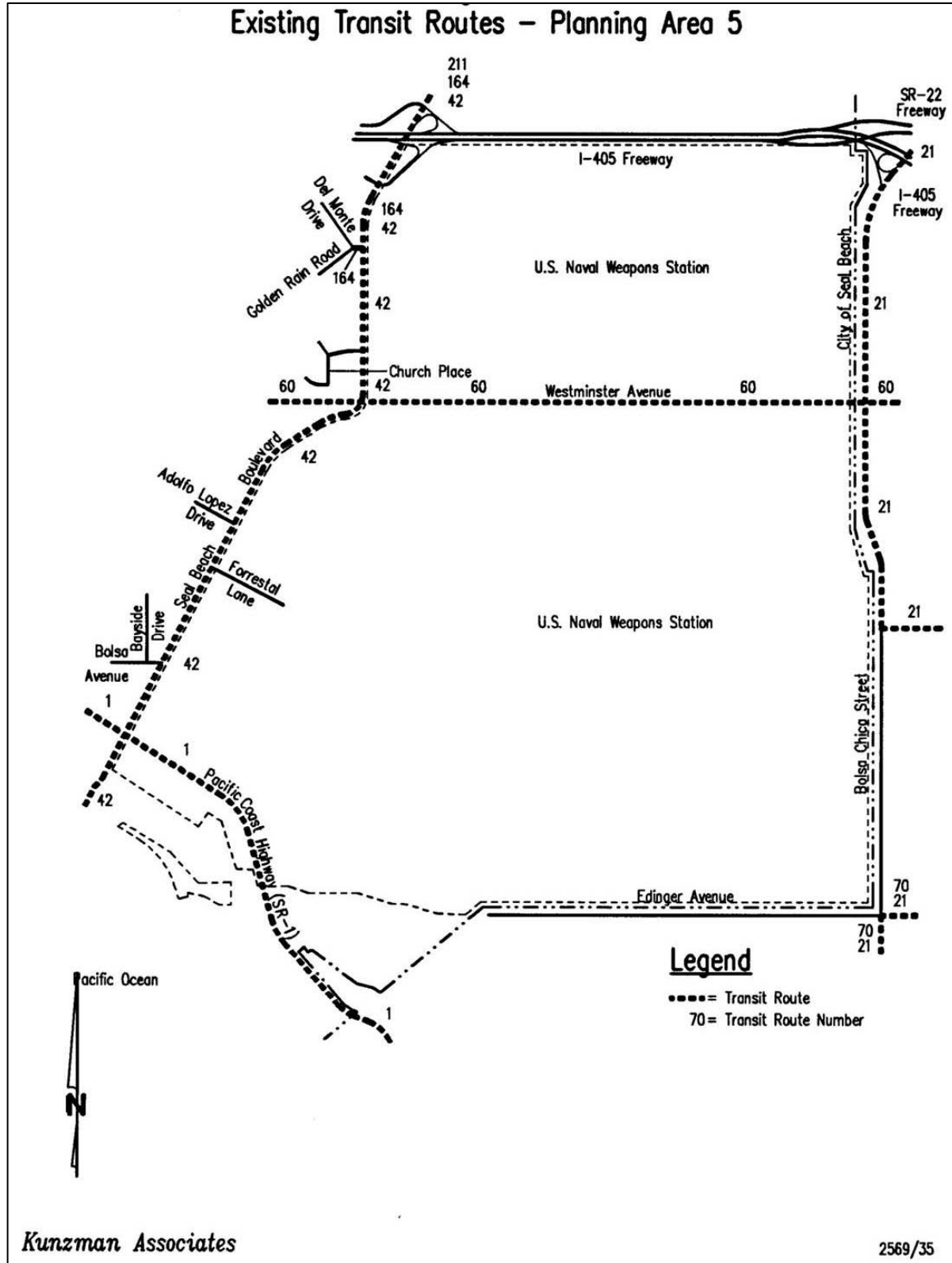






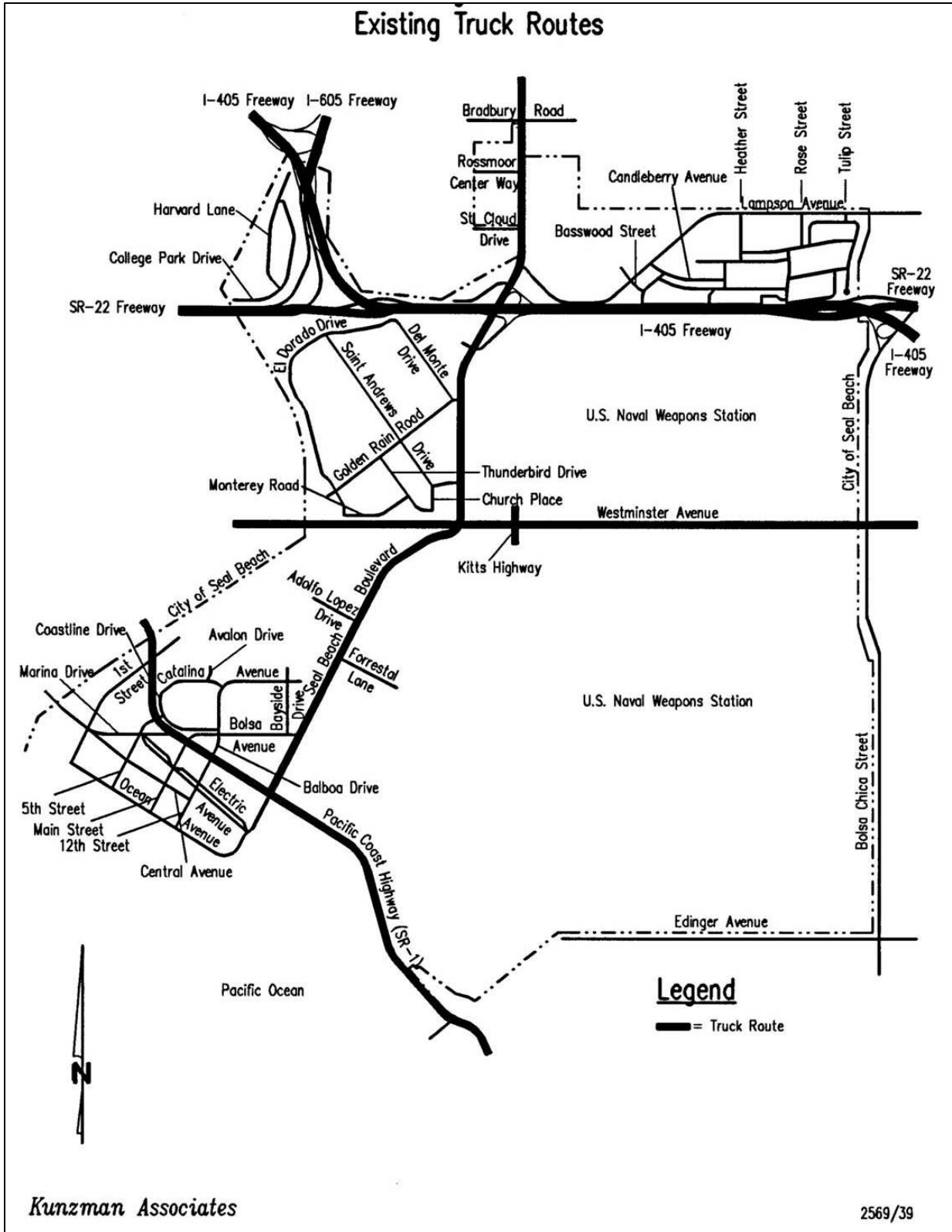
Circulation - Figure 24 - Existing Transit Routes – Planning Area 4





Circulation - Figure 25 - Existing Transit Routes – Planning Area 5





Circulation - Figure 26 - Existing Truck Routes



## Year 2025 Traffic Conditions

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In this section, Year 2025 traffic conditions reflecting ultimate buildout of the existing General Plan are discussed. Circulation - Figure 1 and Circulation - Figure 28 illustrate the Year 2025 traffic conditions.

### Method of Projection

The Year 2025 ADT volumes have been obtained from the subregional travel demand model currently being used for long-range planning in the City of Seal Beach. This model is commonly referred to as the Orange County Traffic Analysis Model (OCTAM 3.1). The data source is OCP-2000 (version 020801). Year 2025 peak hour forecasts have been developed from the OCTAM using accepted procedures for model forecast refinement and smoothing.

The ADT volumes, particularly on the regional facilities, reflect the areawide growth anticipated between now and Year 2025. The Year 2025 peak hour forecasts were refined using the daily forecasts, along with existing peak hour traffic count data collected at each analysis location. The traffic model zone structure is not designed to provide accurate turning movements along arterial roadways unless refinement and reasonableness checking is performed.

The initial estimate of the Year 2025 peak hour turning movements has, therefore, been reviewed for reasonableness. The reasonableness checks performed include review of flow conservation in addition to comparisons to the existing actual counted volume and the overall relationship between the forecast peak hour volume and daily volume on each individual intersection leg. Where necessary, the initial raw model estimates were adjusted to achieve flow conservation, reasonable growth, acceptable relationships between the peak hour and daily traffic volume forecasts, and reasonable diversion between parallel routes.



### Year 2025 Average Daily Traffic (ADT) Volumes

For Year 2025 traffic conditions, through traffic for the study area has been determined by utilizing the OCTAM described above. Year 2025 ADT volumes in the study area are depicted in Circulation - Table 1.

### Year 2025 Volume to Capacity Ratios

For Year 2025 traffic conditions, volume to capacity ratios have been calculated and are shown in Circulation - Table 1. Volume to capacity ratios are based on City of Seal Beach roadway capacities depicted in Circulation - Table 2 - Roadway Capacities. For Year 2025 traffic conditions, the roadway links in the vicinity of the site are projected to operate within acceptable Levels of Service, except for the following study area roadway links that are projected to operate at Level of Service F:

- Pacific Coast Highway, North City Limits to 1st Street
- Pacific Coast Highway, 1st Street to 5th Street
- Pacific Coast Highway, 5th Street to Marina Drive
- Pacific Coast Highway, Marina Drive to Bolsa Avenue
- Pacific Coast Highway, Bolsa Avenue to Seal Beach Boulevard
- Pacific Coast Highway, South of Seal Beach Boulevard

### Year 2025 Intersection Capacity Utilization (ICU)

The technique used to assess the operation of an intersection is known as Intersection Capacity Utilization (ICU). To calculate an ICU value, the volume of traffic using the intersection is compared with the capacity of the intersection. An ICU value is usually expressed as a percent. The percent represents that portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity.

The ICUs for the Year 2025 traffic conditions have been calculated and are shown in Circulation - Table 5. Year 2025 morning and evening peak hour turning movement volumes are shown on Circulation - Figure 1 and Circulation - Figure 28.



**Circulation - Table 4 - Year 2025 Average Daily Traffic (ADT) Volumes and Volume to Capacity Ratios**

Roadway	Segment	No. of Lanes	Capacity	ADT	V/C Ratio	LOS
1st Street	Marina Dr. to Pacific Coast Hwy	2U	12,500	7,200	0.58	A
	East of Pacific Coast Hwy.	2U	12,500	2000	0.02	A
5th Street	Marina Drive to Pacific Coast Hwy.	4U	25,000	5,700	0.23	A
	Pacific Coast Hwy to Coastline Dr.	2U	12,500	3,400	0.27	A
Adolfo Lopez Dr	West of Seal Beach Blvd.	2U	12,500	1,500	0.12	A
Basswood St.	South of Lampson Ave.	2U	12,500	4,300	0.34	A
Bolsa Ave.	Pacific Coast Hwy to Seal Beach Blvd.	2U	12,500	8,600	0.69	A
Golden Rain Rd.	West of Seal Beach Blvd.	4D	37,500	14,500	0.39	A
Lampson Ave.	Seal Beach Blvd. to Basswood St.	4D	37,500	20,000	0.53	A
	Basswood St. to East City Limits	4D	37,500	13,500	0.36	A
Main St.	Electric Ave. to Pacific Coast Hwy	2U	12,500	6,100	0.49	A
Marina Ave.	West City Limits to Pacific Coast Hwy	4D	37,500	5,900	0.16	A
Pacific Coast Hwy	North City Limits to 1st St	4D	37,500	85,700	2.29	F
	1st St. to 5th St.	4D	37,500	66,600	1.78	F
	5th St. to Marina Dr.	4D	37,500	65,900	1.76	F
	Marina Dr. to Bolsa Ave.	4D	37,500	65,300	1.74	F
	Bolsa Ave. to Seal Beach Blvd.	4D	37,500	60,300	1.61	F
	South of Seal Beach Blvd.	4D	37,500	54,200	1.45	F
Rossmoor Center Way	West of Seal Beach Blvd.	2U	12,500	4,200	0.34	A
Seal Beach Blvd.	Rossmoor Center Way to St. Cloud Dr.	6D	56,300	36,000	0.64	B
	St. Cloud Dr. to Lampson Ave.	6D	56,300	47,200	0.84	D
	Lampson Ave. to I-405 Fwy	6D	56,300	49,500	0.88	D
	I-405 Fwy to Golden Rain Rd.	6D	56,300	42,300	0.75	C
	Golden Rain Rd. to St. Andrews Dr.	6D	56,300	36,100	0.64	B
	St. Andrews Dr. to Westminster Ave.	6D	56,300	34,500	0.61	A
	Westminster Ave. to Adolfo Lopez Dr.	6D	56,300	29,100	0.52	A
	Adolfo Lopez Dr. to Bolsa Ave.	6D	56,300	27,900	0.50	A
	Bolsa Ave. to Pacific Coast Hwy.	6D	56,300	21,900	0.39	A
	Pacific Coast Hwy. to Electric Ave.	2U	12,500	8,300	0.66	A
St. Cloud Dr.	West of Seal Beach Blvd.	4U	25,000	10,200	0.41	A
Westminster Ave.	West City Limits to Road A	4D	37,500	27,100	0.72	B
	Road A to Seal Beach Blvd.	4D	37,500	27,200	0.73	B
	East of Seal Beach Blvd.	4D	37,500	24,100	0.64	A
	West of Bolsa Chica St.	4D	37,500	25,700	0.69	B



**Circulation - Table 5 - Year 2025 Intersection Capacity Utilization (ICU) and Level of Service (LOS)**

Intersection	Traffic Control <sup>3</sup>	Intersection Approach Lanes <sup>1</sup>												Peak Hour ICU-LOS <sup>2</sup>	
		Northbound			Southbound			Eastbound			Westbound			AM	PM
		L	T	R	L	T	R	L	T	R	L	T	R		
Pacific Coast Hwy at:															
1 <sup>st</sup> St. (EW)	TS	1	2	1	1	2	1	1.5	0.5	1	0	1	0	147.5-F	138.2-F
5 <sup>th</sup> St. (EW)	TS	1	2	1	1	2	1	1	1	1	0	1	0	126.1-F	128.1-F
Marina Dr. (EW) Main St./Bolsa Ave. (EW)	CSS	1	2	0	0	2	1	0	0	1	0	0	0	94.6-E	117.3-F
Seal Beach Blvd. (EW)	TS	1	2	1	1	2	1	1	1	1	1	1	1>	84.4-D	96.4-E
	TS	1	2	1>	1	2	1	1	2	0	2	1	1	95.6-E	95.4-E
Seal Beach Blvd. (NS) at:															
Rossmoor Center Way (EW)	TS	1	3	0	1	3	0	1	1	0	0	1	0	43.4-A	65.9-B
St. Cloud Dr. (EW)	TS	1	3	0	1	3	0	1	0.5	1.5	1	1	0	69.8-B	83.5-D
Lampson Ave. (EW)															
- without improvements	TS	0	3	1>	2	2	0	0	0	0	2	0	1>	80.5-D	69.1-B
- with improvements	TS	0	3	1>	2	3	0	0	0	0	2	0	1>	67.8-B	69.1-B
I-405 Fwy NB Ramps (EW)															
- without improvements	TS	2	2	1>>	1	2	1	1	1	1	1.5	0.5	1	75.7-C	111.0-F
- with improvements	TS	2	3	1>>	1	3	1	1	1	1	1.5	0.5	1	66.5-B	88.6-D
I-405 Fwy SB Ramps (EW)															
- without improvements	TS	1	2	1	1	2	0	0.5	0.5	1	1.5	0.5	1>>	101.4	109.5-F
- with improvements	TS	1	3	1	2	3	0	0.5	0.5	1	1.5	0.5	1>>	71.6-C	75.6-C
Golden Rain Rd. (EW)	TS	1	3	0	0	3	1	2	0	1	0	0	0	49.3-A	56.0-A
Westminster Ave. (EW)															
- without improvements	TS	1	3	0	1	3	1	1	2	1	1	2	1	102.3-F	100.4-F
- with improvements	TS	1	3	1	2	3	1	2	3	0	2	2	1	81.3-D	72.0-C
Adolfo Lopez Dr. (EW)	CSS	1	3	0	0	3	1	1	0	1	0	0	0	32.4-A	33.6-A
Bolsa Ave. (EW)	TS	1	3	1	1	3	1	1	1	0	1	1	0	38.6-A	36.7-A
Basswood St. (NS) at:															
Lampson Ave. (EW)	TS	1	1	0	0	1	0	1	2	0	1	2	0	53.8-A	48.5-A

1 When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane, there must be sufficient width for right turning vehicles outside the through lanes.

L=left, T=through, R=right, >=right turn overlap, >>=free right turn

2 ICU-LOS=Intersection Capacity Utilization-Level of Service

3 TS=traffic signal

CSS=cross street stop





For Year 2025 traffic conditions, the study area intersections are projected to operate at Level of Service D or better during the peak hours, except for the following study area intersections, which are projected to operate at Level of Service E/F during the peak hours, without improvements:

- Pacific Coast Highway (NS) at:
- 1st Street (EW)
- 5th Street (EW)
- Marina Drive (EW)
- Main Street/Bolsa Avenue (EW)
- Seal Beach Boulevard (EW)
- Seal Beach Boulevard (NS) at:
- I-405 Freeway NB Ramps (EW)
- I-405 Freeway SB Ramps (EW)
- Westminster Avenue (EW)

The following study area intersection improvements should be included within the City of Seal Beach Capital Improvement Program (CIP):

- Seal Beach Boulevard (NS) at Lampson Avenue (EW)
  - Additional Southbound Through Lane
- Seal Beach Boulevard (NS) at I-405 Freeway NB Ramps (EW)
  - Additional Northbound Through Lane – Bridge Widening
  - Additional Southbound Through Lane – Bridge Widening
- Seal Beach Boulevard (NS) at I-405 Freeway SB Ramps (EW)
  - Additional Northbound Through Lane – Bridge Widening
  - Additional Southbound Left Turn Lane
  - Additional Southbound Through Lane – Bridge Widening
- Seal Beach Boulevard (NS) at Westminster Avenue (EW)
  - Northbound Right Turn Lane
  - Additional Southbound Left Turn Lane

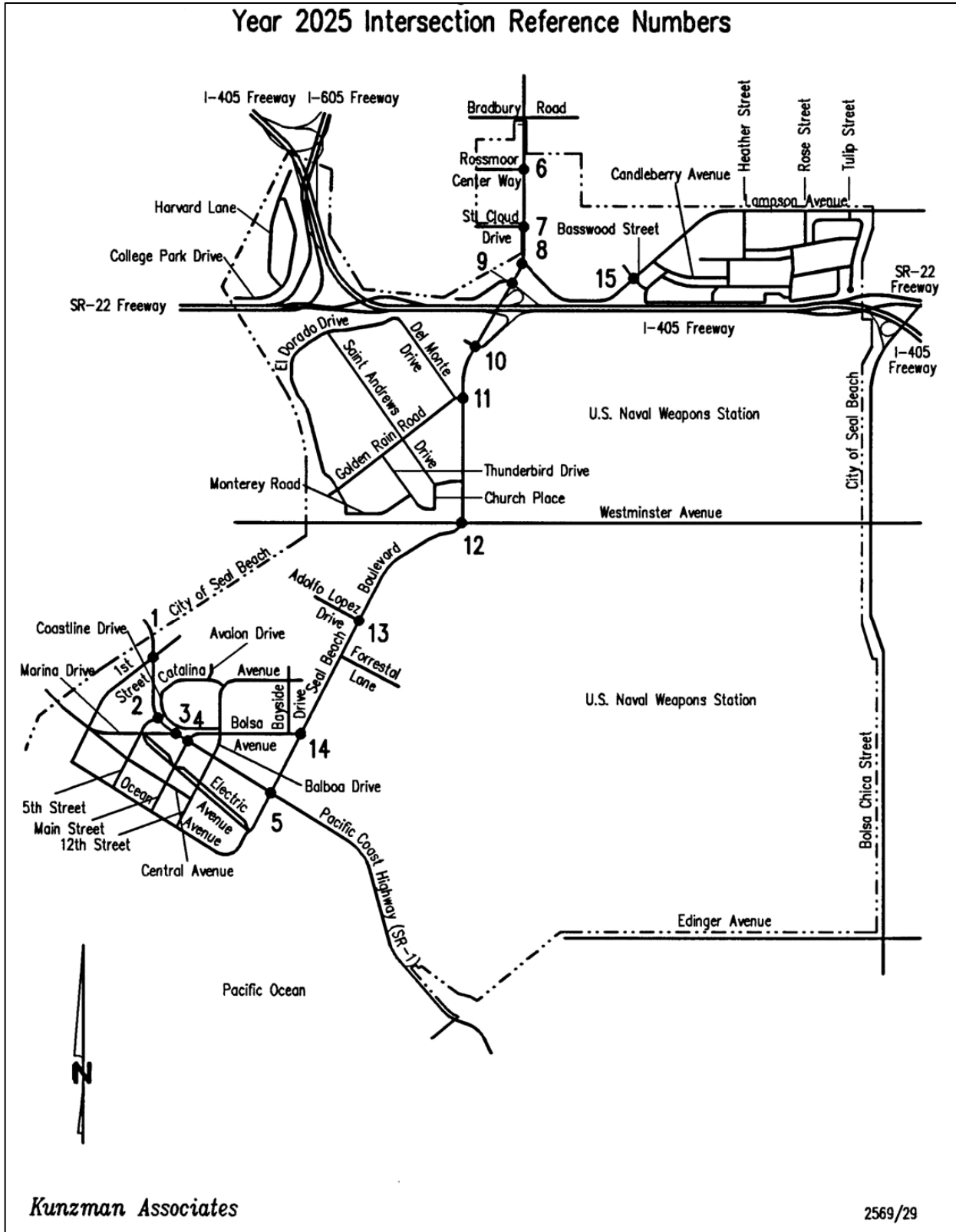




- Additional Eastbound Left Turn Lane
- Additional Eastbound Through Lane
- Additional Westbound Left Turn Lane

The study area intersections that are projected to operate at worse than Level of Service D (with improvements) are all located along Pacific Coast Highway (SR-1). The relatively high levels of traffic along this corridor are a direct result of increased development outside the City of Seal Beach and the congestion along the I-405 Freeway. The City of Seal Beach General Plan Circulation Element and the Orange County Master Plan of Arterial Highways (MPAH) depict Pacific Coast Highway (SR-1) as a Primary highway (4 lanes divided). As a Primary highway (4 lanes divided), there is insufficient capacity along Pacific Coast Highway (SR-1) to accommodate the existing as well as future traffic volumes.



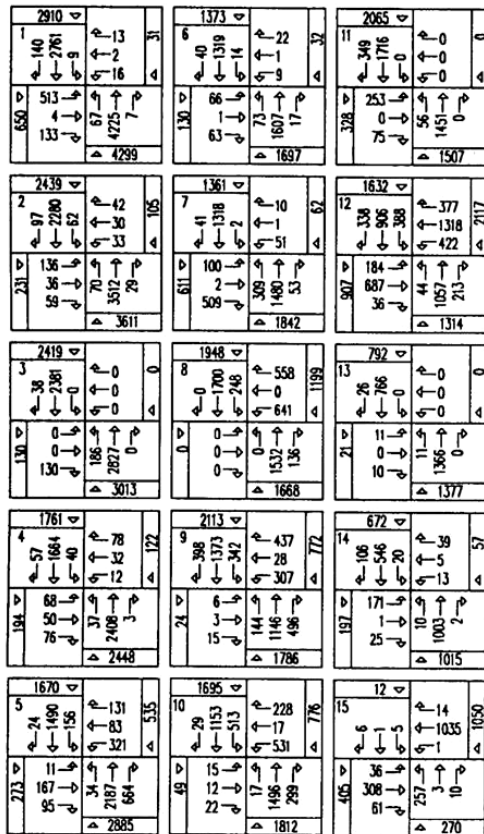


Circulation - Figure 27 - Year 2025 Intersection Reference Numbers

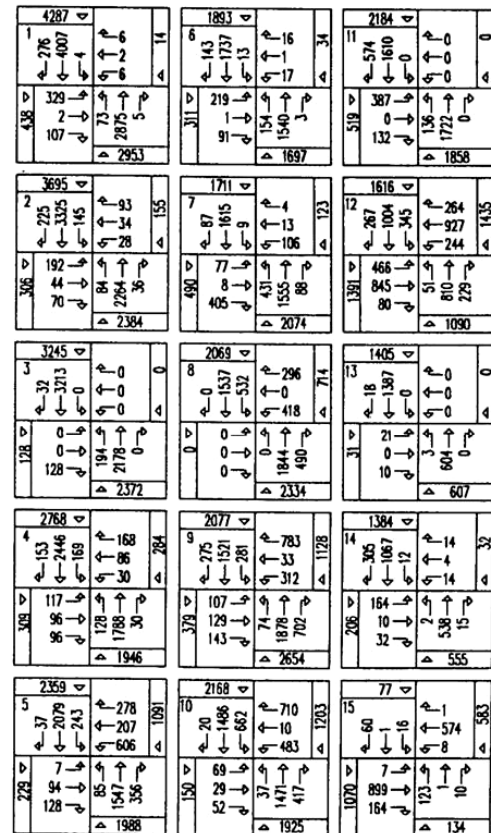


# Year 2025 Peak Hour Turning Movement Volumes

## Morning Peak Hour



## Evening Peak Hour



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Intersection reference numbers are in upper left corner of turning movement boxes.

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Circulation - Figure 28 - Year 2025 Peak Hour Turning Movement Volumes



## Goals, Objectives, and Policies

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The following goals, objectives, and policies form the basis for providing a circulation system that adequately serves the development intensity anticipated in the Land Use Element. The goal for the Circulation Element expresses the importance of the circulation system to the quality of life and the vitality of the local economy, and sets a high standard for its performance.

### General

#### Goal:

Provide and maintain a comprehensive circulation system that facilitates the efficient movement of people and goods throughout the City and near open space habitats for wildlife, while minimizing environmental impacts (including air, light, and noise pollution).

#### Objective:

Ensure that the circulation system is in balance with the City's Land Use Element.

#### Policies:

Monitor and participate in applicable county, regional, state, and federal transportation plans and proposals.

Maintain compliance with the County's Congestion Management Plan (CMP) and Growth Management Plan (GMP).

Review implementation programs that coordinate the transportation needs and requirements of the City with those of other public agencies in order to ensure that the overall circulation plan of the City is effective, efficient, and safe.

Develop and implement an annual Capital Improvement Program (CIP) for transportation system projects.



### **Objective:**

Provide adequate capacity for the City's circulation needs while minimizing negative impacts, including environmental impacts needing mitigation.

### **Policies:**

Maintain circulation system standards for roadways and intersection classifications, right-of-way width, pavement width, design speed, capacity, maximum grades, and associated features such as medians and bicycle lanes.

Develop a circulation system that enhances environmental amenities and scenic areas.

Maintain primary truck routes that sustain an effective transport of commodities while minimizing the negative impacts on local circulation and on noise-sensitive land uses.

Utilize Caltrans and City design criteria for any future truck routes within the City.

### **Objective:**

Provide a circulation/transportation system that enhances and minimizes response time needed for emergency vehicles.

### **Policies:**

Ensure that primary and secondary roadways are able to be used for evacuating persons from their homes during emergency conditions or for ingress when emergency response units are needed.

### **Goal:**

Create attractive circulation corridors to enhance the City's image.

### **Objective:**

Preserve rights-of-way along circulation corridors to provide landscaped parkways and setback areas.



### **Policies:**

Enhance street design standards to promote attractive circulation corridors.

Coordinate a signage program to direct motorists to City activity centers from freeways.

Provide landscaped medians on major arterials, when appropriate.

Provide upkeep of the City's streets and parkways based upon an established maintenance schedule.

Promote the undergrounding of utilities along travel routes.

Support the protection and enhancement of view corridors.

## **Level of Service**

### **Goal:**

Provide a circulation system that supports existing, approved, and planned land uses throughout the City while maintaining a desired Level of Service on all streets and at all intersections.

### **Objective:**

Comply with adopted performance standards for acceptable Levels of Service.

### **Policies:**

Maintain a citywide Level of Service (LOS) not exceeding LOS D for roadway segments and intersections during the peak hours. The study area intersections that are projected to operate at worse than Level of Service D (with improvements) are all located along Pacific Coast Highway (SR-1). The relatively high levels of traffic along this corridor are a direct result of increased development outside of the City of Seal Beach and the congestion along the I-405 Freeway. The City of Seal Beach General Plan Circulation Element and the Orange County Master Plan of Arterial Highways (MPAH) depict Pacific Coast Highway (SR-1) as a Primary highway (4 lanes divided). As a Primary highway (4 lanes divided), there is insufficient capacity along Pacific



Coast Highway (SR-1) to accommodate the existing as well as future traffic volumes.

Coordinate transportation improvements along Pacific Coast Highway (SR-1) with Caltrans in a manner that minimizes disruptions to the community.

### **Objective:**

Ensure that the location, intensity, and timing of development are consistent with the provision of adequate transportation infrastructure and standards defined in the Growth Management Element.

### **Policies:**

Assess all development projects in order to identify their traffic impacts and require that they pay their fair share of the system improvements necessary to accommodate traffic generated by the project.

Limit the number of driveways on arterial streets to reduce vehicular conflict and facilitate traffic flow.

Require new development to install traffic signals at intersections on arterials that, based on individual study, are shown to satisfy traffic signal warrants.

Promote the use of traffic signal coordination within the City and with adjacent jurisdictions.

## Regional Transportation

### **Goal:**

Support development of regional transportation facilities that ensure the safe and efficient movement of people and goods from within the City to areas outside its boundaries, and that accommodate the regional travel demands of developing areas outside the City, while minimizing air and noise pollution and other environmental impacts.

### **Objective:**

Support the completion of the Orange County Master Plan of Arterial Highways (MPAH).



### **Policies:**

Work with adjacent cities to ensure that the traffic impacts of development projects do not adversely impact the City of Seal Beach.

Coordinate traffic signal synchronization citywide and with adjacent jurisdictions.

### **Objective:**

Enhance the accessibility to the regional transportation system.

### **Policies:**

Improve access to and across the I-405 Freeway.

Support the addition of capacity and noise mitigation improvements such as high-occupancy vehicles (HOV) lanes, general purpose lanes, auxiliary lanes, and noise barriers to the I-405 Freeway.

Maintain a proactive and assertive role with appropriate agencies dealing with regional transportation issues affecting the City.

Maintain a network of truck routes on arterial streets.

## **Transportation Demand Management (TDM)**

### **Goal:**

Develop and encourage a TDM system to assist in mitigating traffic impacts and in maintaining a desired Level of Service on the circulation system, while minimizing air pollution and other environmental impacts.

### **Objective:**

Pursue transportation management strategies that can maximize vehicle occupancy, minimize average trip length, and reduce the number of vehicle trips.





### **Policies:**

Encourage non-residential developments to provide employee incentives for utilizing alternatives to the conventional automobile (e.g., carpools, vanpools, buses, bicycles, and walking).

Encourage the implementation of employer TDM requirements included in the Southern California Air Quality Management Plan.

Encourage industry to use flextime, staggered working hours, and other means to lessen commuter traffic.

Encourage the use of multiple-occupancy vehicle programs for shopping and other uses to reduce traffic.

Support national, state, and regional legislation directed at encouraging the use of carpools and vanpools.

Promote ridesharing through publicity and provision of information to the public.

Require that proposals for major new non-residential developments include submission of a TDM plan to the City.

Encourage the development, implementation, and use of new advanced technologies to optimize safe traffic flow and manage traffic congestion.

## **Public Transportation**

### **Goal:**

Maintain participation in a public transit system that provides mobility to City residents and employees as a logical alternative to automobile travel.

### **Objective:**

Encourage improved local and express bus service through the Orange County Transportation Authority (OCTA) to the City.

### **Policies:**

Coordinate with OCTA and other appropriate entities to improve bus service to and within the City.



Encourage the provision of safe, attractive, and clearly identifiable transit stops throughout the community.

Implement and expand, wherever feasible, programs aimed at enhancing the mobility of senior citizens and disabled persons.

### **Objective:**

Require new development that is designed in a manner that facilitates provision or expansion of transit service, provides on-site commercial/recreational facilities to discourage midday travel, and provides on-site public transportation circulation.

### **Policies:**

Encourage developers to work with agencies providing transit service with the objective of maximizing the potential for transit use.

Encourage employers to reduce vehicular trips by offering employee incentives.

Require proposed developments to include transit facilities, such as park-and-ride sites, bus benches, shelters, pads or turnouts, where appropriate, in their improvement plans or as needed in proximity to their development.

## **Bicycle and Pedestrian Facilities**

### **Goal:**

Provide a citywide system of safe, efficient, and attractive bicycle and pedestrian routes for commuter, school, and recreational use.

### **Objective:**

Promote the safety of bicyclists and pedestrians by adhering to citywide standards and practices.

### **Policies:**

Develop citywide standards for construction and maintenance of bikeways and pedestrian walkways.



Develop and adopt a planned bikeway system that is consistent with the County of Orange Master Plan of County-wide Bikeways, and other adopted Master Plans, to assure that local bicycle routes will be compatible with routes of neighboring jurisdictions.

Maintain existing pedestrian facilities and require new development to provide pedestrian walkways between developments, schools, and public facilities.

Where appropriate, require proposed developments adjacent to proposed bikeway routes to include bicycle paths or lanes in their street improvement plans and to construct the bicycle paths or lanes as a condition of approval.

Construct safe, convenient paths for bicycles and pedestrians so as to encourage these alternative forms of transportation.

Require plans for bicycle and pedestrian facilities to give priority to providing continuity and closing gaps in the bikeway and sidewalk network.

Develop programs that encourage the safe utilization of easements and/or rights-of-way along flood control channels, public utilities, railroads, and streets wherever possible for the use of bicycles and/or pedestrians.

Develop a comprehensive pedestrian circulation plan that facilitates pedestrian traffic in major activity areas.

Ensure accessibility of pedestrian facilities to the elderly and disabled.

Require the installation of sidewalks with all new roadway construction and significant reconstruction of existing roadways.

Develop a plan and pursue funding for bicycle support facilities and cycling education/information programs.

## Parking

### Goal:

Provide sufficient, well-designed, and convenient on-street parking and off-street parking facilities throughout the City.



### **Objective:**

Develop and implement a Parking Management Plan or other program that identifies citywide parking requirements.

### **Policies:**

Consolidate parking, where appropriate, to eliminate the number of ingress and egress points onto arterials.

Consider the use of public/private joint-ventures to provide funding sources for parking facilities.

Improve public access to the coast by providing better transit and parking opportunities.

Support satellite parking sites and shuttle services to minimize congestion and travel demand for special events and temporary activities.

Utilize City programs to address specific parking issues (i.e., Downtown Parking Meter Program).

## Coastal Access

### **Goal:**

Maintain Local Coastal Program standards, including the improvement of public coastal access wherever possible.

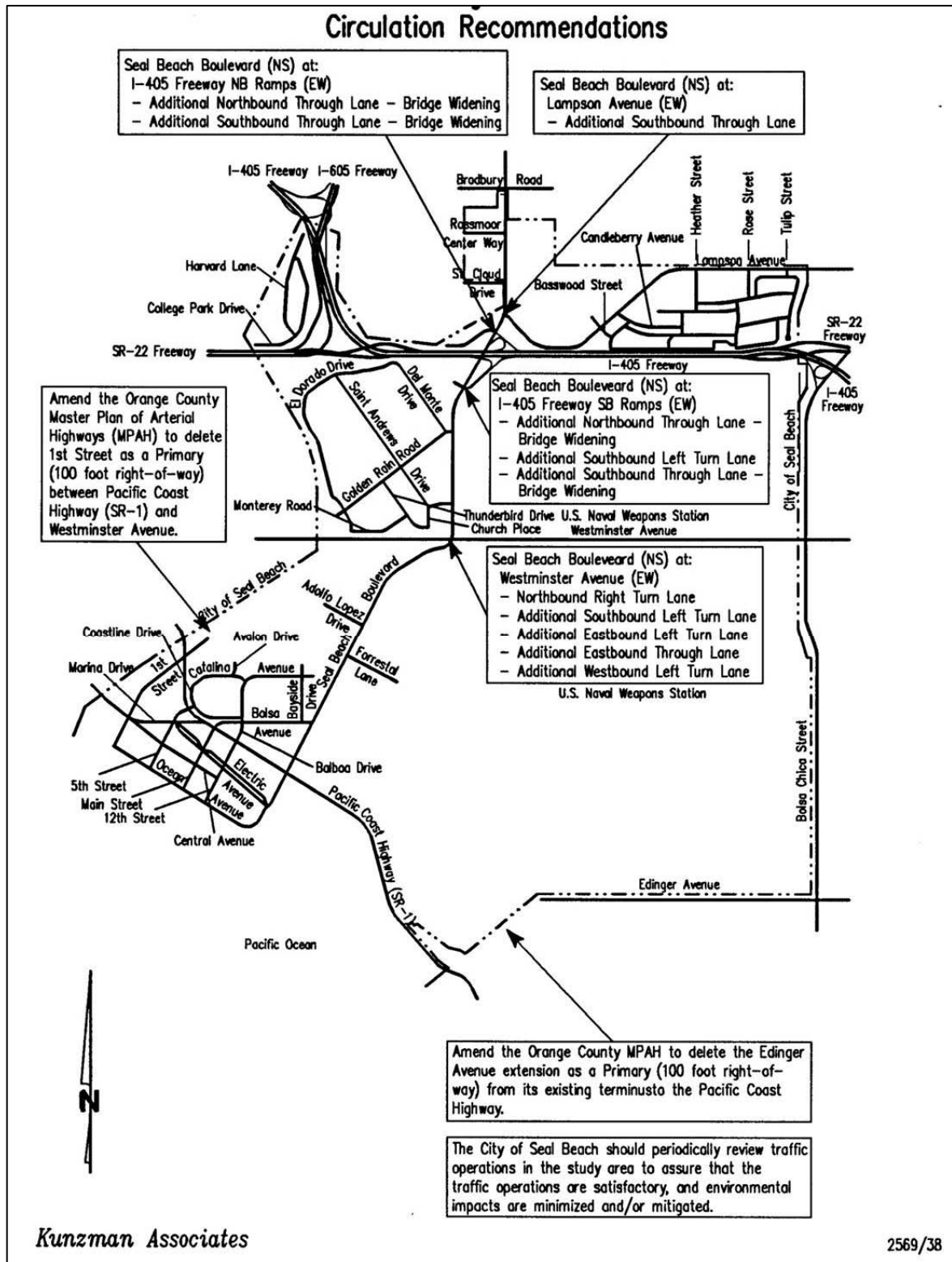
### **Objective:**

Provide better transit and parking opportunities on-street and in designated lots, and/or inland parking with beach transportation.

### **Policies:**

Monitor and attempt to improve the safety of pedestrian crossings along Pacific Coast Highway (SR-1).





Circulation - Figure 29 - Circulation Recommendations





# Appendix A – Glossary of Transportation Terms

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## Common Abbreviations

AC:	Acres
ADT:	Average Daily Traffic
Caltrans:	California Department of Transportation
DU:	Dwelling Unit
ICU:	Intersection Capacity Utilization
LOS:	Level of Service
TSF:	Thousand Square Feet
V/C	Volume/Capacity
VTM:	Vehicle Miles Traveled

## Terms

**AVERAGE DAILY TRAFFIC:** The total volume during a year divided by the number of days in a year. Usually only weekdays are included.

**BANDWIDTH:** The number of seconds of green time available for through traffic in a signal progression.

**BOTTLENECK:** A constriction along a travelway that limits the amount of traffic that can proceed downstream from its location.

**CAPACITY:** The maximum number of vehicles which can be reasonably expected to pass over a given section of a lane or a roadway in a given time period.

**CHANNELIZATION:** The separation or regulation of conflicting traffic movements into definite paths of travel by the use of pavement markings, raised islands, or other suitable means to facilitate the safe and orderly movements of both vehicles and pedestrians.

**CLEARANCE INTERVAL:** Nearly same as yellow time. If there is an all red interval after the end of a yellow, then that is also added into the clearance interval.

**CORDON:** An imaginary line around an area across which vehicles, persons, or other items are counted (in and out).



**CYCLE LENGTH:** The time period in seconds required for one complete signal cycle.

**CUL-DE-SAC STREET:** A local street open at one end only, and with special provisions for turning around.

**DAILY CAPACITY:** The daily volume of traffic that will result in a volume during the peak hour equal to the capacity of the roadway.

**DAILY TRAFFIC:** Same as average daily traffic.

**DELAY:** The time consumed while traffic is impeded in its movement by some element over which it has no control, usually expressed in seconds per vehicle.

**DEMAND RESPONSIVE SIGNAL:** Same as traffic-actuated signal.

**DENSITY:** The number of vehicles occupying in a unit length of the through traffic lanes of a roadway at any given instant. Usually expressed in vehicles per mile.

**DETECTOR:** A device that responds to a physical stimulus and transmits a resulting impulse to the signal controller.

**DESIGN SPEED:** A speed selected for purposes of design. Features of a highway, such as curvature, superelevation, and sight distance (upon which the safe operation of vehicles is dependent) are correlated to design speed.

**DIRECTIONAL SPLIT:** The percent of traffic in the peak direction at any point in time.

**DIVERSION:** The rerouting of peak hour traffic to avoid congestion.

**FIXED TIME SIGNAL:** Same as pretimed signal.

**FORCED FLOW:** Opposite of free flow.

**FREE FLOW:** Volumes are well below capacity. Vehicles can maneuver freely and travel is unimpeded by other traffic.

**GAP:** Time or distance between successive vehicles in a traffic stream, rear bumper to front bumper.

**HEADWAY:** Time or distance spacing between successive vehicles in a traffic stream, front bumper to front bumper.





**INTERCONNECTED SIGNAL SYSTEM:** A number of intersections that are connected to achieve signal progression.

**LEVEL OF SERVICE:** A qualitative measure of a number of factors, which include speed and travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience, and operating costs.

**LOOP DETECTOR:** A vehicle detector consisting of a loop of wire embedded in the roadway, energized by alternating current and producing an output circuit closure when passed over by a vehicle.

**MINIMUM ACCEPTABLE GAP:** Smallest time headway between successive vehicles in a traffic stream into which another vehicle is willing and able to cross or merge.

**MULTI-MODAL:** More than one mode; such as automobile, bus transit, rail rapid transit, and bicycle transportation modes.

**OFFSET:** The time interval in seconds between the beginning of green at one intersection and the beginning of green at an adjacent intersection.

**PLATOON:** A closely grouped component of traffic that is composed of several vehicles moving, or standing ready to move, with clear spaces ahead and behind.

**ORIGIN-DESTINATION SURVEY:** A survey to determine the point of origin and the point of destination for a given vehicle trip.

**PASSENGER CAR EQUIVALENTS (PCE):** One car is one Passenger Car Equivalent. A truck is equal to 2- or 3- Passenger Car Equivalents in that a truck requires longer to start, goes slower, and accelerates slower. Loaded trucks have a higher Passenger Car Equivalent than empty trucks.

**PRETIMED SIGNAL:** A type of traffic signal that directs traffic to stop and go on a predetermined time schedule without regard to traffic conditions.

**PROGRESSION:** A term used to describe the progressive movement of traffic through several signalized intersections.

**SCREEN-LINE:** An imaginary line or physical feature across which all trips are counted, normally to verify the validity of mathematical traffic models.



**SIGNAL CYCLE:** The time period in seconds required for one complete sequence of signal indications.

**SIGNAL PHASE:** The part of the signal cycle allocated to one or more traffic movements.

**STARTING DELAY:** The delay experienced in initiating the movement of queued traffic from a stop to an average running speed through a signalized intersection.

**TRAFFIC-ACTUATED SIGNAL:** A type of traffic signal that directs traffic to stop and go in accordance with the demands of traffic, as registered by the actuation of detectors.

**TRIP:** The movement of a person or vehicle from one location (origin) to another (destination). For example, from home to store to home is two trips, not one.

**TRIP END:** One end of a trip at either the origin or destination; i.e. each trip has two trip-ends. A trip-end occurs when a person, object, or message is transferred to or from a vehicle.

**TRIP GENERATION RATE:** The quality of trips produced and/or attracted by a specific land use stated in terms of units such as per dwelling, per acre, and per 1,000 square feet of floor space.

**TRUCK:** A vehicle having dual tires on one or more axles, or having more than two axles.

**UNBALANCED FLOW:** Heavier traffic flow in one direction than the other. On a daily basis, most facilities have balanced flow. During the peak hours, flow is seldom balanced in an urban area.

**VEHICLE MILES OF TRAVEL:** A measure of the amount of usage of a section of highway, obtained by multiplying the average daily traffic by length of facility in miles.

