Notice of Completion

State of California
Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

McDonnell Centre Business Park Specific Plan EIR #96-1
Project Title

Bounded by Springdale Street, Bolsa Avenue, Bolsa Chica Street, and Rancho Road
Project Location –Specific

City of Huntington Beach — Orange County
Project Location – City — **Project Location – County**

Description of Nature, Purpose, and Beneficiaries of Project:

The project involves preparation of a Specific Plan to allow for the cohesive development of a mix of industrial and commercial/retail/office uses that are submitted under the existing Industrial Limited (IL) zoning designation. Approximately 173 acres of the 307-acre project site are currently developed or have been granted entitlement for development of industrial storehouse/distribution and McDonnell Douglas aerospace uses.

City of Huntington Beach — Community Development Department
Lead Agency — **Division**

City of Huntington Beach, 2000 Main Street, 3rd Floor, Huntington Beach, CA 92648
Address Where Copy of EIR is Available

June 24, 1997 through August 7, 1997
Review Period

Julie Sakaguchi — (714) 536-5271
Contact Person — **Area Code/Phone/Extension**

PUBLIC NOTICE
DEPARTMENT OF COMMUNITY DEVELOPMENT
CITY OF HUNTINGTON BEACH
NOTICE OF AVAILABILITY AND PUBLIC INFORMATION MEETING FOR DRAFT ENVIRONMENTAL IMPACT REPORT (EIR) NO. 96-1 FOR THE PROPOSED MCDONNELL CENTRE BUSINESS PARK SPECIFIC PLAN

Location: McDonnell Douglas Aerospace Facility, Building 28
(Located off Bolsa Avenue)
Huntington Beach, CA 92647

Date and Time: Tuesday, July 8, 1997
6:30 p.m.

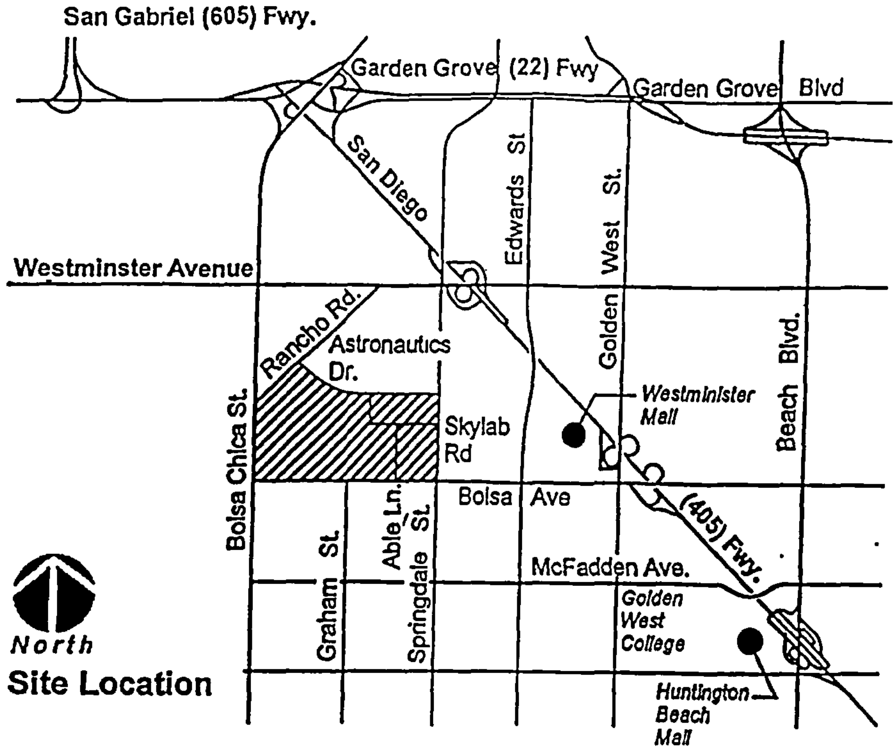
Purpose: To accept verbal and written comments related to the environmental information analyzed and findings made within the Draft EIR.

Background: The City of Huntington Beach is preparing an EIR on the proposed project. The 307-acre property is located in the northwest section of the City of Huntington Beach, bounded on the north by Rancho Road and the US Navy railroad right-of-way, on the east by Springdale Street, on the south by Bolsa Avenue, and on the west by Bolsa Chica Street. The Draft EIR analyzes the potential environmental effects associated with the buildout of the McDonnel Douglas Specific Plan which allows for development of a cohesive mix of industrial and commercial/retail/office uses that are submitted under the existing Industrial Limited (IL) zoning designation. Approximately 173 acres of the 307-acre project site are currently developed or have been granted entitlement for development of industrial storehouse/distribution and McDonnell Douglas aerospace uses.

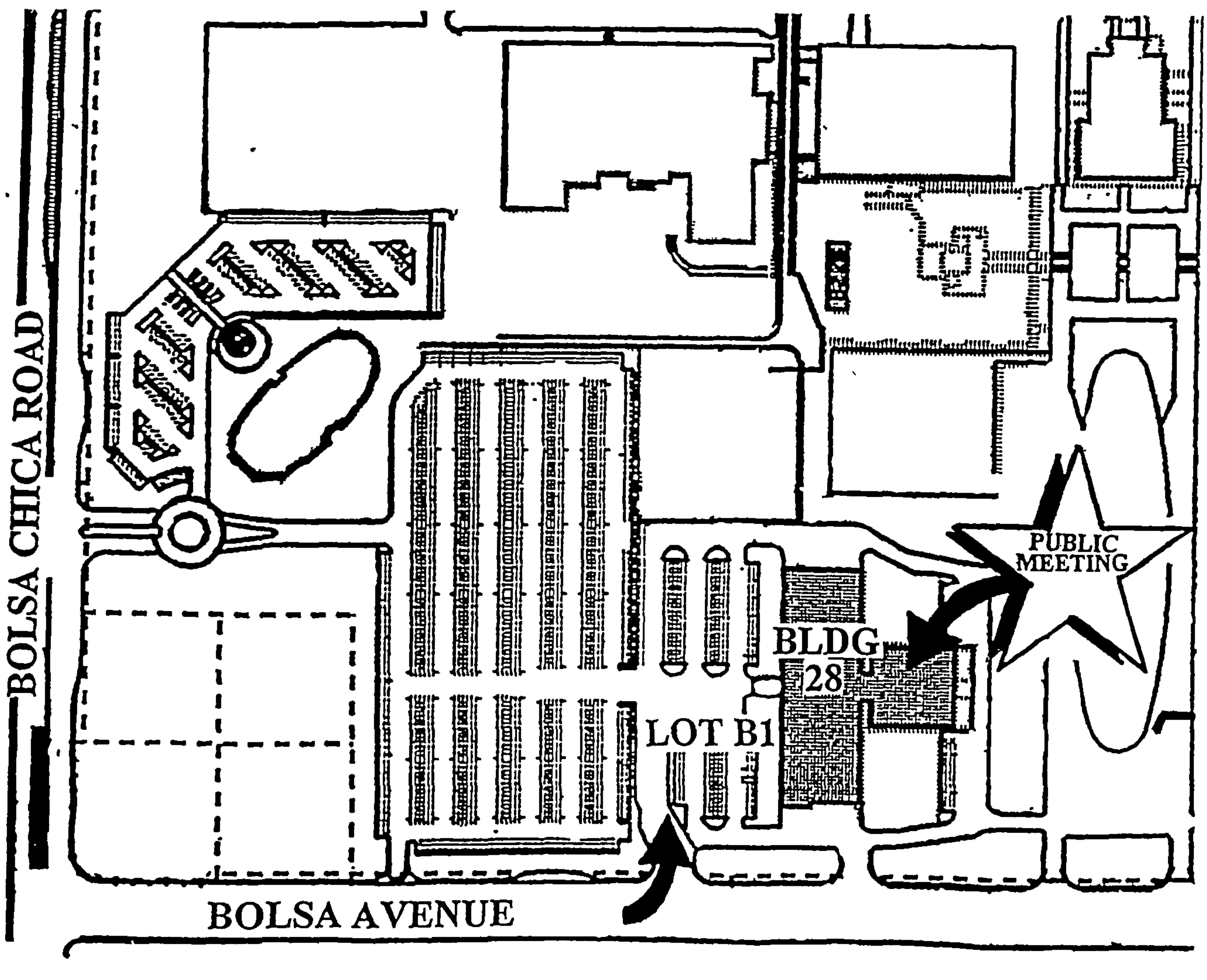
For further information, please contact:

Ms. Julie Sakaguchi
City of Huntington Beach
Department of Community Development
2000 Main Street
Huntington Beach, California 92648
714/536-5271

(A map depicting the project site and public meeting location is shown on the reverse side. Parking will be provided within lot B1. A copy of the Draft EIR is also available for review at the locations identified on the attached page.)



San Gabriel (605) Fwy.
Garden Grove (22) Fwy
Garden Grove Blvd
San Diego
Westminster Avenue
Edwards St
Golden West St.
Beach Blvd.
Rancho Rd.
Astronautics Dr.
Skylab Rd
Westminster Mall
Bolsa Chica St.
Bolsa Ave
(405) Fwy.
Graham St.
Able Ln.
Springdale St.
McFadden Ave.
Golden West College
Huntington Beach Mall
North
Site Location



BOLSA CHICA ROAD
PUBLIC MEETING
BLDG 28
LOT B1
BOLSA AVENUE

A copy of the Draft EIR for the project is available for review at the following location:

City of Huntington Beach
Office of the City Clerk
2000 Main Street
Huntington Beach, CA 92648
(714) 536-5227

City of Huntington Beach
Department of Community Development
2000 Main Street
Huntington Beach, CA 92648
(714) 536-5271

City of Huntington Beach
Central Library
7111 Talbert Avenue
Huntington Beach, CA 92648
(714) 842-4481

EDAW

June 23, 1997

TO: INTERESTED PARTIES

RE: DRAFT ENVIRONMENTAL IMPACT REPORT No. 96-1 FOR THE MCDONNELL CENTRE BUSINESS PARK SPECIFIC PLAN

The City of Huntington Beach is the Lead Agency and has prepared a Draft Environmental Impact Report (EIR) for the proposed McDonnell Centre Business Park Specific Plan generally described below. (A detailed project description. location, and the probable environmental effects are contained in the Draft EIR, forthcoming from State Clearing House). We need to know the views of responsible agencies and other interested parties as to the scope and content of the environmental information contained within the above referenced document.

Due to the time limits mandated by State Law, your response must be sent at the earliest possible date, but not later than 45-days after initiation of the public comment period by the State Clearing House. The State Clearing House began the public comment period on Tuesday, June 24, 1997. Comments on the Draft EIR are due by August 7, 1997 in writing to Julie Sakaguchi at the City of Huntington Beach Community Development Department at 2000 Main Street, Huntington Beach, CA 92648. For the public's convenience, we have also scheduled a public information meeting for Tuesday, July 8, 1997, at which time City staff will also take verbal comments on the Draft EIR (a notice for the meeting is also attached).

Project Title: McDonnell Centre Business Park Specific Plan Draft EIR No. 96-1

Project Description: The project involves preparation of a Specific Plan to allow for the cohesive development of a mix of industrial and commercial/retail/office uses that are submitted under the existing Industrial Limited (IL) zoning designation. Approximately 173 acres of the 307-acre project site are currently developed or have been granted entitlement for development of industrial storehouse/distribution and McDonnell Douglas aerospace uses.

Project Location: In the northwest section of the City of Huntington Beach. The site is bounded on the north by Rancho Road and the US Navy railroad right-of-way, on the east by Springdale Street, on the south by Bolsa Avenue, and on the west by Bolsa Chica Street.

Project Applicant: McDonnell Douglas Realty Company, 4060 Lakewood Blvd., 6th Floor, Long Beach, CA 90808-1700

If you have any questions, please contact Julie Sakaguchi at (714) 536-5274.

Sincerely,

Jayna Morgan

Jayna Morgan
Senior Associate

cc: Julie Sakaguchi

Landscape Architecture
Planning
Urban Design
Environmental Analysis
Site Engineering
Graphic Design

EDAW, Inc.
17875 Von Karman Avenue
Suite 400
Irvine, CA 92614
714 660-8044
FAX 714 660-1046

San Francisco
Alexandria
Atlanta
Denver
Fort Collins
Huntsville
Irvine
Orlando
Sacramento
Seattle
London
Glasgow
Colmar
Sophia Antipolis
Sydney
Brisbane
Gold Coast
Melbourne
Hong Kong

McDONNELL CENTRE BUSINESS PARK SPECIFIC PLAN EIR
HUNTINGTON BEACH, CALIFORNIA

FINAL
ENVIRONMENTAL IMPACT REPORT

STATE CLEARINGHOUSE NO. 96061043

PREPARED FOR:

THE City OF HUNTINGTON BEACH
COMMUNITY DEVELOPMENT DEPARTMENT
2000 MAIN STREET
HUNTINGTON BEACH, CA 92648

PREPARED BY:

EDAW, INC.

AUGUST 29, 1997

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1.0 INTRODUCTION

1.1 GENERAL PURPOSE

This EIR addresses potential environmental impacts associated with the preparation of a Specific Plan to allow for the cohesive development of a mix of industrial and commercial/retail/office uses that are submitted under the existing Industrial Limited (IL) zoning designation. The McDonnell Centre Business Park Specific Plan has been prepared to establish the planning concept, design theme, development regulations and administrative procedures necessary to achieve an orderly and compatible development of the 307-acre project area. The Specific Plan is regulatory in nature and serves as zoning for the McDonnell Centre Business Park area. The site is located in the City of Huntington Beach, County of Orange.

The City of Huntington Beach has the principal authority to approve the project and is the lead agency for preparation and certification of this EIR. The material contained in this EIR is intended to serve as an informational document for decisions to be made by the City and responsible agencies regarding the proposed project.

This EIR provides an overall analysis of potential impacts associated with implementation of the proposed project. The issues discussed within this EIR are those which have been identified in the course of extensive review of all potentially significant environmental impacts associated with the proposed project.

1.2 ENVIRONMENTAL PROCEDURES

This EIR has been prepared in accordance with the California Environmental Quality Act of 1970 (CEQA), as amended (Public Resources Code Section 21000 et seq.) and the State Guidelines for Implementation of CEQA (CEQA Guidelines), as amended (California Administrative Code Section 15000 et seq.). This report complies with the rules, regulations, and procedures adopted by the City of Huntington Beach for implementation of CEQA.

The CEQA Guidelines require that each EIR contain areas of description and analysis. Table A identifies areas required by CEQA and the corresponding sections in this EIR.

This EIR analyzes and assesses the significant environmental impacts of the proposed project and the cumulative impacts of the proposed project in conjunction with past, present, and reasonably foreseeable future projects in the surrounding area. It identifies alternatives to the proposed project and discusses possible ways to reduce or avoid the potentially significant environmental impacts.

The environmental procedures for analysis of the proposed project were initiated in June 1996, when the City prepared an Initial Study for the proposed project. Through the preparation of the Initial Study, the City determined that the proposed project may have a significant impact on the environment and that an EIR was necessary to analyze potentially significant environmental impacts associated with the potential development of the project site. The Initial Study is contained in Technical Appendix A of this EIR. A Notice of Preparation (NOP) was prepared for this EIR and circulated with the Initial Study for review by the State Office of Planning and Research on June 14, 1996. The NOP and the comments received on the NOP are included in Technical Appendix A .

TABLE A

REQUIRED EIR SECTIONS

	Required Description and Analysis	Section of EIR
1.	Summary (Section 15123 of Guidelines)	Section 2.0
2.	Description of Project (Section 15124 of Guidelines)	Section 3.0
3.	Description of Environmental Setting (Section 15125 of Guidelines)	Sections 4.0 and 5.0
4.	Environmental Impact (Sections 15126 and 15143 of Guidelines) a. Significant Environmental Effects b. Effects Which Cannot Be Avoided c. Mitigation Measures	Section 5.0
5.	Alternatives to the Proposed Action (Section 15126 of Guidelines)	Section 6.0
6.	The Relationship Between Local Short-term Uses of Man's Environment and Long-term Productivity (Section 15126 of Guidelines)	Section 7.0
7.	Significant Irreversible Environmental Changes (Section 15126 of Guidelines)	Section 7.0
8.	Growth Inducing Impacts (Section 15126 of Guidelines)	Section 7.0

Source: EDAW, Inc.

This EIR, as a final document pursuant to Sections 15089 and 15132 of the CEQA Guidelines, will serve as the environmental informational document for all public and private activities and undertakings pursuant to or in furtherance of completion of the project. This document is a Program EIR as defined in Section 15161 of the CEQA Guidelines. The information provided in this EIR builds from the Program EIR prepared for the City of Huntington Beach General Plan, and lays the foundation for any future discretionary actions for the project site. The City of Huntington Beach recognizes the fact that if new information should arise (i.e. through subsequent geotechnical or hydrology studies), an addendum pursuant to Section 15164 of the CEQA Guidelines may be required. The City of Huntington Beach as the decision making body, will consider the information in this EIR in the course of their deliberations.

CEQA Guidelines Section 21081.6 requires that a public agency adopt a reporting or monitoring program for adopted mitigation measures or conditions of the project approval in order to mitigate or avoid significant effects on the environment. The Mitigation Monitoring Program for the Specific Plan will be prepared under a separate cover and will be submitted to the City with the Final EIR for consideration at the time the proposed project is considered for approval.

CEQA Guidelines Section 15093 requires that, ".. the decision-maker (the City of Huntington Beach) balance the benefits of a proposed project against its unavoidable environmental risks in determining whether to approve the project." The City of Huntington Beach may prepare a Statement of Overriding Considerations for the proposed project pursuant to Section 15093 of the CEQA Guidelines. This document will be available at the time the project is considered for approval.

Technical Studies

The following technical studies were prepared for this EIR:

- Traffic Impact Analysis for the McDonnell Centre Business Park in Huntington Beach, WPA Traffic Engineering, Inc.
- McDonnell Centre-Huntington Beach-Parking Study, Paul E. Cook and Associates
- Air Modeling, EDAW
- Noise Modeling, EDAW
- Utilities Master Plan, Adams-Streeter

These technical studies are included in the Appendices of this EIR.

1.3 PROJECT SPONSORS AND CONTACT PERSONS

The lead agency for preparation of this EIR is the City of Huntington Beach. The project sponsor for this project is McDonnell Douglas Realty Company. The environmental consultant to the City is EDAW, Inc. Preparers of and contributors to this report are listed in the Report Preparation Resources section of this EIR. Key contact persons are as follows:

Lead Agency:

City of Huntington Beach

Ms. Melanie S. Fallon
Director of Community Development
Ms. Julie Osugi
Associate Planner
2000 Main Street
Huntington Beach, CA 92648
(714) 536-5271

Project Applicant:

McDonnell Douglas Realty Company

Mr. Stephen J. Barker
Director of Business Operations
McDonnell Douglas Realty Company
4060 Lakewood Boulevard, 6th Floor
Long Beach, CA 90808-1700
(310) 627-3063

Environmental Consultant:

EDAW, Inc.

Ms. Jayna Morgan, Senior Associate
Ms. Sally Mirabella, Associate
EDAW, Inc.
17875 Von Karman Avenue, Suite 400
Irvine, CA 92614
(714) 660-8044

1.4 MAJOR ISSUES

The major issues of the project identified in the Initial Study outline areas of possible environmental impact resulting from development of the project site as described within the Specific Plan. As a result of the Initial Study, this EIR addresses the following areas of potential environmental effect:

- Land Use Compatibility
- Aesthetics/Urban Design
- Light and Glare
- Transportation/Circulation
- Air Quality
- Noise
- Earth Conditions
- Drainage and Hydrology
- Natural Resources/Energy
- Public Services and Utilities
- Agriculture
- Socioeconomic

2.0 PROJECT SUMMARIES

2.1 EXECUTIVE SUMMARY

This Environmental Impact Report analyzes the potential environmental impacts associated with a Specific Plan to allow for the cohesive development of a mix of industrial and commercial/retail/office uses that are submitted under the existing Industrial Limited (IL) zoning designation. The McDonnell Center Business Park Specific Plan has been prepared to establish the planning concept, design theme, development regulations and administrative procedures necessary to achieve an orderly and compatible development of the 307-acre project area.

Approximately 173 acres of the 307-acre project site are currently developed or have been granted entitlement for development of industrial storehouse/distribution and McDonnell Douglas aerospace uses. Since the initiation of this Environmental Impact Report for the total 307-acre Specific Plan, the City of Huntington Beach approved two separate industrial projects within two parcels of the McDonnell Centre Business Park area. The approved projects are Conditional Use Permit No. 96-104 (Airtech International 121,500 SF) and Conditional Use Permit No.96-73 (Dynamic Cooking Systems 167,950 SF). The projects are located south of Skylab Road and east and west of Able Lane (northwest of the intersection of Springdale Street and Bolsa Avenue).

Access to the project site from a regional perspective is provided via the San Diego (405) Freeway directly from the Westminster Avenue and Bolsa Avenue interchanges. On a local perspective, access is provided via the four roadways surrounding the site: Rancho Road, Springdale Street, Bolsa Avenue and Bolsa Chica Street.

Long-Term Implications of the Project

Growth Inducing Impacts

According to the CEQA Guidelines, this section is concerned with "... the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." It should not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

The proposed Specific Plan provides for the expansion of industrial and office/business park land uses. The project site is situated in an area which has been experiencing a rapid rate of regional and local growth and development. Population growth in the City of Huntington Beach is expected to continue through the year 2015.

Implementation of the Specific Plan project would be growth-inducing in terms of a localized employment increase. The increase in employment will in turn cause an increase in demand for utilities, community services, fire protection facilities and personnel, and increased police personnel. Since the project restricts urban development to industrial, business park/office, and commercial uses, it is likely that other uses will be attracted to the area to absorb new residential demand generated by the proposed residential uses. These uses will include, but will not be limited to, additional support commercial services, employment-based uses, and housing for employees generated by the Specific Plan. No major extension of overall infrastructure (i.e. roads, sewer mains, utility lines, etc.) outside the Specific Plan boundaries would occur that would induce additional growth.

The Specific Plan project site represents an area containing undeveloped land, surrounded by development. As such, it can be viewed as an infill site and a logical extension of the development of land uses that currently exist on the site. It can also be viewed as an opportunity to provide a complementary, cohesive land use to surrounding urban areas. The proposed project represents land uses for the site which are in compliance with the City of Huntington Beach General Plan. The project site is surrounded by development to the north, south and east.

The City has recognized in the General Plan the development potential of the site and has included development of the site in its planning projections. Consequently, most major urban systems have been, or will be, sized in anticipation of site development.

2.2 PROJECT IMPACT SUMMARY

This Environmental Impact Report evaluates the potential project-specific and cumulative impacts regarding Land Use, Aesthetics/Urban Design, Light and Glare, Transportation/Circulation, Air Quality, Noise, Earth Conditions, Drainage and Hydrology, Natural Resources/ Energy, Public Services and Utilities, Agriculture and Socioeconomic. Significant impacts, the level of significance, and the mitigation measures recommended in this EIR are summarized in the Project Impact Summary which begins on page 2-3.

2.3 ALTERNATIVE SUMMARY

Alternatives to the proposed project under consideration and evaluated in this EIR are listed below. The Alternative Section provides a descriptive analysis and evaluation of each alternative. In addition, the Alternatives Summary located in Section 6.0, displays a comparison of each alternatives' potential environmental impact in comparison to the proposed project.

- No Project/No Development
- Development Based on Existing Zoning Standards
- Alternative Location
- Reduced Intensity - 60% Specific Plan Buildout

PROJECT IMPACT SUMMARY MATRIX

CATEGORY OF IMPACT	DESCRIPTION OF IMPACT	SCOPE	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE
LAND USE COMPATIBILITY	The proposed project may result in impacts to on-site land use.	Project-specific	None provided.	Project-specific impact is considered to be less than significant.
	The proposed project may result in impacts to adjacent land uses.	Project-specific	None provided.	Project-specific impact is considered to be less than significant.
	The proposed Specific Plan may result in impacts to the Land Use, Urban Design, Housing, Economic Development, Growth Management, Circulation, Public Facilities and Public Services, Recreation and Community Services, Utilities, Environmental Resources/Conservation, Coastal, Environmental Hazards, Noise, Housing, and Hazardous Materials Elements.	Project-specific	None provided.	Project-specific impact is considered to be less than significant.
	The proposed Specific Plan will result in impacts to the Air Quality Element due to the increase in local and regional emissions.	Project-specific and Cumulative	None provided.	Project-specific and Cumulative impacts are considered significant and unavoidable.
	The proposed Specific Plan in conjunction with other past, present, and reasonably foreseeable future projects will not result in impacts to the Land Use, Urban Design, Housing, Economic Development, Growth Management, Circulation, Public Facilities and Public Services, Recreation and Community Services, Utilities, Environmental Resources/ Conservation, Coastal, Environmental Hazards, Noise, and Hazardous Materials.	Cumulative	None provided.	Cumulative impact is considered to be less than significant.
AESTHETICS/URBAN DESIGN	The proposed project may result in impacts between on-site uses and development of the Specific Plan.	Project-specific	None provided.	Project-specific impacts considered to be less than significant.
	Off-site adjacent residential land uses located north and east of the project site will experience an aesthetic change associated with ultimate development of the McDonnell Centre Business Park.	Project-specific	Mitigation Measures 1 and 2 shall be implemented.	Project-specific impacts mitigated to a level less than significant.
	The proposed project, in conjunction with other past, present, and reasonably foreseeable future developments will incrementally contribute to changes to the perceived aesthetic quality of the local and regional area.	Cumulative	Mitigation Measures 1 and 2 shall be implemented.	Cumulative impacts mitigated to a level less than significant.
LIGHT AND GLARE	The project will affect on-site and nearby residents' nighttime perception of light and glare.	Project-specific	Mitigation Measures 1 through 3 shall be implemented.	Project-specific impacts mitigated to a level less than significant.
	The project will allow for the potential development of commercial recreation and entertainment-type uses in Planning Area 5. The development of such uses, which could include movie theaters, shops, etc., may result in an increase in night-time activity related light, unlike that of the typical industrial uses.	Project-specific	Mitigation Measure 2 shall be implemented.	Project-specific impacts mitigated to a level less than significant.
	The project in conjunction with other past, present and reasonably foreseeable future projects will incrementally increase the amount of light and glare in the area. Over time, the project will contribute to a cumulative increase in the amount of light and glare in the vicinity.	Cumulative	Mitigation Measures 1 through 3 shall be implemented.	Cumulative impacts mitigated to a level less than significant.

CATEGORY OF IMPACT	DESCRIPTION OF IMPACT	SCOPE	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE
TRANSPORTATION/CIRCULATION	The proposed project may result in impacts related to traffic signal warrants on the surrounding street system.	Project-specific	None provided.	Project-specific impacts considered to be less than significant.
	The proposed project may result in impacts related to parking.	Project-specific	Mitigation Measure 2 shall be implemented.	Project-specific impacts mitigated to a level less than significant.
	Construction related traffic will result from the future buildout of the Specific Plan.	Project-specific	Mitigation Measure 1 shall be implemented.	Project-specific impacts mitigated to a level less than significant.
	Increased activity on-site and in the vicinity of the project could expose pedestrians and bicycles to traffic hazards.	Project-specific	Mitigation Measures 2 through 4 shall be implemented.	Project-specific impacts mitigated to a level less than significant.
	Under the Level 3 Condition, the proposed interim project traffic is contributing to the need for intersection improvements.	Project-specific and Cumulative	Mitigation Measure 5 through 7 shall be implemented.	Project-specific and Cumulative impacts mitigated to a level less than significant.
	Under the Level 3 Condition, the proposed interim project traffic is contributing to the need for improvements at the roadway segments.	Project-specific and Cumulative	Mitigation Measure 5 shall be implemented.	Project-specific and Cumulative impacts mitigated to a level less than significant.
	Under the Level 5 condition, the proposed buildout project traffic is contributing to the need for the identified improvements at Westminster/Bolsa Chica, Westminster-Rancho-Hammon, Bolsa/Springdale, and Bolsa Golden West.	Project-specific and Cumulative	Mitigation Measures 7 through 9 shall be implemented.	Cumulative impacts to Westminster/Rancho-Hammon and Bolsa/Springdale are mitigated to a level less than significant. Cumulative impacts to Westminster/Bolsa Chica and Bolsa/ Goldenwest Intersections cannot be mitigated to a level less than significant.
	Under the Level 5 condition, the proposed buildout project traffic is contributing to the need for improvements at Edinger to Heil along Bolsa Chica Street and Rancho to Bolsa along Bolsa Chica Street.	Project-specific and Cumulative	Mitigation Measures 8 and 9 shall be implemented.	Cumulative impacts at Edinger to Heil along Bolsa Chica Street are mitigated to a level less than significant. Cumulative impacts to Rancho to Bolsa along Bolsa Chica Street cannot be mitigated to a level less than significant.
AIR QUALITY	The proposed project is anticipated to exceed SCAQMD's daily threshold emission during construction activities. In addition, the addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.	Project-specific	Mitigation Measures 1 through 6 shall be implemented.	Project-specific impacts cannot be mitigated to a level less than significant.
	The proposed project is anticipated to exceed SCAQMD's daily threshold emission levels for CO, NO_x and HC. The daily exceedance of the thresholds for CO, NO_x and HC is a long-term air quality impact. In addition, the addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.	Project-specific	Mitigation Measure 8 shall be implemented.	Project-specific impacts cannot be mitigated to a level less than significant.

Note: Level 2 and Level 4 traffic conditions do not assume project traffic and therefore are not summarized in this table.

CATEGORY OF IMPACT	DESCRIPTION OF IMPACT	SCOPE	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE
	The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in a short-term air quality impact due to construction activities. The addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.	Cumulative	Mitigation Measures 1 through 6 shall be implemented.	Cumulative impacts cannot be mitigated to a level less than significant.
	The project will result in the development of industrial uses which has the potential to generate objectionable odors which could affect nearby sensitive receptors.	Project-specific	Mitigation Measure 7 shall be implemented.	Project-specific impacts mitigated to a level less than significant
	The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in significant cumulative long-term impacts to air quality. The addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.	Cumulative	Mitigation Measure 8 shall be implemented.	Cumulative impact cannot be mitigated to a level less than significant.
NOISE	The proposed project has the potential to result in significant short-term noise impacts during construction activities.	Project-specific	Mitigation Measure 1 and 2 shall be implemented.	Project-specific impact mitigated to a level less than significant.
	It is possible that increased traffic due to the project may cause the Rancho Road near the Navy Railroad roadway segment to experience higher CNEL values in the future which have the potential to impact nearby residential units.	Project-specific	Mitigation Measure 3 shall be implemented.	Project-specific impact mitigated to a level less than significant.
	The proposed project will increase the year 2015 traffic noise levels by up to 1.7dB. The increase in noise levels due to the project along the segment of Rancho Road between Bolsa Chica and Westminster is considered a significant impact.	Project-specific	Mitigation Measure 3 shall be implemented.	Project-specific impact mitigated to a level less than significant.
	The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in a short-term construction noise impact.	Cumulative	Mitigation Measures 1 and 2 shall be implemented.	Cumulative impact mitigated to a level less than significant.
	The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in an incremental increase in traffic noise levels that currently exceed 65 CNEL.	Cumulative	None proposed.	Cumulative impact is considered significant and unavoidable.
EARTH CONDITIONS	The proposed project may result in impacts related to local geology.	Project-specific	Mitigation Measure 1 shall be implemented.	Project-specific impact mitigated to a level less than significant.
	The proposed project may result in impacts related to seismicity.	Project-specific	Mitigation Measures 2 and 3 shall be implemented.	Project-specific impact mitigated to a level less than significant.
	The proposed project may result in impacts related to liquefaction.	Project-specific	Mitigation Measure 4 shall be implemented.	Project-specific impact mitigated to a level less than significant.
	The proposed project may result in impacts related to expansive soils.	Project-specific	Mitigation Measures 5 and 6 shall be implemented.	Project-specific impact mitigated to a level less than significant.
	The proposed project may result in impacts related to hazardous materials.	Project-specific	None proposed.	Project-specific impact is considered to be less than significant.
	The proposed project will not result in cumulative impacts related to local geology, seismicity, liquefaction, expansive soils, and hazardous materials.	Cumulative	None proposed.	Project-specific impact is considered to be less than significant.
DRAINAGE AND HYDROLOGY	The proposed project may result in impacts related to drainage.	Project-specific	Mitigation Measures 1 and 2 shall be implemented.	Project-specific impact mitigated to a level less than significant.
	The proposed project may result in impacts related to flooding.	Project-specific	Mitigation Measures 1 and 3 shall be implemented.	Project-specific impact mitigated to a level less than significant.

CATEGORY OF IMPACT	DESCRIPTION OF IMPACT	SCOPE	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE
	The proposed project may result in impacts related to water quality.	Project-specific	Mitigation Measures 4 and 5 shall be implemented.	Project-specific impact mitigated to a level less than significant.
	The proposed project may result in cumulative impacts related to drainage, flooding, and water quality.	Cumulative	Mitigation Measures 1 through 5 shall be implemented.	Cumulative impacts mitigated to a level less than significant.
NATURAL RESOURCES/ENERGY	Development of this property will result in an increase in the use of fuel, water and energy for the life of the project; this increase is considered significant on a project-specific basis. The project in conjunction with other past, present and reasonably foreseeable future projects will result in natural resources impacts.	Project-specific and Cumulative	Mitigation Measures 1 and 2 shall be implemented.	Project-specific and cumulative impact mitigated to a level less than significant.
PUBLIC SERVICES AND UTILITIES	The proposed project may result in significant impacts to hospital facilities.	Project-specific	None provided.	Project-specific impact is considered to be less than significant.
	The proposed project may result in impacts to public services and utilities.	Project-specific	Mitigation Measures 1 through 26 and Mitigation Measure 2 from Section 5.9 shall be implemented.	Project-specific impact mitigated to a level less than significant.
	The proposed project will create increased demand for public services and utilities on a local and regional basis. Additionally, the project in conjunction with other past, present and reasonably foreseeable future projects, will create an increased demand for police, community services, water, solid waste disposal, public transportation, and sewage.	Project-specific and Cumulative	Mitigation Measures 1 through 26 and Mitigation Measure 2 from Section 5.9 shall be implemented.	Project-specific and cumulative impact mitigated to a level less than significant.
AGRICULTURE	The proposed project is located on an area of prime farmland as identified by the State Department of Conservation. The project will result in the loss of less than 80 acres of farmland.	Project-specific	None provided.	Project-specific impact is considered to be less than significant.
	The proposed project in conjunction with past, present, and reasonably foreseeable future projects will contribute to the ongoing cumulative impacts to agricultural resources in the region.	Cumulative	None provided.	Cumulative impact considered significant and unavoidable.
SOCIOECONOMIC	The proposed project in and of itself, and in conjunction with other past, present and reasonably foreseeable future projects, may result in socioeconomic impacts.	Cumulative	None provided.	Cumulative impact is considered to be less than significant.

3.0 PROJECT DESCRIPTION

3.1 PROJECT LOCATION

The proposed project is located within the northwest portion of the City of Huntington Beach, Orange County, California. The project site encompasses approximately 307 acres.

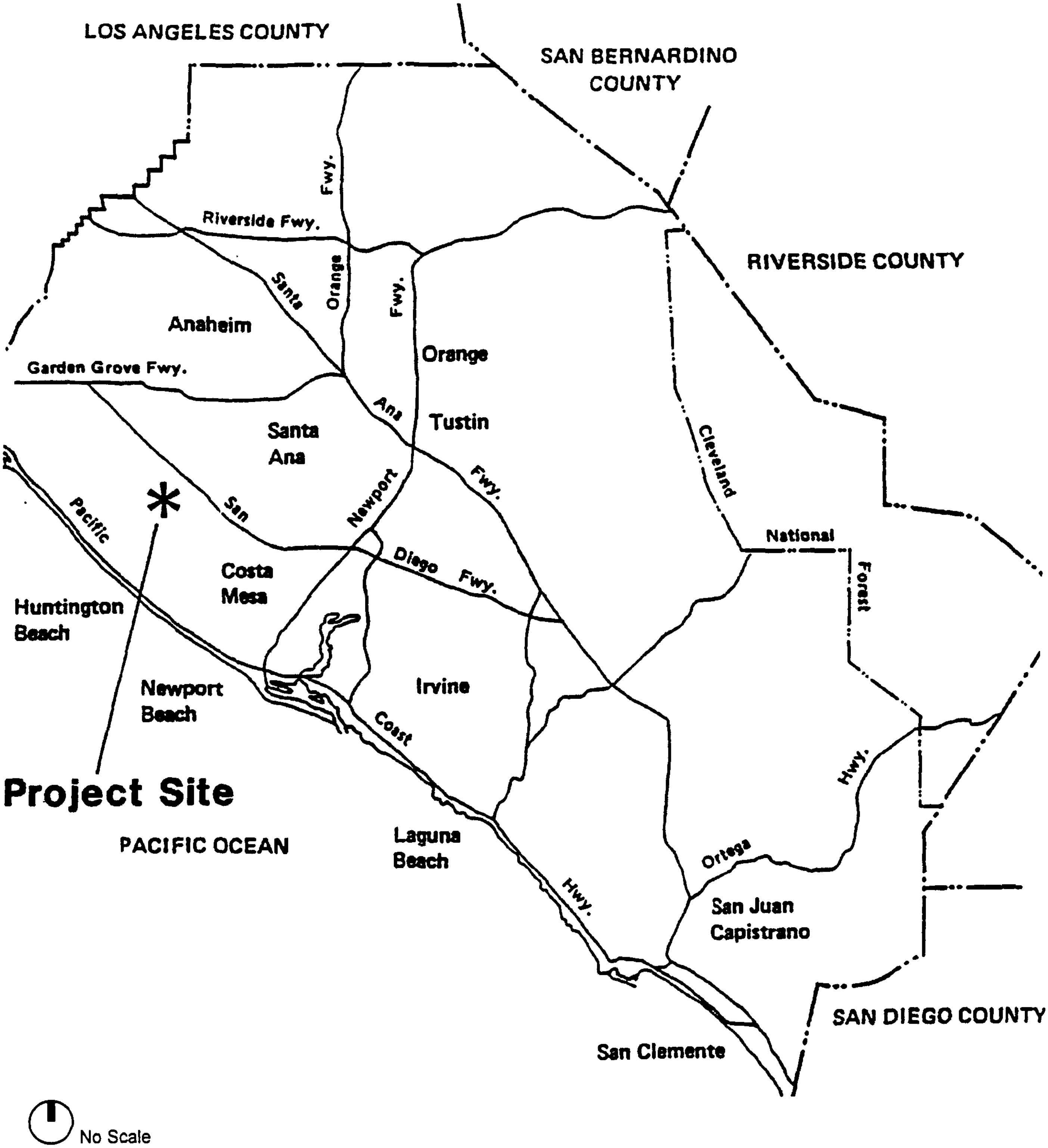
The site is bounded on the north by Rancho Road and the U.S. Navy Railroad right-of-way, and Astronautics Drive on the east by Springdale Street, on the south by Bolsa Avenue, and on the west by Bolsa Chica Street. Low density residential uses are located north of the railroad tracks and Rancho Road. Low density residential and commercial uses are located east of Springdale Street, and office and manufacturing uses are located south of Bolsa Avenue. To the west, is the Orange County Flood Control Channel (CO-3). The property across from Bolsa Chica Street and the flood control channel is owned by the U.S. Navy and is used as part of the Seal Beach Naval Weapons Station. The location of the project in relation to the local and regional setting is displayed in Exhibit 1 and Exhibit 2. Exhibit 3 illustrates the site on a USGS topographical map.

Access to the project site from a regional perspective is provided via the San Diego (405) Freeway directly from the Westminster Avenue and Bolsa Avenue interchanges. On a local perspective, access is provided via the four roadways surrounding the site: Rancho Road, Springdale Street, Bolsa Avenue and Bolsa Chica Street.

3.2 PROJECT CHARACTERISTICS

The EIR analyzes the potential environmental effects associated with a Specific Plan to allow for the cohesive development of a mix of industrial and commercial/retail/office uses. The permitted uses within the Specific Plan are discussed in more detail in Section 5.1 Land Use of this document. The purpose of the Specific Plan is to establish the planning concept, design theme, development regulations and administrative procedures necessary to achieve an orderly and compatible development of the project area; and to implement the goals, policies, and objectives of the Huntington Beach General Plan. The Specific Plan development procedures, regulations, standards and specifications shall supersede the relevant provisions of the City's Zoning Code (Huntington Beach Zoning and Subdivision Ordinance), as they currently exist or may be amended in the future. Any development regulation and building requirement not addressed in the Specific Plan shall be subject to the City's adopted regulations in place at the time of an individual request.

Approximately 173 of the 307-acre project site are currently developed or have been granted entitlement for development of industrial storehouse/distribution and McDonnell Douglas aerospace uses. Refer to Exhibit 4 which depicts an aerial view of the existing development on-site.

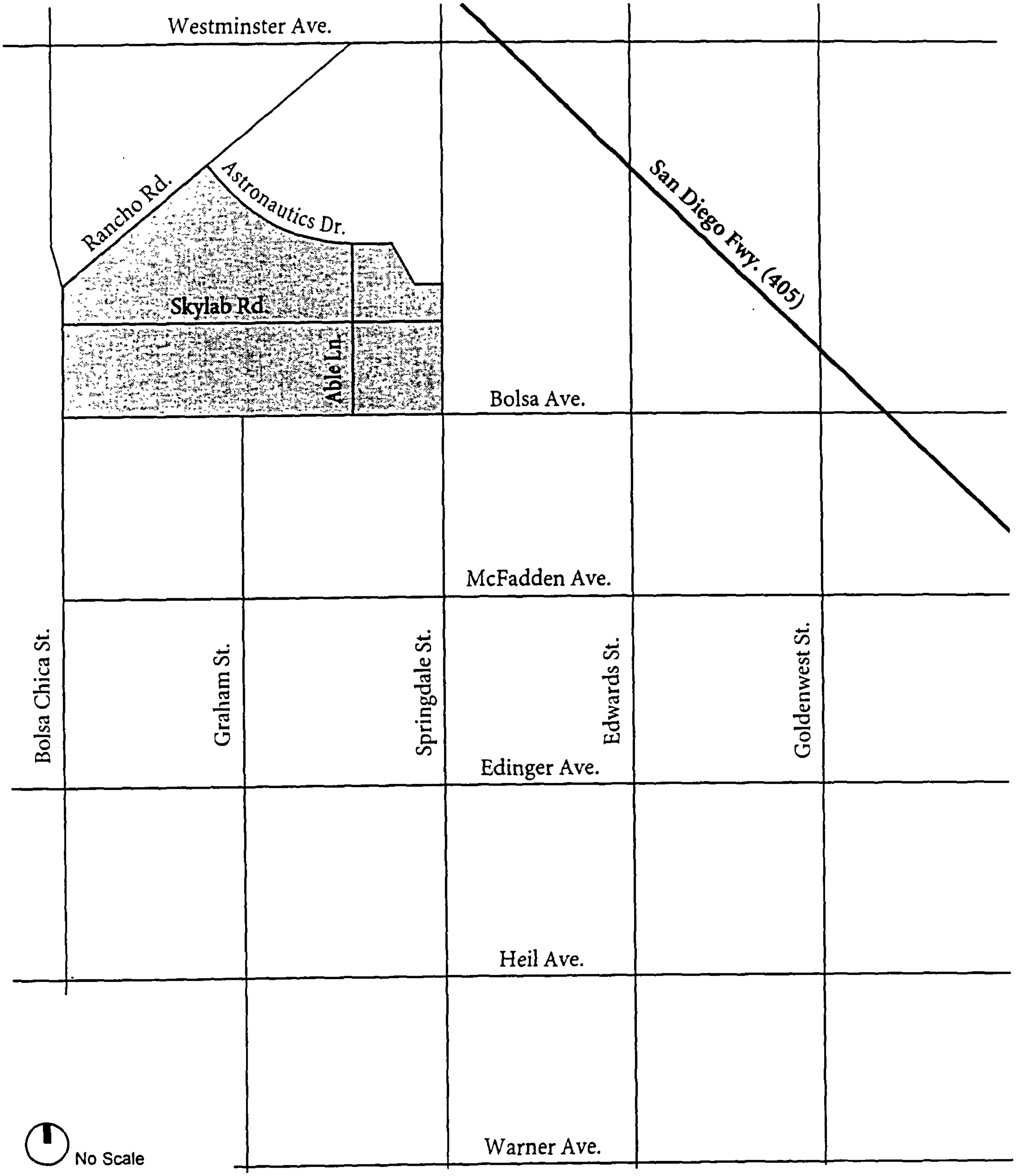


EDAW, Inc.

Source: EDAW, Inc.

Exhibit 1

Regional Location

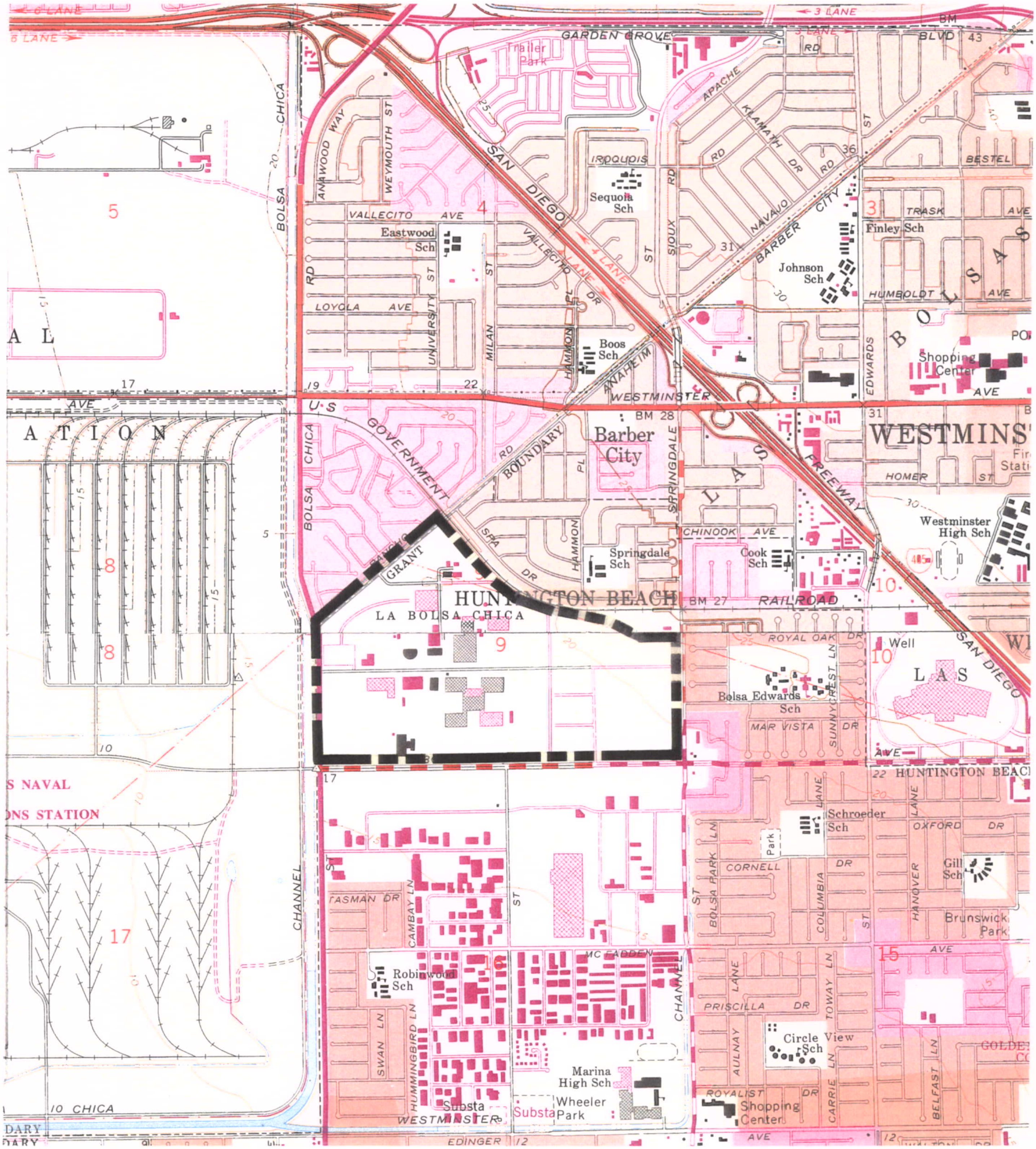


EDAW, Inc.

Exhibit 2

Source: EDAW, Inc.

Local Vicinity



Scale 1":2000'

EDAW, Inc.

Exhibit 3

Source: USGS Quad Map - Seal Beach, Los Alamitos

USGS Map

No Scale

EDAW, Inc.

Source: MDRC

Exhibit 4

1997 Aerial Photo

Since the initiation of this Environmental Impact Report for the total 307-acre Specific Plan, the City of Huntington Beach approved two separate industrial projects within two parcels of the McDonnell Centre Business Park area. The approved projects are Conditional Use Permit No. 96-104 (Airtech International 121,500 SF) and Conditional Use Permit No. 96-73 (Dynamic Cooking Systems 167,950 SF). The projects are located south of Skylab Road and east and west of Able Lane (northwest of the intersection of Springdale Street and Bolsa Avenue).

A Zoning Text and Map Amendment is being processed to implement the McDonnell Centre Business Park Specific Plan #11. The existing zoning on the property within the project is Limited Industrial, with a multi-story suffix on a portion of the site. The zoning for the property will change to McDonnell Centre Business Park Specific Plan #11 with approval of the project.

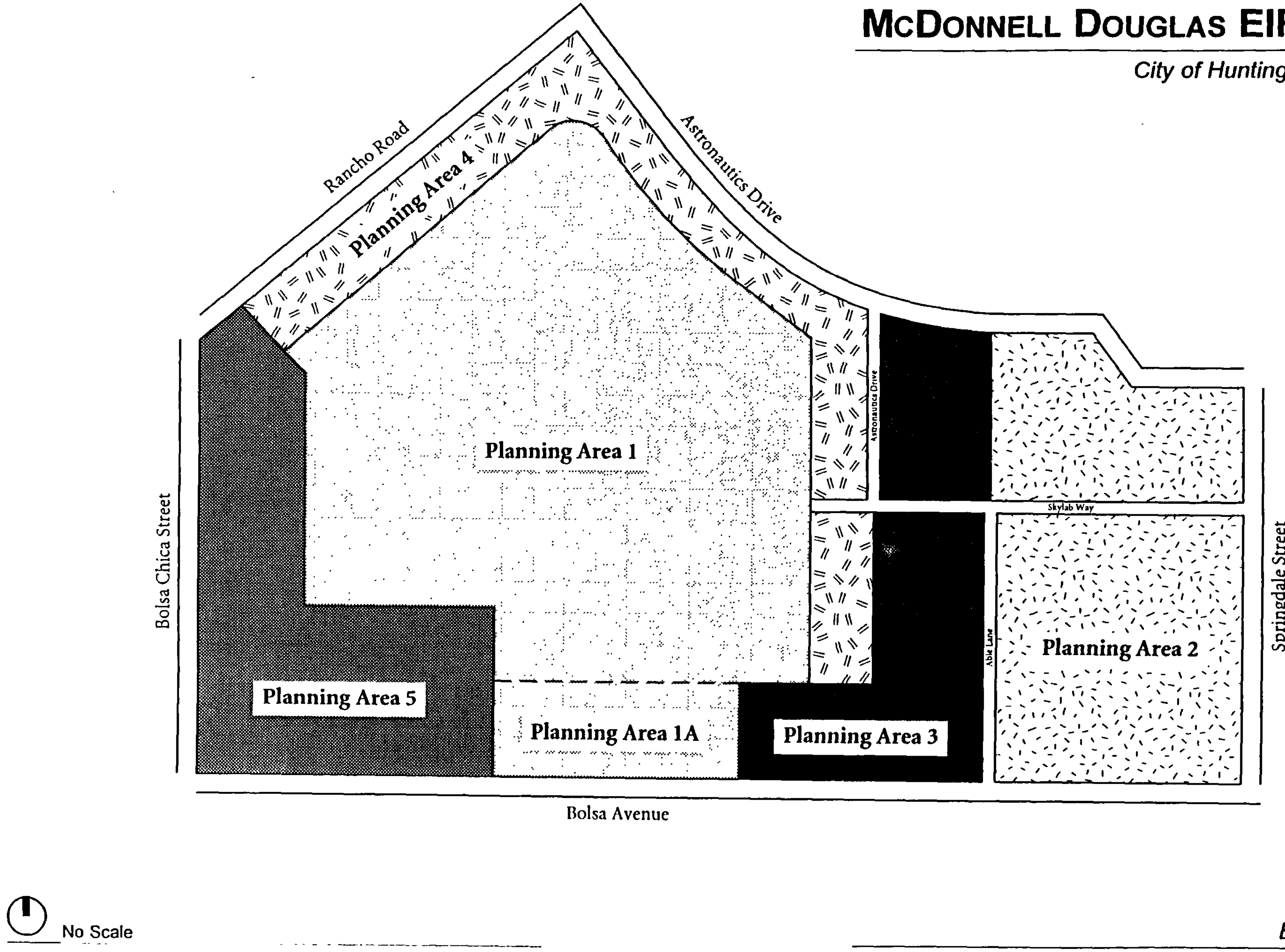
The proposed Specific Plan is divided into five (5) planning areas in an effort to create a distinct cluster of future uses/activities and to identify potential time frames for individual project development to occur in a timely manner, within the overall Master Plan Concept. Table B provides a breakdown of project components by planning area and current development status. Table C provides a breakdown of acreage per planning area and corresponding percentage of the total Specific Plan area. Exhibit 5 illustrates the location of the planning areas on the site. The following is a brief description of the areas:

Planning Area 1 includes the existing McDonnell Douglas Aerospace Facility comprised of approximately 2,789,053 square feet of building area and approximately 8,000 parking spaces on 100 net acres of land. The Specific Plan contemplates the continued expansion of aerospace facilities pursuant to existing entitlements. Planning Area 1A, located directly south of Planning Area 1, is also anticipated to be developed as additional McDonnell Douglas research and development operations and/or industrial, Research and Design (R&D) and office uses. MDA has recently informed City staff of potential plans to expand the aerospace facilities. Although no formal City applications have been filed, the City of Huntington Beach has been selected as one of seven (7) sites to construct the Delta IV-EELV facility. This approximate 2.3 million square foot facility, depending on its location within the Specific Plan area, would be subject to the City's Subdivision and Zoning Ordinance and/or Specific Plan standards and requirements. This facility may also include special components that could trigger additional requirements such as special permitting from other responsible agencies.

Planning Area 2 is comprised of 58 net acres of land located along Springdale Street and Bolsa Avenue to Able Lane. Sharp Electronics is currently constructing a 538,859 square foot facility on 23.4 net acres of land. Cambro Manufacturing currently occupies a 120,000 square foot building on 11.9 net acres of land; with an ultimate building area of 280,412 square feet. The remaining acreage (currently vacant) is expected to be developed with research and development facilities, office space, light industrial, warehouse and/or distribution uses. A recently approved industrial project, Conditional Use Permit No. 96-73 (Dynamic Cooking Systems 167,950 SF), is to be located within this planning area.

McDONNELL DOUGLAS EIR 96-1

City of Huntington Beach



EDAW, Inc.

Source: EDAW, Inc.

Exhibit 5

Proposed Planning Areas

TABLE B

PROJECT COMPONENTS

PROJECT COMPONENTS	ACRES	EXISTING USES	APPROVED USES	FUTURE USES
Planning Area 1 and Area 1A **McDonnell Douglas Aerospace** **Subtotal**	120	2,789,053 SF - manufacturing/ aerospace		manufacturing - 253,312 SF warehouse - 76,472 SF office/office park - 409,524 SF R&D - 261,360 SF **1,000,668 SF - manufacturing/ aerospace/R&D**
Planning Area 2 **Cambro Manufacturing**	11.9			
Phase I		120,000 SF - warehouse		
Phase II			10,000 SF - office 40,000 - warehouse	
Phase III			110,400 SF - manufacturing	
Future Potential				30,619 SF - office/warehouse/ manufacturing
Sharp Electronics Corporation	23.4			
Phase I			400,032 SF - warehouse/distribution 88,139 SF - office	
Phase II			50,700 SF - warehouse/distribution	
Future Potential				72,711 SF - R&D, distribution, office, manufacturing
Vacant Land - Phase I	8			209,088 SF - R&D, distribution, office, manufacturing
Vacant Land - Phase II	14.7			384,199 SF - R&D, distribution, office, manufacturing
Subtotal				**696,617 SF - R&D, distribution, office, manufacturing, warehouse**

TABLE B (CONTINUED)

PROJECT COMPONENTS

PROJECT COMPONENTS	ACRES	EXISTING USES	APPROVED USES	FUTURE USES
<u>**Planning Area 3**</u> **Vacant Land - Phase IIIa** **Subtotal**	36			light industrial - 470,448 SF warehouse - 235,224 SF office/office park - 235,224 SF **940,896 SF - R&D, distribution, office, manufacturing**
<u>**Planning Area 4**</u> **Vacant Land - Phase IIIb** **Subtotal**	35.0			light industrial - 457,380 SF warehouse - 228,690 SF office/office park - 228,690 SF **914,760 SF - R&D, distribution, office, manufacturing**
<u>**Planning Area 5**</u> **Mixed Use Office Complex**				
Phase I	9	235,831 SF - office (8-story building)		light industrial - 98,450 SF office/office park - 134,169 SF
Phase II	31		345,551 SF - office (12-story building) 14,000 SF - restaurant 9,600 SF - support retail	R&D - 107,399 SF hotel - 120,000 SF/150 rooms retail - 150,000 SF
Subtotal				**610,018 SF - mixed use**[1]
Future Potential				
Streets, Roads, etc.	18			
TOTAL	**307**	**3,144,884 SF**	**1,068,422 SF**	**4,162,959 SF**

Source: McDonnell Douglas Realty Company
Note: This table has been revised from its original version included as Table A of Appendix A. The Future Uses total square footage was reduced and the optional residential component was deleted.

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1 The mixed use area will allow for retail/commercial/office uses, and hotel.

TABLE C

PLANNING AREA ACREAGE

PLANNING AREA	DESCRIPTION	ACREAGE	PERCENT OF TOTAL
1 & 1A	McDonnell Douglas Aerospace - Aerospace Operations	120	39%
2	Area West of Able Lane to Springdale - Sharp and Cambro	58	19%
3	Bolsa Avenue Frontage West of Able Lane - mostly vacant	36	12%
4	Northern Perimeter Area Surrounding Planning Area 1 - Vacant	35	11%
5	Bolsa Avenue Frontage west of Planning Area 1A - Mixed Use Office Complex	40	13%
	Streets, Roads, etc.	18	6%
	TOTAL	**307**	**100%**

Source: McDonnell Douglas Realty Company

Planning Area 3, currently vacant and west of Planning Area 2, is ultimately anticipated to be developed with office, light industrial, warehouse and distribution uses. A recently approved industrial project, Conditional Use Permit No. 96-104 (Airtech International 121,500 SF) is to be located within this planning area. Additionally, City staff has recently been informed of future development applications for the development of a 265,000 SF light industrial/office building to be located within Planning Area 3, north of Airtech International. This development would ultimately replace the vacant land previously utilized for strawberry fields (see Exhibit 4).

Planning Area 4 is comprised of 35 net acres of vacant land along the northern perimeter of the project site, intended to be developed as an expansion of the current aerospace facility located in Planning Area 1 (south of Planning Area 4). Expansion of aerospace facilities into Planning Area 4 would be subject to staff-level site plan review to ensure consistency with the design standards in the Specific Plan. Such an expansion into Planning Area 4 could be part of a larger expansion associated with McDonnell Douglas Aerospace's potential utilization of this site for its Delta IV-EELV facility.

Planning Area 5 consists of 40 acres, located at the northeast intersection of Bolsa Avenue and Bolsa Chica Street, with a significant amount of frontage on both arterials. Phase one of this planning area is complete, which includes an 8-story, 235,831 square foot office building (constructed in 1989). Phase Two is anticipated to include a 12-story, 345,551 square foot office building, restaurant, and support commercial services. Development applications for the development of a 104-room, three-story executive suite hotel to be located within Planning Area 5, has recently been submitted to the City of Huntington Beach.

The Specific Plan includes a circulation plan illustrating the general alignments, classifications, location and design of cross-sections for public and private streets within the Specific Plan area, consistent with the Huntington Beach General Plan Circulation Element (refer to Exhibit 6 on page 3-13). Access to the Specific Plan area is provided via a system of arterial highways including: Bolsa Chica Street; Springdale Street; Bolsa Avenue; Graham Street; and Rancho Road. A number of entry drives and public transportation facilities are also identified. The interior streets within the Specific Plan are: Able Lane, Astronautics Drive, Graham Street, Skylab Road, and Skylab Road West. The system is designed to accommodate traffic around and within the project area resulting from ultimate buildout. Section 5.4 Transportation/Circulation of this EIR provides a detailed impact analysis of the proposed Circulation Plan.

The Specific Plan also includes a Public Facilities Plan which identifies existing and proposed infrastructure, storm drain, sewer, and water facility improvements to serve development within the Specific Plan area. A specific analysis of infrastructure requirements and detailed design, construction and phasing plans can be found in the Infrastructure Master Plan Appendix F of this document. Infrastructure impact analyses are included within the appropriate sections of this EIR. As stated above, the Specific Plan identifies and requires sufficient infrastructure and public facilities to adequately and efficiently support any and all anticipated land uses and activities. These improvements will be phased to coincide with or precede individual development projects. This upfront effort will allow future development projects to obtain City approval in an expedited manner, providing the individual projects are consistent with the Specific Plan and this EIR.

McDonnell Douglas EIR 96-1

City of Huntington Beach

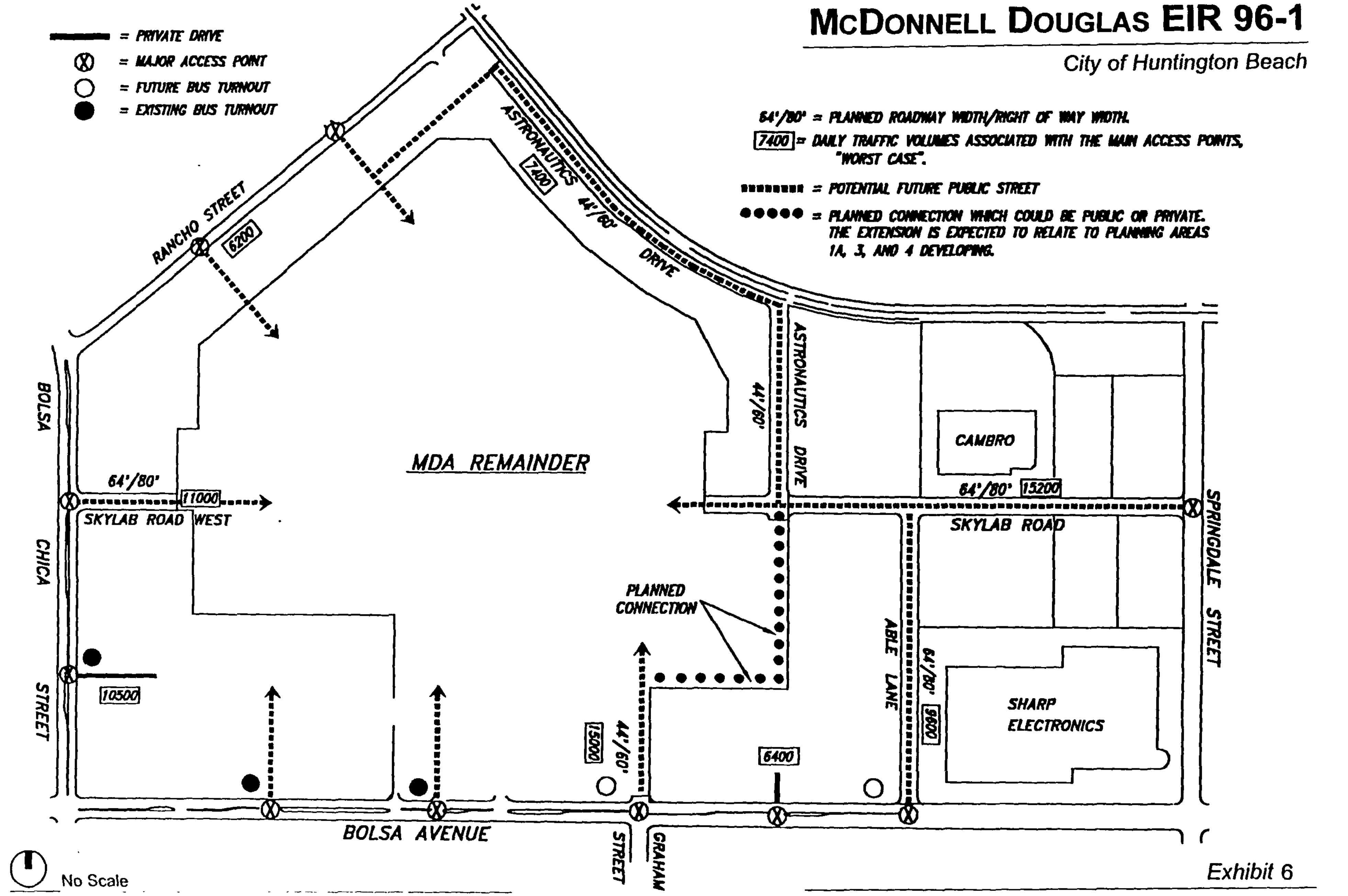


Exhibit 6

Proposed Circulation Plan

EDAW, Inc.

Source: WPA Traffic

3.3 PROJECT APPLICANT/PROPERTY OWNERS

The 307-acre project site consists of parcels owned by various entities: the McDonnell Douglas Realty Company (MDRC); McDonnell Douglas Aerospace (MDA); McDonnell Douglas Corporation; Douglas Realty Company, Inc.; Master Development Meridian Trust; Sharp Electronics; Cambro Manufacturing; and Airtech International. MDRC is the project applicant. MDRC offices are located at 4060 Lakewood Boulevard, 6th Floor, Long Beach, CA 90808. The applicant contact for the project is Mr. Stephen J. Barker, Director of Business Operations for MDRC.

3.4 HISTORY OF PROJECT

In 1962, McDonnell Douglas Aerospace was granted Conditional Exception Use Variance Permit #433. Approved by the City of Huntington Beach Planning Commission on May 15, 1962, this variance permit allows structures of up to 250 feet in height to be built on the McDonnell Douglas property; however, it did not include the 66-acre parcel located at the northwest corner of Springdale Street and Bolsa Avenue. The purpose of the variance permit is to allow research developmental testing laboratories and to allow for the provision of an integrated facility to explore vehicles for space exploration.

The applicant for the proposed project, the McDonnell Douglas Realty Company, originally initiated development plans for 66 acres of the project site in 1980. An Initial Study was prepared in April 1980, at which time the City of Huntington Beach Planning Department determined that an Environmental Impact Report (EIR) was necessary to analyze potentially significant environmental impacts associated with development of the site.

An EIR was prepared by Environmental Resources Group (ERG), a Los Angeles-based consulting firm. The Final EIR on the McDonnell Douglas Industrial/Office Complex (EIR 80-2) was submitted in March 1981.

The original proposed development consisted of 1.2 million square feet of industrial and office space (located within Planning Area 2 of the proposed Specific Plan). The plans made use of the Restricted Manufacturing (M1-A) zone which allows for "appropriate" mixed uses with the issuance of a conditional use permit. At that time, the applicant also applied for a zone change which would allow for a Multi-Story (MS) designation.

The original proposed plans for the Industrial/Office Complex consisted of industrial/warehouse buildings, office buildings, a hotel and restaurant, parking structures, access roads and landscaped open space. The office building was proposed to be a six to seven-story structure. The nearby hotel would have a tower of the same height. The Final EIR was approved and certified in March 1981. Due to an inability to contract with an interested developer, construction of the proposed Industrial/Office Complex was never initiated.

A subsequent application was submitted by the McDonnell Douglas Realty Company on January 8, 1991, requesting an amendment to the land use map of the General Plan by redesignating 62 acres of the project site (Planning Area 2 of the proposed Specific Plan) from General Industrial into four different land use designations: Medium Density Residential (15 units/acre) on 8.48 acres; Medium-High Density Residential (25 units/acre) on 19.41 acres; High Density Residential (35 units/acre) on 19.84 acres; and General Commercial on 10.02 acres. At that time a zone change was processed in conjunction with the General Plan Amendment. An Initial Study was prepared on February 4, 1991. It was determined through the Initial Study process that an EIR should be prepared for this project. An EIR (91-2) was prepared by STA Planning, Inc., an environmental planning consulting firm. The final EIR was certified and the project application was denied.

The City of Huntington Beach recently updated its General Plan. The City Council adopted the plan on May 13, 1996. It is comprised of 16 separate elements; land use, urban design, housing, historic and cultural resources, economic development, growth management, circulation, public facilities and public services, recreation and community services, utilities, environmental resources/conservation, air quality, coastal, environmental hazards, noise and hazardous materials. The Land Plan Map adopted with the General Plan designates this area as Industrial. An Environmental Impact Report was prepared for the General Plan Update and certified on May 13, 1996.

In 1996, the McDonnell Centre Business Park Specific Plan was prepared to establish the planning concept, design theme, development regulations and administrative procedures necessary to achieve an orderly and compatible development of the project area; and to implement the goals, policies, and objectives of the recently updated and adopted Huntington Beach General Plan. The Specific Plan is regulatory in nature and serves as zoning for the McDonnell Centre Business Park area. Subsequent development plans, Parcel Maps and other entitlement requests for the project area which are consistent with both the Specific Plan and City of Huntington Beach General Plan can receive expeditious approvals through the site plan review process. The intent is to establish a public private partnership to enable the development of a high quality business park.

In June 1996, the City of Huntington Beach prepared an Initial Study and it was determined that an EIR was necessary to analyze the potentially significant environmental effects associated with buildout of the proposed Specific Plan.

Subsequent to the circulation of the Initial Study and Notice of Preparation (NOP) for this project, revisions to the Project Components Table were implemented. The original Table A in the NOP which is included within this EIR as Table B was revised to show a reduction in the Future Uses square footage figures. The optional residential component originally proposed in Planning Area 5 was also subsequently deleted in the EIR table per City Council direction.

3.5 PHASING

According to the Phasing Plan of the McDonnell Centre Business Park Specific Plan, the business park will be developed in various phases over the next several years. The Specific Plan Planning

Areas (1, 1A, 2, 3, 4, & 5) have been further divided into Subareas (A through M) to reflect the anticipated development pattern and infrastructure improvement phasing. The Phasing Plan presents a schedule of project development based on the incremental installation of infrastructure improvements. The Phasing Plan recognizes that the project area is presently 40 percent built-out including the McDonnell Douglas facility with an additional 10 percent under construction and/or entitled. As indicated on the Phasing Plan (Exhibit 7), development of the eastern portion of the project site (Planning Areas 2 and 3) is anticipated to occur in the first phases of the Specific Plan implementation. Development of the western portion of the project site along Bolsa Chica Street, is anticipated to occur in later phases, as market conditions warrant; however, there is the potential for a hotel project at Bolsa Chica Street and Skylab Road West to occur sooner.

In order to ensure accommodation of proposed development, an Infrastructure Improvement Plan/Phasing Schedule has been prepared as part of the Specific Plan (Exhibit 19). The first phase of the infrastructure phasing plan will extend, install, and improve the utilities necessary to provide for new development in Planning Areas 2 and 3. First phase infrastructure improvements are anticipated to be complete by the year 1998.

Later phase infrastructure improvements will be extended west along the southern boundary of the project area. This extension of services will facilitate a variety of new development options in Planning Areas 1A and 5. It is anticipated that Planning Area 4 will be the last area to develop, allowing for expansion of the existing aerospace facility.

The applicant is not proposing development of the subject property at this time. Once approval has been obtained for the Specific Plan and associated Code Amendment, the applicant will implement the development phasing plan based upon current economic conditions.

3.6 PROJECT OBJECTIVES

A statement of objectives is required by Section 15124 of the California Environmental Quality Act. The objectives of the applicant and the City of Huntington Beach are identified through the following:

Applicant

- Provide opportunity for a variety of high quality industrial, office and commercial uses consistent with the City's General Plan.

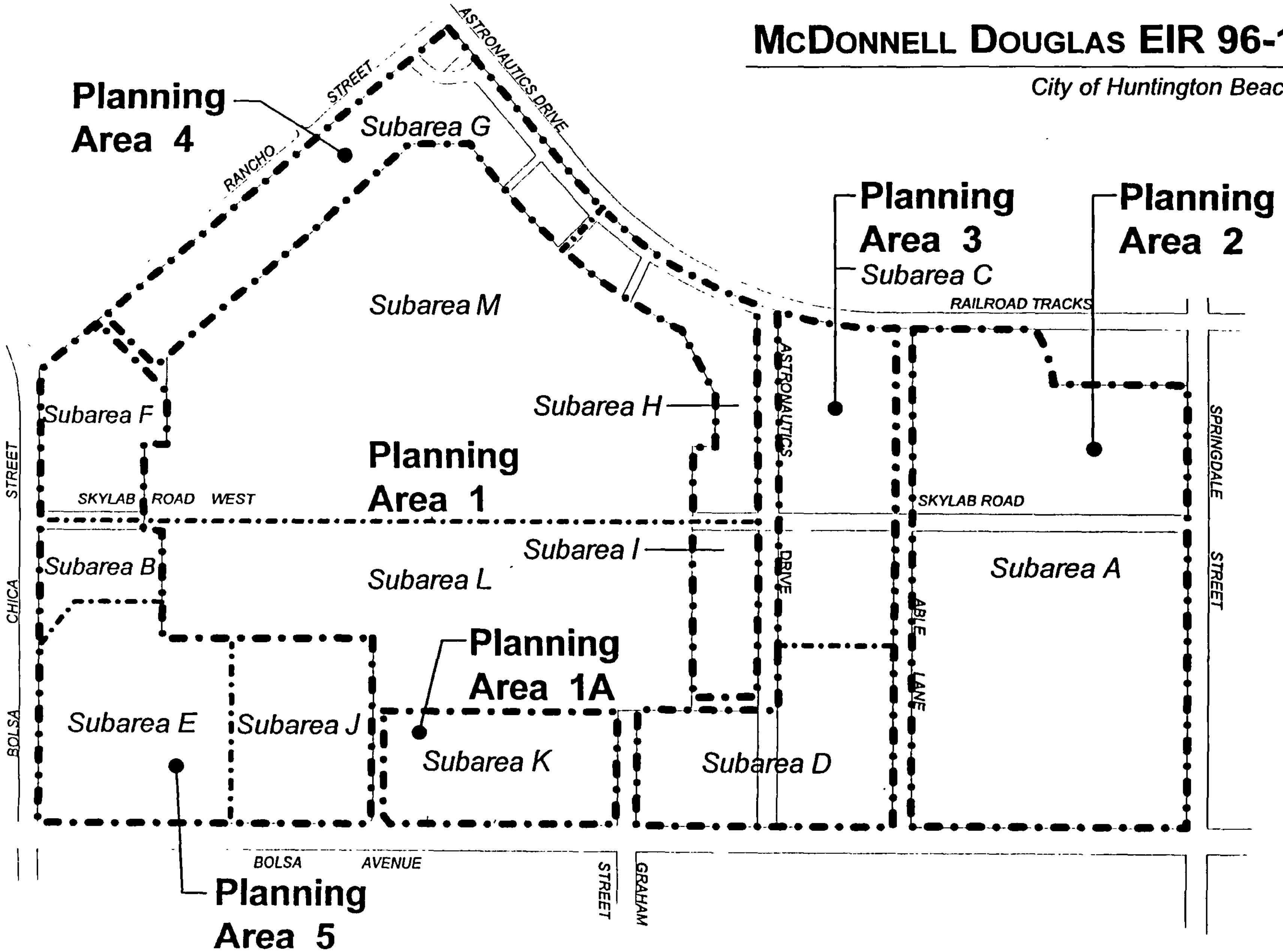
- Provide a range of employment opportunities including professional, retail and service, and industrial, thereby widening the employee base of the City.

- Result in a positive revenue flow to the City.

- Ensure that the development is perceived as a single, cohesive business park complex; design measures encompassing landscaping, signage, setbacks, and streetscapes will combine to establish the unique character of the development.

McDonnell Douglas EIR 96-1

City of Huntington Beach



No Scale

EDAW, Inc.

Source MDRC

Exhibit 7

Phasing Plan

- Establish flexible development guidelines which will accommodate future market trends and tenant needs, without sacrificing the intended high-quality character of the project.

- Provide adequate infrastructure to support the specific plan land uses.

- Ensure that future development proposals consistent with the Specific Plan obtain City approval in an expeditious manner.

City of Huntington Beach

- Create a development compatible with and sensitive to the existing land uses in the project area.

- Promote the development of commercial, industrial, and public buildings and sites that convey a high quality visual image and character.

- Provide for necessary transportation improvements and strategies to accommodate the demands of new and existing development.

- Balance projected costs and revenues.

- Balance the City's long-term needs for industrial and commercial property.

- Ensure adequate utility infrastructure and public services for new development, and that timing and funding of improvements is closely correlated with development phasing.

- Enhance the community image of Huntington Beach, through the design and construction of a high-quality, state-of-the-art planned development.

- Allow projects that conform with the standards of the Specific Plan without the need for additional entitlements.

3.7 PROJECT PROPOSALS AND THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

This Environmental Impact Report (EIR) has been prepared and addresses the potential impacts of the land uses allowed by the Specific Plan. The EIR identifies the impacts of the amount and mix of development described in the Specific Plan. If individually proposed projects are within this prescribed level of development, then the subsequent environmental review process should incorporate the findings of this document and if necessary only address the project's site-specific impacts. If additional impacts are identified and a subsequent EIR is required, general impacts which are addressed in the Specific Plan EIR should be included by reference.

As time passes and conditions change or projects differ from those included in the Specific Plan, additional environmental review on those issues addressed in the EIR may be necessary.

3.8 PROPOSED ACTIONS

The following section describes discretionary actions which are currently proposed for the subject property. Approval of these actions is granted by the Lead Agency (City of Huntington Beach).

1. Certification of Environmental Impact Report No. 96-1. The applicant is requesting acceptance of an environmental document as having been prepared in compliance with the California Environmental Quality Act (CEQA), the State CEQA guidelines, City policies, and certification that the data was considered in final decisions on the project.

2. Zone Text and Map Amendment 96-1. The applicant is requesting a zone text and map amendment from the existing Industrial Limited (IL) zoning designation to a Specific Plan (#11) zoning designation. Appropriate zoning modifications would be made for the various project components.

3.9 LEAD, RESPONSIBLE, AND INTERESTED AGENCIES

Lead Agency

In conformance with Sections 15050 and 15367 of the State CEQA Guidelines, the City of Huntington Beach is the Lead Agency for the project. The Lead Agency is defined as the "public agency which has the principal responsibility for carrying out or approving the project." This EIR will be used by the City of Huntington Beach, as the Lead Agency, in the review and consideration of the proposed project.

The Lead Agency Contact is:

Ms. Melanie S. Fallon
Director of Community Development
Ms. Julie Osugi
Associate Planner
2000 Main Street
Huntington Beach, CA 92648
(714) 536-5271

Responsible/Interested Agencies

Responsible Agencies are those agencies which have discretionary approval over one or more actions involved with development of the proposed project site. This EIR is also intended to provide environmental information to a number of agencies which may be involved in serving the project, or may otherwise have an interest in the development's environmental effects. These agencies include, but are not limited to, the following:

Agencies:		Interest:
1.	Orange County Sanitation District	Wastewater transport and treatment
2.	Huntington Beach Public Works Department	Potential impacts upon sewer availability
3.	Orange County Environmental Management Agency	Potential cumulative effects related to traffic, noise and flood control
4.	Huntington Beach Water District	Potential impacts upon water supplies
5.	Orange County Transit District	Accessibility to existing bus stops
6.	Caltrans	Roadway conditions and improvements
7.	State Department of Conservation	Conversion of agriculture/farmland

4.0 REGIONAL, CITYWIDE, AND LOCAL SETTING

4.1 INTRODUCTION

The following section discusses the project area from a regional, citywide and local perspective. The project site itself is also discussed. The setting section has been divided into these three subsections to indicate and discuss the three distinct areas in which the project may affect or be affected by existing and proposed development. The study areas discussed in this section were designated for the purpose of evaluating project impacts only and do not necessarily represent an adopted study area of the City of Huntington Beach.

4.2 REGIONAL SETTING

The City of Huntington Beach is located in northwest Orange County along the southern California coast. The County of Orange is south of the County of Los Angeles and north of San Diego County. The regional location is displayed in Exhibit 1 within the Project Description of this EIR. The major arterials surrounding the site from a regional perspective are the San Diego (405) and Garden Grove (22) Freeways to the north; Pacific Coast Highway (1) to the south; and Beach Boulevard (39) to the east. Direct access to the site would be from the San Diego Freeway (405) at the Westminster Avenue/Springdale Street and Bolsa Avenue interchanges.

Regional facilities include the John Wayne Airport located to the southeast in nearby Santa Ana and the U.S. Naval Weapons Station located in Seal Beach to the west.

4.3 CITYWIDE SETTING

From a citywide perspective, the project is located within the northern portion of the City of Huntington Beach approximately three miles north of the Pacific Ocean. Nearby public amenities include Goldenwest College to the southeast, Westminster Mall to the east, and Meadowlark Golf Course to the south. Surrounding municipalities include Westminster to the northeast, Fountain Valley to the east, Costa Mesa to the southeast, Newport Beach to the south and the Seal Beach Naval Weapons Station to the west. Exhibit 2 within the Project Description of this report displays the project's location within the City of Huntington Beach.

4.4 LOCAL SETTING

From a local perspective, the project site is bounded by an at grade spurtrack of the U.S. Navy (Railroad Right-of-Way) and Astronautics Drive and Rancho Road. The site is bounded by Springdale Street to the east. On the other side of the Navy railway to the north are low density residential uses. On the other side of Springdale Street to the east are low density residential and commercial uses. To the west, the site is bounded by Bolsa

Chica Street and the Orange County Flood Control District Channel. The property west of Bolsa Chica Street and the flood control channel is owned by the U.S. Navy and is primarily vacant. Bolsa Avenue forms the southern boundary of the site with office and manufacturing uses along Bolsa Avenue opposite the site. Skylab Road bisects the site in an east-west direction, while Able Lane bisects the eastern portion of the site in a north-south direction.

The project site encompasses approximately 307 acres and is partially developed with industrial/office uses. The project site is characterized by flat topography and is level with adjacent topography. Exhibit 3 within the Project Description section depicts the project site on a USGS topographical map, while Exhibit 4 within the Project Description section depicts a 1997 aerial photograph taken of the site.

4.5 RELATED PROJECTS

In the local vicinity of the project site there are projects that may be affected by or affect the proposed project. Each project's size, location, approval status and relationship to the proposed project is discussed below.

Huntington Beach Planned Development Projects

1. **Waterfront (Phases II - VI & Residential):** Zone Change No. 87-7/ Development Agreement/Precise Plan of Street Alignment No. 88-1/Supplemental Environmental Impact Report No. 82-2. The first phase was development of the Hilton Hotel which has been complete and in operation since July 1990. The Waterfront project is encompassing four hotels, a tennis and health center, a retail shopping plaza and approximately 875 residential units. The Future Master Plan includes: Phase II - Conference Hotel, 500 rooms, 20 stories, total 451,000 square feet; Phase III - Tennis and Health Club, 33,000 square feet, 4 stories, 6 tennis courts; Phase IV - All Suite Hotel, 250 rooms, 15 stories, 250,600 square feet; Phase V - Retail shopping, 3 stories, 75,000 square feet; Phase VI - Luxury Hotel, 400 rooms, 9 stories, 440,000 square feet; and Waterfront Residential - 775 units over 3 phases. However, it should be noted that the plan may be amended due to changes in market trends; amendments to the plan and/or subsequent development under the plan will be subject to project specific entitlement and environment review.

2. **Main Pier, Phase II:** Conditional Use Permit No. 92-17/Coastal Development Permit No. 92-14/Tentative Tract Map No. 14666. A mixed use project consisting of 80 residential units and 39,766 square feet of new retail development. The project is located on the 2 blocks bounded by Pacific Coast Highway, Sixth, Main and Walnut Streets; and was approved by California Coastal Commission on June 13, 1996.

3. **Seaview Village:** Conditional Use Permit No. 96-8, Variance No. 96-9, Tentative Tract Map No. 14357 (Revised). The project consists of construction of 27 single family detached homes (ranging from 1,831 to 2,140 square feet) on an approximate 2.3-acre site located south of Happy Drive, between Joyful Lane and Jolly Lane. Southwest of Beach Boulevard and Talbert Avenue. The project was approved on June 11, 1996.

4. **Sea Call:** Conditional Use Permit No. 96-3/Variance No. 96-2/General Plan Conformance No. 96-3/Negative Declaration No. 92-31. The project consists of construction of 29 three and four bedroom single family detached homes ranging from 1,685 to 2,009 square feet on an approximately 2.27-acre site located at 8166 Constantine Drive (South side of Constantine Drive, east of Sunwood Circle). The project was approved on July 9, 1996.

5. **Ocean Crest:** Development Permit No. 96-11/Zone Change No. 96-3/Local Coastal Program Amendment No. 96-2. Tentative Tract No. 14135/Conditional Use Permit No. 96-27/Coastal (zone change from High Density Residential to Low Density Residential). The project consists of construction of 54 single family homes on a 9.8-acre site located northwest of the intersection of Palm Avenue and Seapoint Avenue. The project was approved by Planning Commission on November 12, 1996.

6. **3rd Block West:** Conditional Use Permit No. 90-39 (R)/Coastal Development Permit No. 90-30 (R)/Design Review Board No. 95-59/Tentative Tract Map No. 14352. The project was originally approved by the City Council in 1991. The Redevelopment Agency and JT Development have recently requested an amendment to the approved plans to add more commercial square footage and reduce the number of residential units. The revised project is currently under review by the Planning Division and will require review and approval of the Planning Commission prior to implementation. The project consists of a mix of uses with 25,500 square feet of retail on the ground level and 11,000 square feet of office space on a second level fronting Main Street and 45 townhomes units. The project is on an 82,023 square-foot site located on the West 300 block of Main Street (full block bounded by Main Street, Olive Avenue, Fifth Street, and Orange Avenue). Was approved by City Council in April, 1997.

7. **Meadowlark Specific Plan:** Conditional Use Permit No. 90-45/Tentative Parcel Map No. 90-268 (submitted for Meadowlark Plaza - commercial portion only). The former Meadowlark Airport site will feature a combination of residential (600 residential units at various densities) and commercial development. The project is a 15-acre site located north of Warner Avenue and east of Bolsa Chica Street. Shopping center construction has been completed and residential development proposals are expected to occur in the next three years. The first phase of residential development has been submitted for review. The proposed plans consist of development of 330 units on approximately 50 acres of the Specific Plan. The application is anticipated to go to Planning Commission for action during the winter of this year.

8. **Bolsa Chica:** Bolsa Chica is a 1,588-acre unincorporated area within the County of Orange. The Bolsa Chica Local Coastal Program preparation/processing has shifted over to the County. Although the City surrounds the Bolsa Chica area and will be impacted by the development, the project is within the County's jurisdiction. Koll Real Estate Group is the primary land owner. Other owners include Fieldstone, Ocean View School District, Metropolitan Water District, Huntington Beach Company, D. E. Goodell, the State of California, and the City of Huntington Beach. On January 11, 1996, the California Coastal Commission approved the Bolsa Chica Local Coastal Program which allows-for the following developments: Residential - development of a maximum of 3,300 residential units (including a maximum 900 units in the lowlands) on a total of approximately 400 acres; Commercial - an optional 10 acres of commercial on the mesa; Recreational - designation of a total of 87 acres for recreational uses (consisting of 58 acres for the Linear Park, 17 acres for a mesa community park, 8 acres for a lowland community park, and 5 acres for beach access and trails); No Bolsa Chica Street Extension (BCSE) - the approved plan did not include the controversial Bolsa Chica Street Extension (a.k.a., the Cross-Gap Connector) but included an "interior collector street" connecting Talbert Ave. and Graham Street; Wetlands Restoration/Tidal Inlet: Ultimate creation of an 1,113-acre coastal wetland ecosystem with a non-navigable tidal inlet which will provide ocean water to support existing and restored tidal wetlands; and East Garden Grove Wintersburg Flood Control Channel (EGGW Channel) Improvements: The project includes improvements to the EGGW Channel. Flows from the channel will be diverted to the wetlands areas as part of the restoration plan.

9. **Holly Seacliff Specific Plan Area:** Tentative Tract No. 14700 (Peninsula II)/Tentative Tract No. 14662 (Parkside/The Cove)/Tentative Tract No. 14661 (Holmby Place)/Tentative Tract No. 14659 (Sherwood)/Environmental Impact Report No. 89-1. This is a 570-acre area generally bounded by Ellis Avenue to the north, Huntington and Main Streets to the east, Yorktown Avenue and Summit Drive to the south, and the Edwards Street bluffs to the west. Uses will include Low Density Residential, Medium Density Residential, Medium High Density Residential, Mixed Development, Commercial, Industrial and Open Space. Ultimately, up to 3,895 residential units may be constructed in the area over the next ten to fifteen years. The 570-acre project site is located on Ellis Avenue/Huntington and Main Street/Yorktown and Summit Drive/Edwards Street. Approximately 1,109 units have been approved.

10. **Broadmoor (Mukai Subdivision):** Tentative Tract No. 15071/Conditional Use Permit No. 95-72/Variance No. 95-16/Negative Declaration No. 95-8. The 3.7-acre project site with 17 detached single family units with square footages ranging from 3,100 to 3,600 are located at 17301 Edwards (between Slater and Warner Avenues). The project has been approved and is under construction.

11. **Hamptons:** Conditional Use Permit No. 90-47 (with special permits) /Conditional Exception (Variation) 90-35/Tentative Tract No. 14007/Tentative Tract No. 14009/ Mitigated Negative Declaration No. 90-44, 90-45, 90-46. The 41-acre project site consists of construction of 141 single family detached homes located on the northwest corner of Golden West Street and Garfield Avenue. The project is currently under construction.

12. **Gill School:** Tentative Tract No. 14990/Conditional Use Permit 94-26. The 8.94-acre project site consists of construction of 58 single family residential units, containing three to five bedrooms. Square footage ranges from 1,900 to 2,700. The project site is located at Cumberland Drive and Victoria Lane. The units are under construction and pre-selling of units has started.

13. **Bushard School:** Tentative Tract No. 14515/Site Plan Amendment No. 94-2. The 9.68-acre project site consists of construction of 58 single family residential units, containing three to five bedrooms. Square footage's range from 1,900 to 2,700. The project site is located on Education Lane. The units are currently under construction and pre-selling of units has started.

14. **Centerstone:** Tentative Tract Map and Conditional Use Permit approved 3/95. Tentative Tract Map No. 15109/Conditional Use Permit No. 94-40. The 3.99-acre project site consists of construction of 30 single family residential units, containing three to five bedrooms. Square footage range from 2,058 to 2,218. Lot sizes are approximately 4,100 square feet. The project site located on Beach Boulevard, south of Adams. The units are currently under construction.

15. **Pier Plaza:** Permit No. 93-70/Coastal Development Permit. New parking lot with 634 stalls, new restroom and concession building, amphitheater and landscaping, improved pedestrian, vehicular: rollerblade, etc.) access in and around pier. The project is located on 1 Pacific Coast Highway. The project started in October 1996.

16. **Duke's Surf City Restaurant:** Conditional Use Permit No. 94-25/Coastal Development Permit No. 94-10. The project site consists of construction of a new 18,000 square foot, two story restaurant located at 317 Pacific Coast Highway (old Maxwell's site). The project has not yet been initiated.

17. **Cannes Pointe:** Tentative Tract Map No. 14590/Conditional Use Permit No. 96-35. The 6-acre project site consists of construction of 29 Single Family Homes, ranging in size from 1,645 to 2,000 square feet. The project site is a triangular lot bounded by Huntington Street, Main Street, and Garfield Avenue. Project is anticipated to go to Planning Commission in August of this year.

18. **Seabridge Specific Plan:** The project consists of development of 20 single family detached units on approximately 3.98 acres, located within the Seabridge Specific Plan (east side of Beach Boulevard, approximately 800 feet south of Adams Avenue). This project was approved by the Planning Commission and is currently under construction.

19. **Bowen Court:** Proposal to develop 23 senior residential units on approximately 0.75 acres located on the southwest corner of Yorktown Avenue and Lake Street. The project was denied by Planning Commission, but approved by the City Council on appeal of the Planning Commission decision, on June 2, 1997.

20. **21st - 22nd Street:** Proposal to amend the zoning on approximately 0.88 acres located on PCH between 21st and 22nd Streets, within the Downtown Specific Plan, from District- 1 (Visitors Serving Commercial) to District-2 (Residential). If approved, the residential designation will allow for development of a maximum of 10 single family detached units or a maximum of 26 multifamily units (or combination of single and multifamily units). However, no proposal for development has been submitted to date.

21. **Wintersburg/Home Depot:** Proposal for a General Plan Amendment, Zone Change, Conditional Use Permit and Tentative Parcel Map to allow for the development of a Home Depot, School Administrative Office, and relocation of recreational fields at the southeast corner of Warner Avenue and Golden West Street. The project consists of the demolition of the closed Wintersburg School buildings, and the construction of a 106,548 SF Home Depot store and 24,337 SF garden center on a 10.5-acre site. The project also includes a future 30,000 SF building on 2.71 acres, and the relocation of various athletic fields on a 4.06-acre remainder parcel and on 16 acres at the adjacent Ocean View High School. The project was approved by the City Council in June 1997 but has not yet been constructed.

5.0 ENVIRONMENTAL ANALYSIS

ORGANIZATION OF ANALYSIS

The following section details project impacts which were previously identified in the Initial Study and Scoping Process for the proposed project. The Initial Study is contained in Appendix A. The environmental topics addressed in this EIR are as follows:

- Land Use
- Aesthetics/Urban Design
- Light and Glare
- Transportation/Circulation
- Air Quality
- Noise
- Earth Conditions
- Drainage and Hydrology
- Natural Resources/Energy
- Public Services and Utilities
- Agriculture
- Socioeconomic

Each impact analysis is structured in the following manner:

1. Existing Conditions
2. Impacts
3. Cumulative Impacts
4. Mitigation Measures
5. Level of Significance

The Existing Conditions describes the project site and characteristics as they presently occur. This description focuses on the particular impact area (i.e., noise, air quality, etc.) that is being discussed.

The Impacts analysis describes how implementation of the proposed project will affect the existing conditions related to the site, neighborhood, and region.

Cumulative impacts of the project in conjunction with other approved, proposed, and reasonably foreseeable future projects are discussed in this EIR.

Mitigation Measures are recommended to reduce or eliminate significant environmental impacts.

The Level of Significance states whether the project-specific and cumulative impacts identified in the Impacts analysis can be mitigated. If the impacts cannot be mitigated, they are noted as unavoidable adverse impacts. Impacts that can be mitigated are either mitigated to a level less than significant, or are lessened but not mitigated to a level less than significant and remain unavoidable adverse impacts of the proposed project.

5.1 LAND USE

EXISTING CONDITIONS

On-Site Land Uses

The 307-acre site currently consists of undeveloped land, developed, urban land uses and existing roadways. The total land currently developed with the existing McDonnell Douglas Aerospace Facility and associated light industrial facilities consists of 173 acres. Exhibit 8 identifies the existing facilities located on the project site. The remaining 134 acres consists of vacant, undeveloped land, of which 50 acres were previously used for strawberry fields. The topography of the site is flat.

The northern border of the site is formed by an at grade spurtrack of the U.S. Navy (Railroad Right-of-Way) and Rancho Road. The site is bounded by Springdale Street to the east. On the other side of the Navy railway to the north are low density residential uses. On the other side of Springdale Street to the east are low density residential and commercial uses. To the west, the site is bounded by Bolsa Chica Street and the Orange County Flood Control District Channel. The property west of Bolsa Chica Street and the flood control channel is owned by the U.S. Navy and is primarily vacant. Bolsa Avenue forms the southern boundary of the site with office and manufacturing uses along Bolsa Avenue opposite the site. Skylab Road bisects the site in an east-west direction, while Able Lane bisects the eastern portion of the site in a north-south direction.

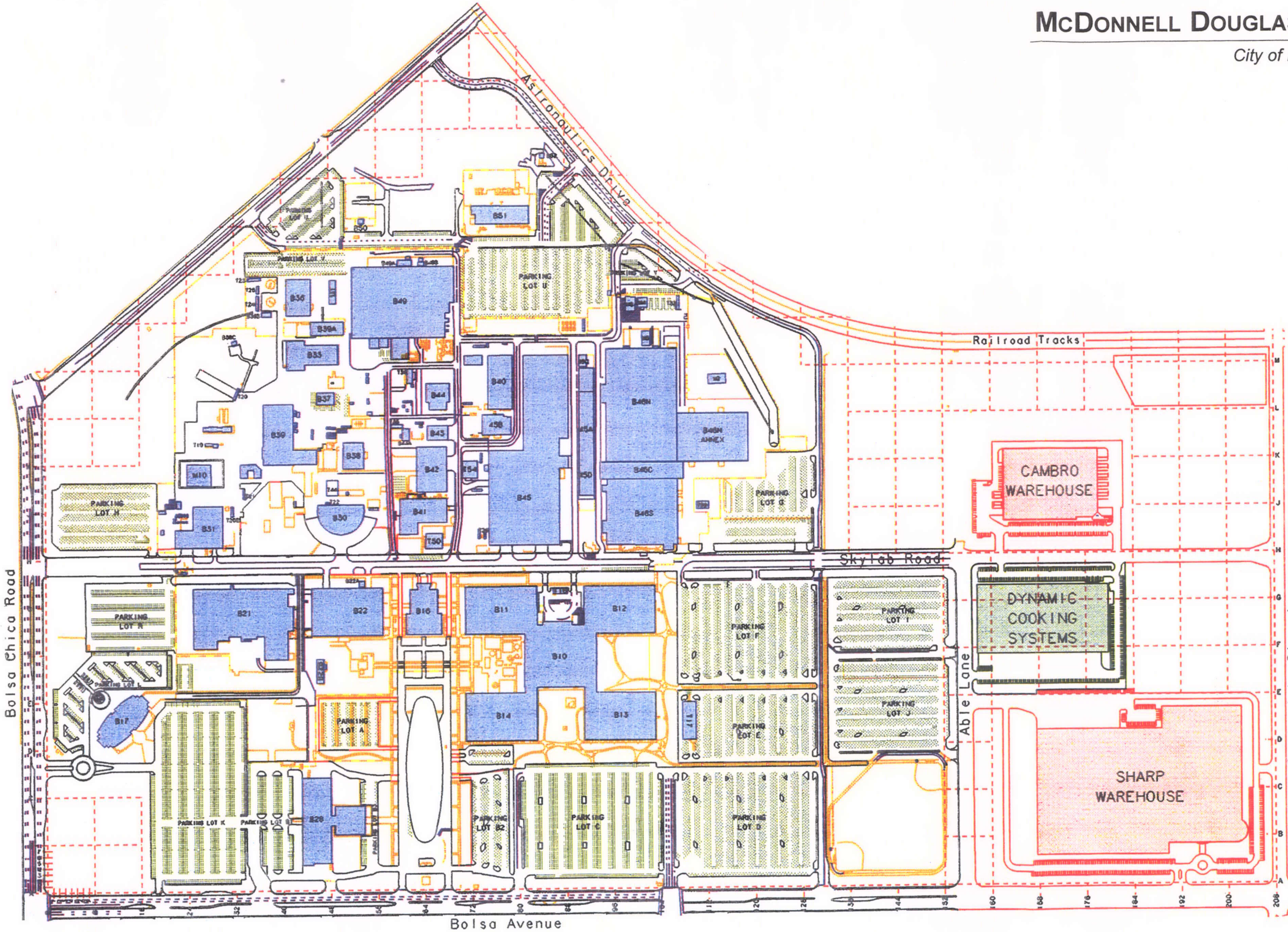
Exhibit 9, Site Photo Index, shows the location from which each photo was taken. Exhibits 10 through 13 depict on-site existing conditions. Each photo is discussed in greater detail below.

Exhibit 10, Site Photo A is a view from the northwest at the corner of Rancho Road and Bolsa Chica Street, looking across Rancho Road at the project site. This photo shows existing McDonnell Douglas warehouse and storage facilities beyond the eucalyptus trees that align the northwest border of the site. Exhibit 10, Site Photo B is a view of the project site from the site's northwest corner, looking southeast across the project site. This photo also shows the existing McDonnell Douglas warehouse and storage facilities.

Exhibit 11, Site Photo C is a view from Astronautics Drive looking south at the project site. This photo shows existing McDonnell Douglas warehouse facilities. The left corner of the photo shows the wall bordering the northwest boundary of the site. Exhibit 11, Site Photo D is a view from the eastern boundary of the site along Springdale Street looking southwest toward the site.

This photo shows the existing vacant land previously utilized for strawberry farming (see Agriculture section of the EIR).

Exhibit 12, Site Photo E is a view from the corner of Skylab Road and Springdale Street looking northwest across the project site. This photo shows the existing 100,000 SF Cambro building and vacant, undeveloped property located in the eastern portion of the site, at the northwest corner of Skylab Road and Springdale Street. Exhibit 12, Site Photo F is a view from the corner of Springdale Street and Bolsa Avenue, looking northwest toward the site. This photo shows the Sharp Electronics Corporation facility currently being constructed at the corner of Springdale Street and Bolsa Avenue.



EDAW, Inc.

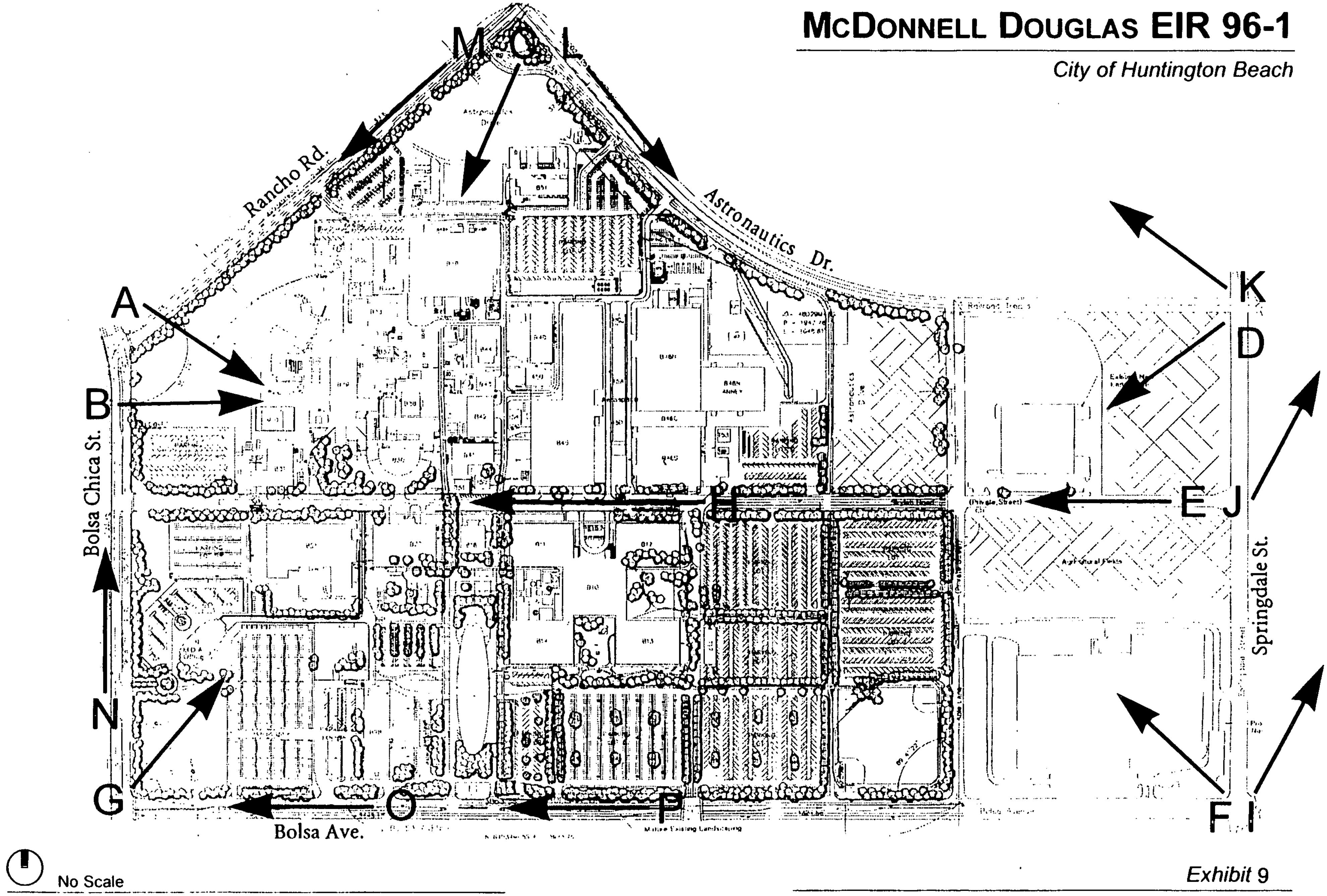
Source: MDRC

Exhibit 8

Existing Facilities Site Plan

McDonnell Douglas EIR 96-1

City of Huntington Beach



EDAW, Inc.

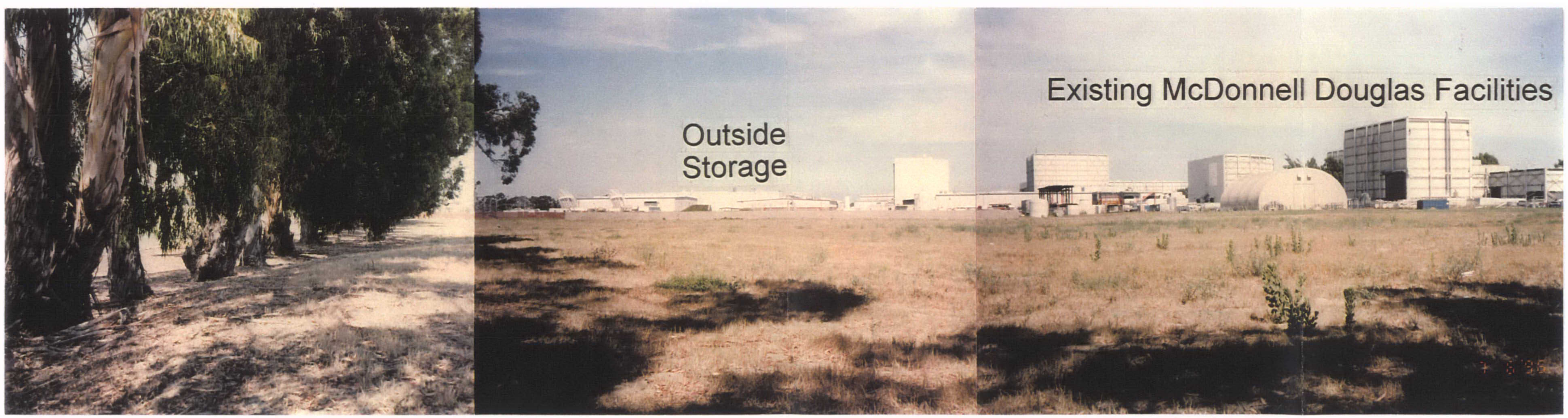
Exhibit 9

Site Photo Index

A

View of Project Site from Corner of Rancho Road and Bolsa Chica Street

B



View of Project Site from Northwest Corner Looking Southeast

C

View from Astronautics Drive Looking South at Project Site

D

View from Springdale Street Looking Southwest at Project Site

EDAW, Inc.

Source: EDAW, Inc.

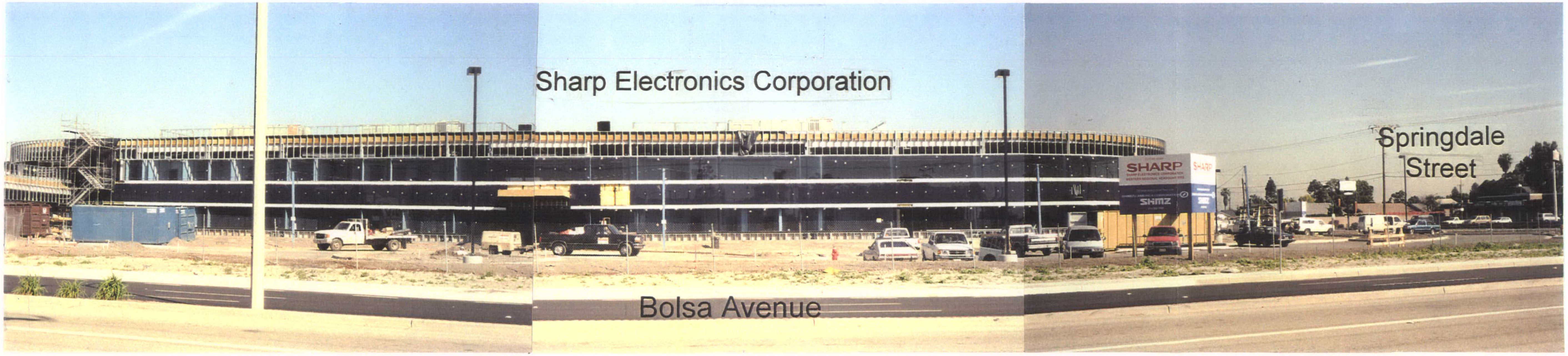
Exhibit 11

Site Photos

E

View from Corner of Skylab Road and Springdale Street

F



View of Project Site from Corner of Springdale Street and Bolsa Avenue

Exhibit 13, Site Photo G is a view from the corner of Bolsa Chica Street and Bolsa Avenue, looking northeast across the project site. This photo shows the existing McDonnell Douglas Aerospace Facilities and associated buildings. The vacant, open space located directly at the corner of Bolsa Chica Street and Bolsa Avenue is shown in the foreground of the photo. Exhibit 13, Site Photo H is a view from Skylab Road just west of Able Lane, looking west toward the existing McDonnell Douglas facilities.

Surrounding Land Uses

A site photo reconnaissance was conducted to graphically depict surrounding land uses in relationship to the proposed project site. Exhibits 14 through 17 present photos of the site's surrounding area.

Exhibit 14, Site Photo I is a view from the southeast corner of the project site looking off-site to the east across Springdale Street. This photo depicts the commercial uses located on the northeast corner of Springdale Street and Bolsa Avenue. Exhibit 14, Site Photo J is a view off-site looking northeast across Springdale Street from the southeast portion of the project site. Single family residential is located across Springdale Street, east of the project site.

Exhibit 15, Site Photo K is a view from Springdale Street, looking northwest along the U.S. Navy railroad tracks. Single family residential is located north of the project site, beyond the railroad tracks. Exhibit 15, Site Photo L is a view of the single family residential located north of the northern boundary of the project site.

Exhibit 16, Site Photo M is a view looking southwest along Rancho Road. The flood control channel is located north of the project site on the other side of Rancho Road. Beyond the flood control channel is residential uses. Exhibit 16, Site Photo N is a view looking north along Bolsa Chica Street. The United States Weapons Station is located west of the project site on the other side of Bolsa Chica Street.

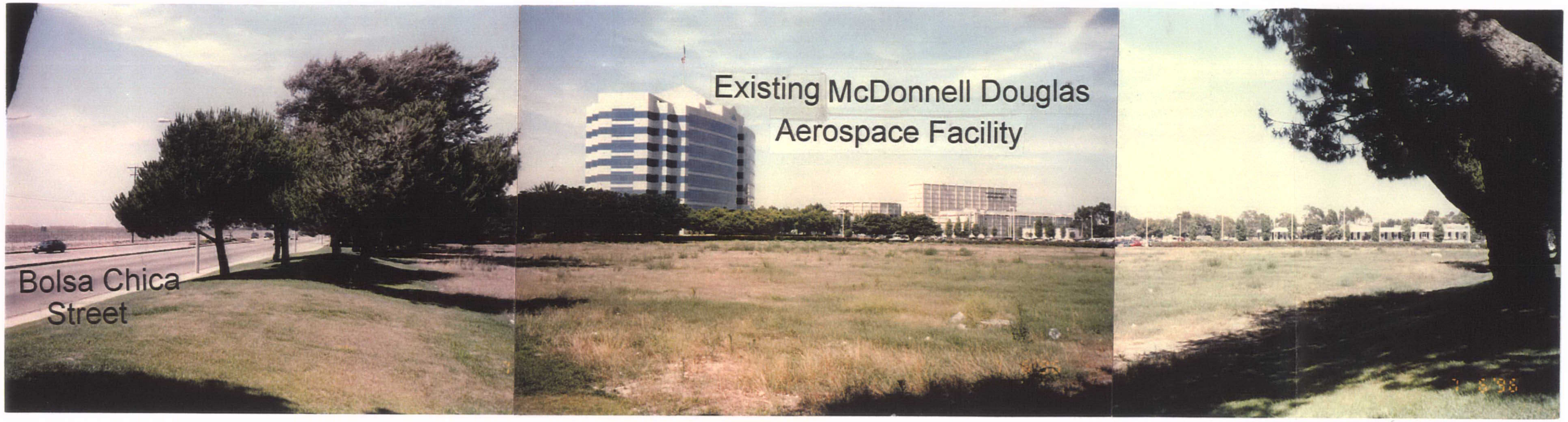
Exhibit 17, Site Photo O is a view from Bolsa Avenue looking west toward Bolsa Chica Street. The photo depicts existing light industrial and office uses located south of Bolsa Avenue. Exhibit 17, Site Photo P is a view from Bolsa Avenue taken further east along Bolsa Avenue. The photo depicts the business park/office uses located across from the project site on the other site of Bolsa Avenue.

Existing Land Use Plans

City of Huntington Beach General Plan

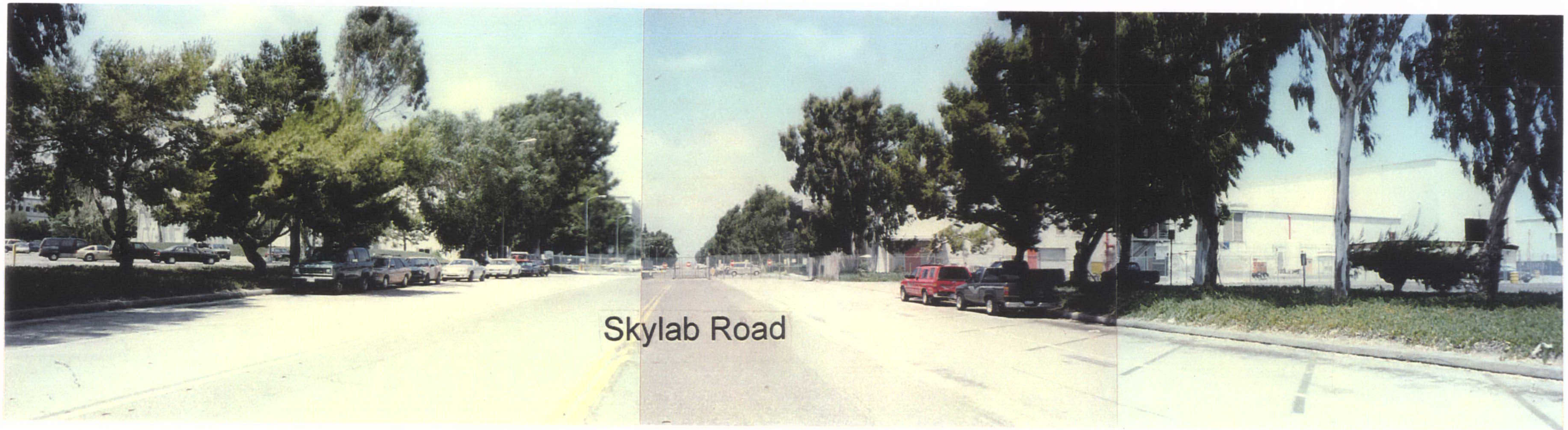
The City of Huntington Beach's General Plan Update, adopted in 1996, is comprised of 16 separate elements: land use, urban design, housing, historic and cultural resources, economic development, growth management, circulation, public facilities and public services, recreation and community services, utilities, environmental resources/ conservation, air quality, coastal, environmental hazards, noise and hazardous materials. The following provides a brief discussion of these Elements which are applicable to the project including a listing of applicable goals.

G



View of Project Site from Corner of Bolsa Avenue and Bolsa Chica Street

H



View from Skylab Road Looking West

EDAW, Inc.

Source: EDAW, Inc.

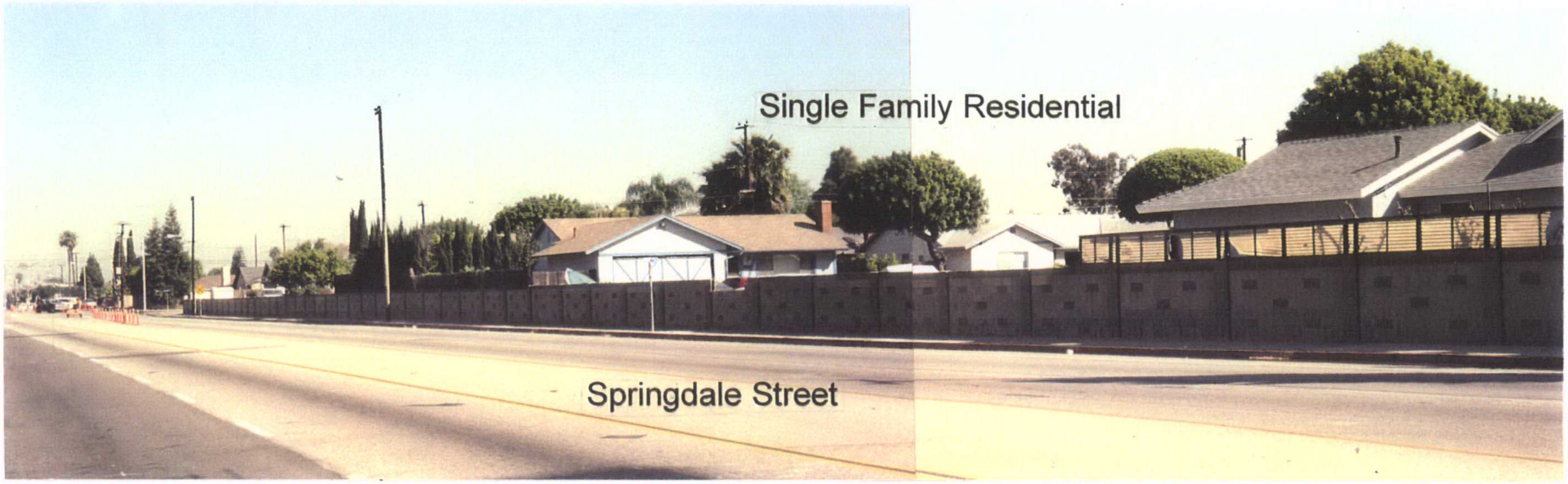
Exhibit 13

Site Photos

I

View of commercial uses at the northeast corner of Springdale Street and Bolsa Avenue.

J



View looking northeast across Springdale Street.

K

View from Springdale Street looking northwest along the U.S. Navy railroad tracks.

L

View from Rancho Road looking southeast along the north boundary of the project site.

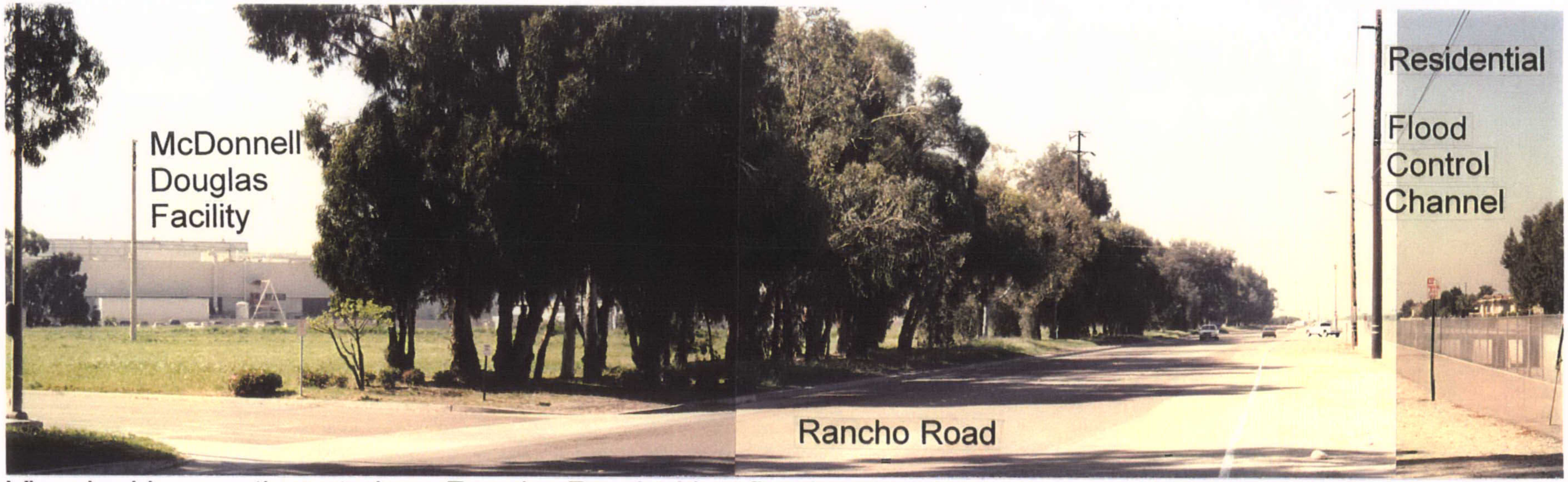
EDAW, Inc.

Source: EDAW, Inc.

Exhibit 15

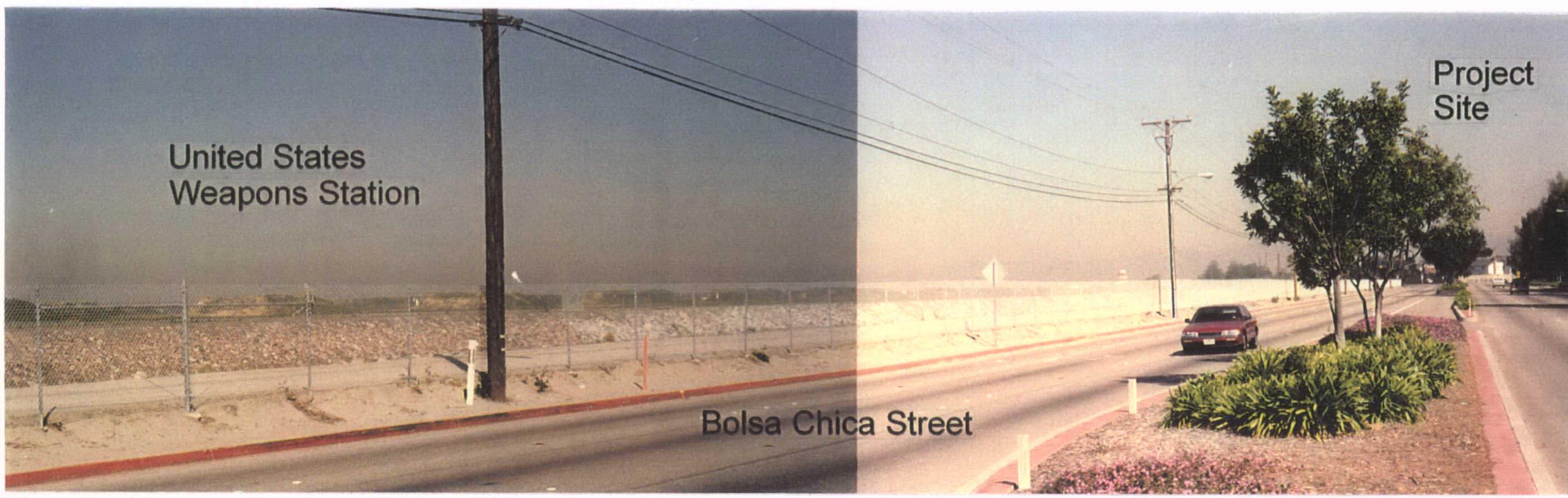
Site Photos

M



View looking southwest along Rancho Road with a flood control channel located north of the project site.

N



View looking north along Bolsa Chica Street with the U. S. Naval Weapons Station west of the project site.

EDAW, Inc.

Source: EDAW, Inc.

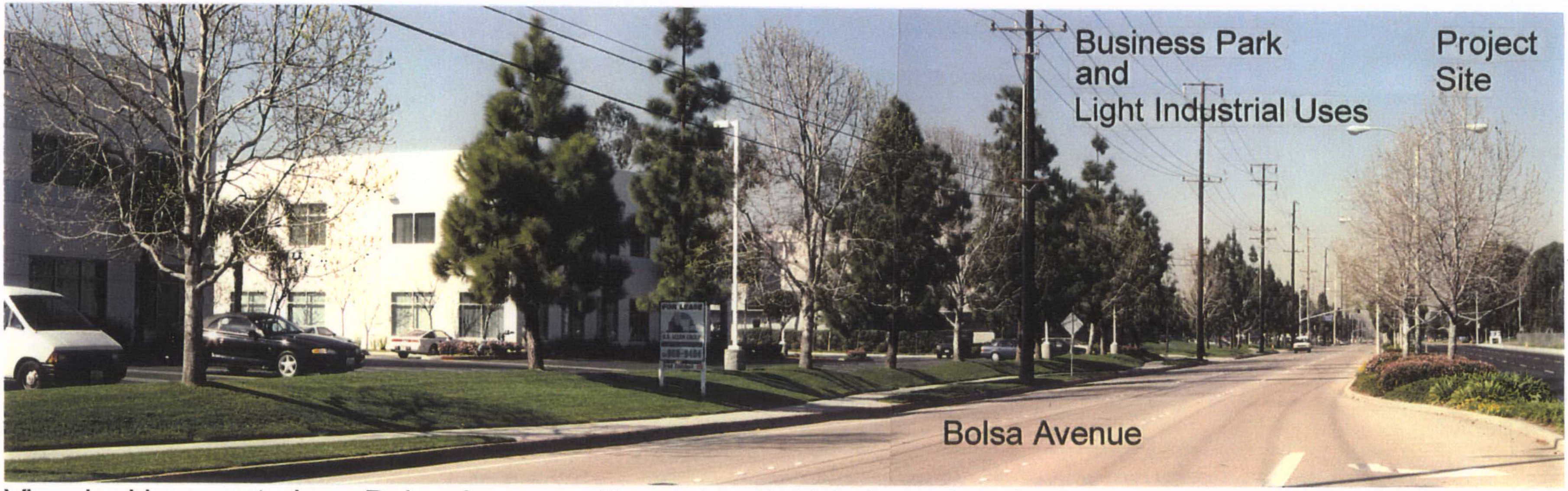
Exhibit 16

Site Photos

O

View looking west along Bolsa Avenue with existing light industrial and offices uses to the south.

P



View looking west along Bolsa Avenue with existing light industrial and offices uses to the south.

LAND USE ELEMENT

The Land Use Element (LUE) for the City of Huntington Beach General Plan provides for the types, density/intensity, design, and distribution of commercial, residential, industrial, and agricultural land uses as well as public and private open space. The LUE includes goals designed to serve as a general guide for the future development of Huntington Beach in terms of location of uses, allowable residential densities, and other criteria.

The LUE designates the 307-acre McDonnell Centre Business Park project site Industrial with an FAR of 0.75. Exhibit 18 identifies the current General Plan designation on the site. Typical permitted uses of the Industrial designation are light manufacturing, research and development, warehousing, business parks and professional offices, supporting retail, financial, and restaurants, and similar uses, or warehouse and sales outlets.

The primary goal of the Land Use Element is to provide guidance regarding the manner in which lands are to be used in the City of Huntington Beach. Applicable goals include:

- Achieve development that maintains or improves the City's fiscal viability and reflects economic demands while maintaining and improving the quality of life for the current and future residents of Huntington Beach.

- Ensure that development is adequately served by transportation facilities, utility infrastructure, and public services.

- Achieve and maintain a high quality of architecture, landscape, and public open spaces in the City.

- Ensure that significant environmental habitats and resources are maintained.

- Achieve a diversity of land uses that sustain the City's economic viability, while maintaining the City's environmental resources and scale and character.

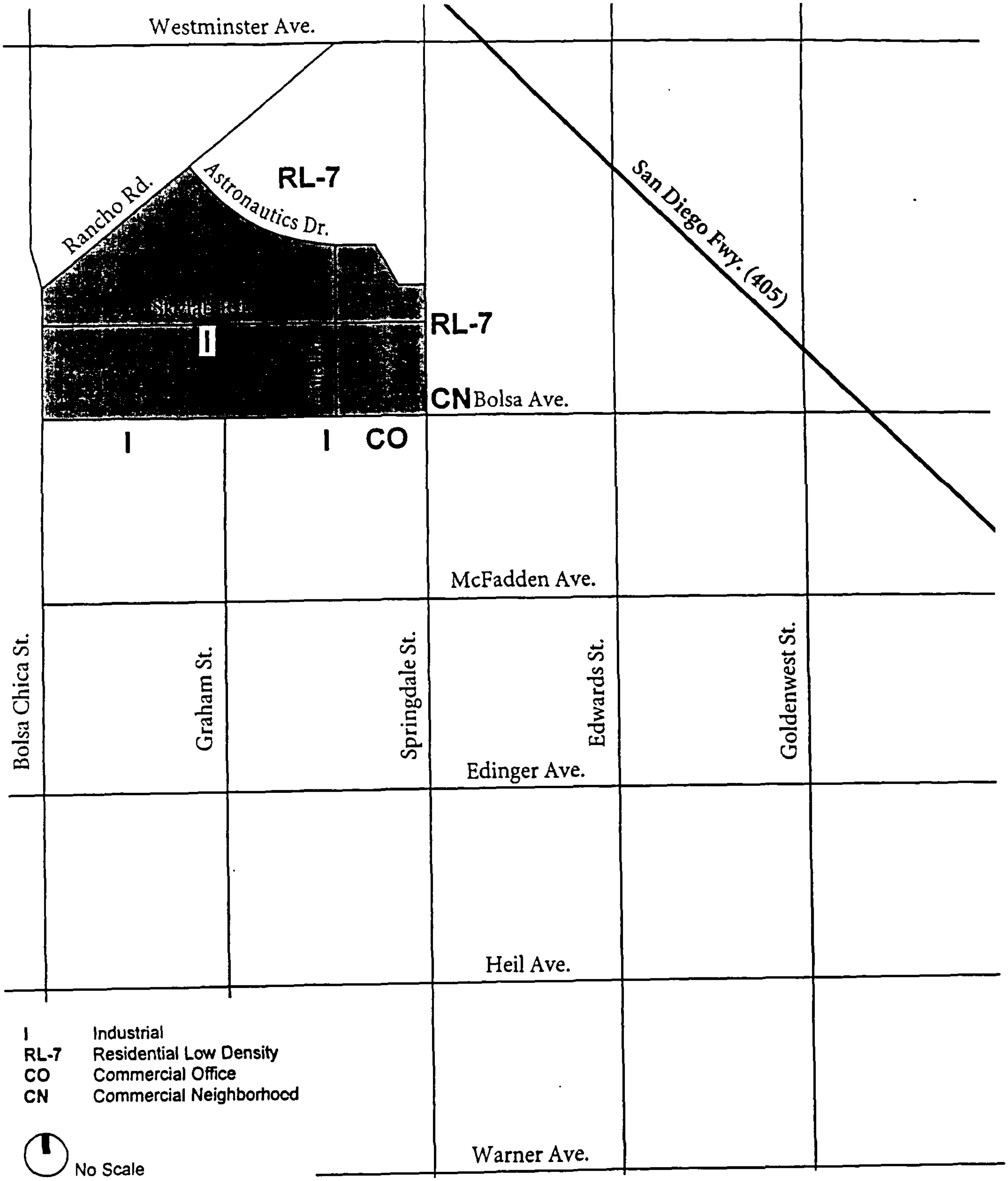
- Achieve the development of industrial uses that provide job opportunities for existing and future residents, as well as the surrounding subregion, and generate revenue for the City.

URBAN DESIGN ELEMENT

The Urban Design Element focuses on the quality of the City's physical and visual character, which is determined by the organization, scale, density and pattern of the community's built environment and open spaces.

The primary goal of the Urban Design Element is to establish and strengthen community identity. An applicable goal includes:

- Enhance the visual image of the City of Huntington Beach



EDAW, Inc.

Exhibit 18

Source: City of Huntington Beach General Plan

Current General Plan Designations

HOUSING ELEMENT

The Housing Element, adopted in July 1990, is intended to direct residential development and preservation in a way that coincides with the overall economic and social values of the community. The Housing Element is an official municipal response to a growing awareness of the need to provide housing for all economic segments of the community, as well as legal requirements that housing policy be made a part of the planning process. As such, the Element establishes policies that will guide City officials in daily decision making and sets forth an action program designed to enable the City to realize its housing goals. The City of Huntington Beach has adopted goals for its housing program which are consistent with State and Regional housing policies. The project does not contain a residential component and does not effect previously designated residential property.

ECONOMIC DEVELOPMENT ELEMENT

The Economic Development Element is specifically concerned with the identification of a strategy to address development potentials that will broaden and stabilize the City's economic base. Its goals and policies are formulated to provide new policy direction for the City and the planning area.

The primary goal of the Economic Development Element is to provide for the economic opportunities of City's residents; business retention and expansion; and land use plan implementation. Applicable goals include:

- Provide economic opportunities for present and future Huntington Beach residents and businesses through employment and local fiscal stability.

- Aggressively retain and enhance the existing commercial, industrial and visitor serving uses while attracting new uses to Huntington Beach.

- Enhance Huntington Beach's economic development potential through strategic land use planning and sound urban design practices.

GROWTH MANAGEMENT ELEMENT

The Growth Management Element, adopted in April 1992, is a pre-requisite to establish and continue eligibility to receive monies generated by the sales tax which was approved by Orange

County voters in November 1990 as Measure M (Revised Traffic Improvement and Growth Management Ordinance). The purpose and intent of the Growth Management Element is to establish goals, policies and programs that will promote growth and development based upon the City's ability to provide an adequate circulation system and public facilities and services.

The applicable goals of the Growth Management Element are to:

- Reduce traffic congestion
- Ensure that adequate transportation and public facilities and public services are provided for existing and future residents of the City.

CIRCULATION ELEMENT

The purpose of the Circulation Element is to evaluate the transportation needs of the City and present a comprehensive transportation plan to accommodate those needs. The Circulation Element focuses on the City's arterial streets and highways; public transportation modes and services; water transportation; and air transportation.

The primary goal of the Circulation Element is to provide a multi-mode transportation system that ensures the safe and efficient movement of people and goods. Applicable goals include:

- Provide a balanced transportation system that supports the policies of the General Plan and facilitates the safe and efficient movement of people and goods throughout the City while minimizing environmental impacts.
- Provide a circulation system which supports existing, approved and planned land uses throughout the City while maintaining a desired level of service on all streets and at all intersections.
- Develop a balanced and integrated multi-modal transportation system.
- Encourage and develop a transportation demand management (TDM) system to assist in mitigating traffic impacts and in maintaining a desired level of service on the circulation system.
- Provide sufficient, well designed and convenient on and off street parking facilities throughout the City.

PUBLIC FACILITIES AND PUBLIC SERVICES ELEMENT

The Public Facilities and Public Services Element discusses public facility service provision for Huntington Beach residents and businesses. The services discussed in this element include: law enforcement, fire protection, marine safety, education, libraries, and governmental administration.

Applicable goals include:

- Protect the community from criminal activity, reduce the incidence of crime and provide other necessary services within the City.

- Ensure adequate protection from fire and medical emergencies for Huntington Beach residents and property owners.

- Promote a strong public school system which advocates quality education. Promote the maintenance and enhancement of the existing educational systems facilities, and opportunities for students and residents of the City to enhance the quality of life for existing and future residents.

RECREATION AND COMMUNITY SERVICES ELEMENT

The Recreation and Community Services Element has been adopted to identify, maintain and enhance local parks and recreational services and facilities.

Applicable goals include:

- Enrich the quality of life for all citizens of Huntington Beach by providing constructive and creative leisure opportunities.

- Provide parks and other open space areas that are efficiently designed to maximize use while providing cost efficient maintenance and operations.

UTILITIES ELEMENT

The Utilities Element discusses water supply, sanitation treatment (wastewater), storm drainage, solid waste disposal, natural gas, electricity, and telecommunications.

Applicable goals include:

- Provide a water supply system which is able to meet the projected water demands; upgrade deficient systems and expand water treatment, supply, and distribution facilities; and pursue funding sources to reduce the costs of water provision in the City.
- Provide a wastewater collection and treatment system which is able to support permitted land uses; upgrade existing deficient systems; and pursue funding sources to reduce costs of wastewater service provision in the City.
- Provide a flood control system which is able to support the permitted land uses while preserving the public safety; upgrade existing deficient systems; and pursue funding sources to reduce the costs of flood control provision in the City.
- Maintain solid waste collection and disposal services in accordance with the California Integrated Waste Management Act of 1989 (AB939), and pursue funding sources to reduce the cost of the collection and disposal services in the City.
- Maintain and expand service provision to City of Huntington Beach residences and businesses.

ENVIRONMENTAL RESOURCES/CONSERVATION ELEMENT

The Environmental Resources/Conservation Element addresses the City of Huntington Beach's environmental resources. Applicable goals include:

- Improve and enhance the overall aesthetic value and appearance of the City of Huntington Beach through the provision and maintenance of local public and private open space.
- Protect and preserve significant habitats of plant and wildlife species, including wetlands, for their intrinsic values.
- Conserve the natural environment and resources of the community for the long-term benefit and enjoyment of its residents and visitors.

AIR QUALITY ELEMENT

The purpose of the Air Quality Element is to address air quality factors affecting the City, and establish goals, policies and programs in order to help achieve the goals of the Air Quality Management Plan adopted by South Coast Air Quality Management District.

An applicable goal includes:

- Improve regional air quality by a) decreasing reliance on single occupancy vehicular trips, b) increasing efficiency of transit, c) shortening vehicle trips through a more efficient jobs-housing balance and a more efficient land use pattern, and d) increasing energy efficiency.

COASTAL ELEMENT

The Coastal Element, amended in 1992, includes information sufficiently detailed to indicate kinds, location and intensity of land use and applicable resource protection and development policies. The Coastal Element designates different categories of land uses which will be permitted within the coastal zone and specifies the areas where each land use map, categories and additional policies together constitute the Coastal Element, which is intended to reflect local conditions and needs while meeting the Coastal Act policies and requirements.

The Coastal Element is organized around the following issue areas which have been identified as relevant to the City's coastal zone:

- Recreation and Shoreline Access
- Visitor-Serving Facilities
- Visual Resources
- Water and Marine Resources and Diking, Dredging, Filling, and Shoreline Structures
- Environmentally Sensitive Habitats
- Energy
- Community Facilities
- Coastal Land Use Plan
- Next Steps in Coastal Planning

The goals and policies within the Coastal Element provide guidance and direction for development in the coastal zone. The project site is not within the coastal zone.

ENVIRONMENTAL HAZARDS ELEMENT

The Environmental Hazards Element addresses flooding as it pertains to geologic, seismic and soils hazards. This Environmental Hazards Element and the referenced materials together satisfy the geologic and seismic portion of the Section 65302 (g) requirement.

Applicable goals include:

- Ensure that the number of deaths and injuries, levels of property damage, levels of economic and social disruption, and interruption of vital services resulting from seismic activity and geologic hazards shall be within levels of acceptable risk.

- Ensure the safety of the City's businesses and residents from methane hazards.

- Eliminate, to the greatest degree possible, the risk from flood hazards to life, property, public investment and social order in the City of Huntington Beach.

- Ensure the safety of the City's businesses and resident from peat hazards.

The Surface Geology Map (dated 1985) shows the entire site as being characterized by Younger Alluvial Material (Qya). The site is situated approximately two miles north of the Bolsa-Fairview fault, which is the eastern branch of the active Newport-Inglewood fault zone. According to the Newport-Inglewood Fault Zone Map contained in the Environmental Hazards Element, the Bolsa-Fairview fault is determined to be Category D (inactive or non-existent; subsurface investigation may be required by the City).

NOISE ELEMENT

The purpose of the Noise Element is to identify and appraise noise problems in the community. The Noise Element recognizes the guidelines adopted by the Office of Noise Control in the State Department of Health Services and shall analyze and quantify to the extent practicable, as determined by the legislative body, current and projected noise levels for all of the following sources:

- Highways and freeways;

- Primary arterials and major local streets;

- Passenger and freight on-line railroad operations and ground rapid transit systems;

- Aviation and airport related operations;

- Other ground stationary noise sources contributing to community noise environment.

An applicable goal includes:

- Ensure that all necessary and appropriate actions are taken to protect Huntington Beach residents, employees, visitors and noise sensitive uses from the adverse impacts created by excessive noise levels from stationary and ambient sources.

According to the Huntington Beach Noise Contours Map (1992), the project site is located within the 60 Ldn noise contour.

HAZARDOUS MATERIALS ELEMENT

In February 1987, the Orange County Board of Supervisors directed the preparation of a countywide hazardous waste management plan. The Orange County Hazardous Waste Management Plan, completed in January 1989 and amended in June 1991, establishes a city and county action program for managing hazardous waste through the year 2000.

The City of Huntington Beach must implement and incorporate applicable portions of the County Plan into their General Plan and Zoning Ordinance. State law requires that implementation of the County Plan occur within 180 days of the Plan being approved by the State Department of Health Services. An applicable goal includes:

- Reduce, to the greatest degree possible, the potential for harm to life, property and the environment from hazardous materials and hazardous waste.

Huntington Beach Zoning and Subdivision Ordinance

Under the present Huntington Beach Zoning and Subdivision Ordinance, the existing zoning on the property within the project site is Limited Industrial, with a multi-story suffix on a portion of the site. Exhibit 19 in Section 3.0 Project Description of this EIR illustrates on-site and surrounding existing zoning. Property west of the western portion of the site across Bolsa Chica Street is currently located in the City of Seal Beach. Property north of the northern boundary of the project site is currently zoned Low Density Residential. Property east of the eastern boundary of the project site is currently zoned Low Density Residential and General Commercial. Property south of the southern boundary of the project site is currently zoned Limited Industrial and General Commercial.

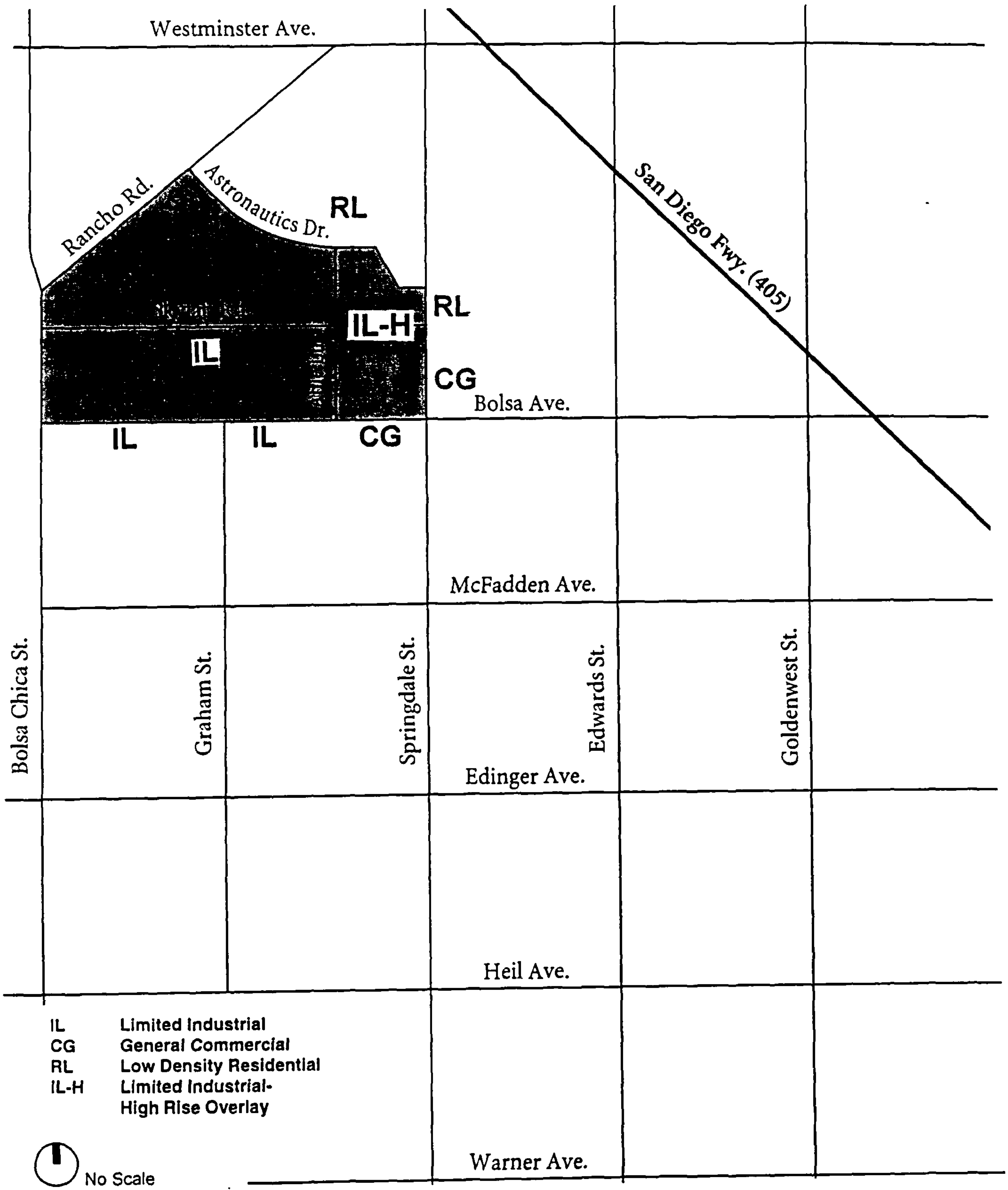
IMPACTS

Appendix G of the CEQA Guidelines, serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant land use effect if it will:

(a) Conflict with adopted environmental plans and goals of the community where it is located;
(b) Disrupt or divide the physical arrangement of an established community.

A significant impact would occur if implementation of the proposed project would result in physical development which is inconsistent with the adopted goals and policies of the City of Huntington Beach General Plan or Subdivision and Zoning Ordinance. Additionally, a significant land use impact would occur if implementation of the project would create incompatibilities of land use either on or off-site.

The proposed Code Amendment (zoning text and map amendment to reflect the new Specific Plan) will allow for the establishment of the Master Plan concept, design theme, development standards and administrative procedures necessary to achieve an orderly and compatible development of the project area, allowing for the eventual conversion of undeveloped land to a variety of urban uses, compatible with existing McDonnell Douglas uses. Additionally, the proposed project will establish new land use relationships with adjacent land uses. The overall effect of the change in land use associated with the project creates potential impacts. These impacts are evaluated based on the above stated impact criteria.



EDAW, Inc.

Source: City of Huntington Beach

Exhibit 19

Current Zoning Map

The following analysis includes impacts which would result from the implementation of the proposed project as described in the project description. Exhibit 20 on the following page provides a conceptual illustrative of the proposed master plan for the project site, which depicts the proposed land uses on-site. Approval of the project will allow for the cohesive development of a mix of industrial and commercial/retail/office uses that are permitted under the existing Industrial Limited (IL) zoning designation. Establishment of the Specific Plan as proposed by this project will allow subsequent development, that is consistent with the Specific Plan to go forward without requiring additional discretionary approvals.

Impacts associated with implementation of alternatives for this project are discussed in Section 6.0 Alternatives to the Proposed Project.

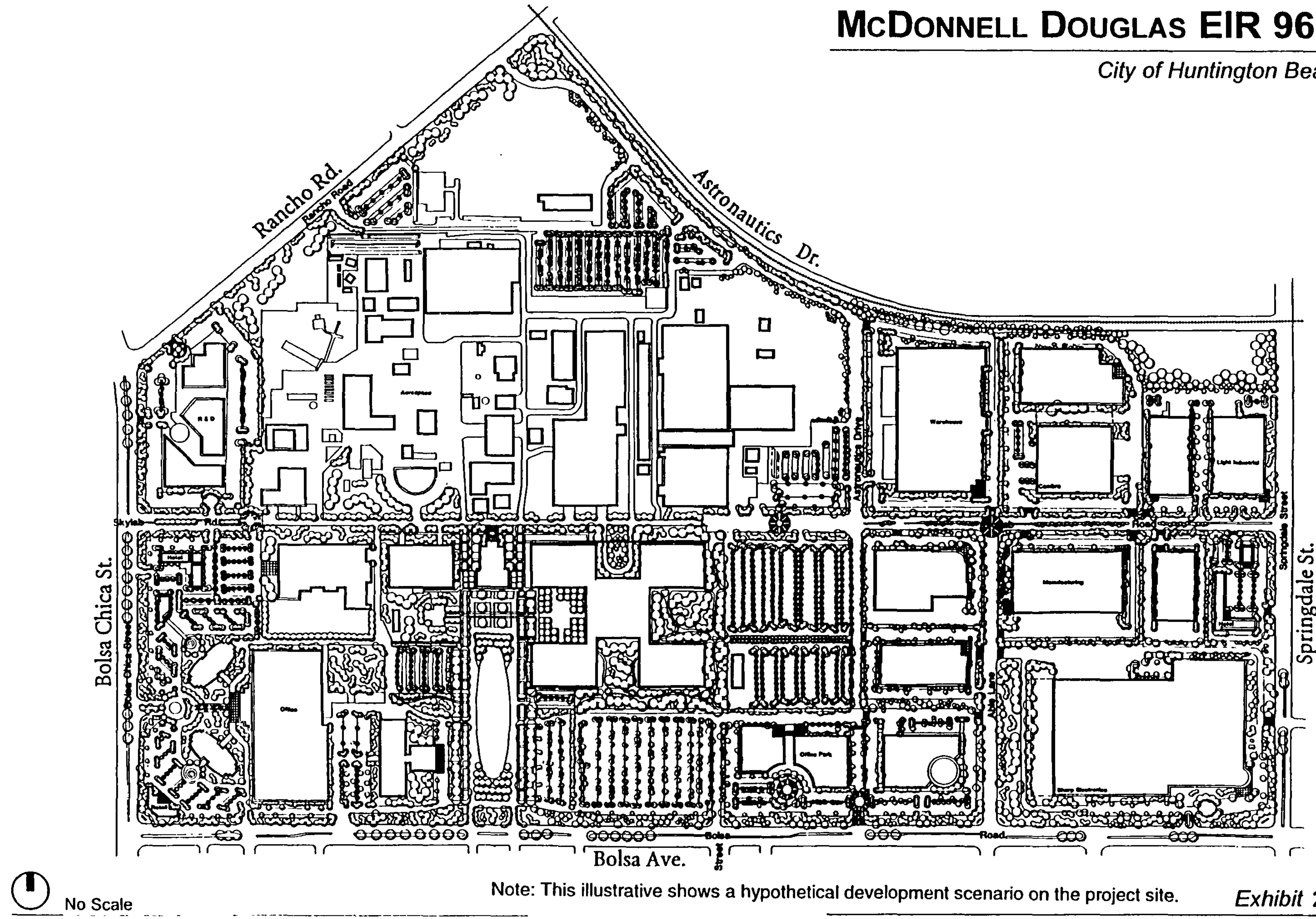
Where there are measurable definitive General Plan standards, this EIR has used these standards for impact criteria (i.e. noise, traffic, aesthetics/light and glare) and. are discussed further in the Transportation/ Circulation, Air Quality, Noise, Aesthetics/Urban Design and Light and Glare sections of this EIR.

On-Site Land Use

The proposed project will allow for the development of the site with a variety of aerospace, manufacturing, warehouse, office, R&D and commercial uses. Implementation of the proposed project will result in the ultimate development of an industrial, research and development business park complex. The McDonnell Centre Business Park is proposed to be a Master Planned Industrial Business Park Community with supporting office and retail facilities. These uses are consistent with the City of Huntington Beach General Plan.

Additionally, implementation of the proposed project will establish new on-site land use relationships. Exhibit 5 in the Project Description section identifies the proposed Planning Areas for the project. Table D identifies specific uses permitted within each Planning Area per the McDonnell Centre Business Park Specific Plan. The potential for on-site land use compatibility impacts is evaluated below.

The proposed project divides the project site into a number of Planning Areas. The purpose of identifying individual Planning Areas is to create distinct subareas of potential future uses and to allow for private development to occur in a timely manner with an overall Master Plan Concept. The new on-site planning area land use relationships that will occur as a result of the proposed project include: 1) Planning Area 1 adjacent to Planning Area 1A; 2) Planning Area 2 adjacent to Planning Area 8;3) Planning Area 3 adjacent to Planning Area 1A and 4; 4) Planning Area 4 adjacent to Planning Area 1 and Planning Area 5 and 5) Planning Area 5 adjacent to Planning Area 1 and 1A.



No Scale

Note: This illustrative shows a hypothetical development scenario on the project site.

Exhibit 20

EDAW, Inc.

Source: Adams Associates

Conceptual Illustrative Master Plan

TABLE D

PLANNING AREA PERMITTED USES

Permitted Uses	Planning Area					
	1	1a	2	3	4	5
INDUSTRIAL						
MDA Aerospace, *including all existing* buildings and facilities as well as expansion of similar facilities under the existing development standards. Such uses may include tank fabrication and assembly operation, heavy welding, insulation, and thermal protective coatings.	●	●		●	●	●
Manufacturing	●	●	●	●	●	●
Warehousing	●	●	●	●	●	●
Light Industrial	●	●	●	●	●	●
Research and Development	●	●	●	●	●	●
COMMERCIAL						
Banks and other Financial Institutions		●				●
Commercial Recreation and Entertainment						●
Communication Facilities	●	●	●	●	●	●
Eating & Drinking Establishments	●	●	●	●	●	●
Hotels, Motels and Ancillary Retail Uses		●	●	●		●
Retail Sales		●		●		●
Maintenance & Repair Services	●	●	●	●	●	●
Warehouse & Sales Outlets	●	●	●	●	●	●
OFFICE						
Business & Professional	●	●	●	●	●	●
Personal Services		●				●
Research & Development Services	●	●	●	●	●	●
Laboratories	●	●	●	●	●	●
PUBLIC AND SEMIPUBLIC						
Conference Facilities	●	●		●		●
Day Care, General	●	●	●	●	●	●
Governmental Facilities	●	●	●	●	●	●
Heliports Maintenance and Service Facilities	●				●	
Public Utilities and Facilities	●	●	●	●	●	●

Planning Area 1 includes the existing McDonnell Douglas Aerospace Facility comprised of approximately 2,789,053 square feet of building area and parking spaces on 100 net acres of land. The Specific Plan proposes the continued expansion of the aerospace facility. Planning Area 1A, located directly south of Planning Area 1, is anticipated to be developed as additional McDonnell Douglas research and development operations. Uses between Planning Area 1 and Planning Area 1A are anticipated to be compatible. No impacts to on-site land uses between Planning Area 1 and 1A are anticipated.

Planning Area 2 is comprised of 58 net acres of land located along Springdale Street and Bolsa Avenue to Able Lane. Sharp Electronics is currently constructing a 538,859 square foot facility on 23.4 net acres of land. Cambro Manufacturing currently occupies a 120,000 square foot building on 11.9 net acres of land; with an ultimate building area of 280,412 square feet. A recently approved industrial project, Conditional Use Permit No. 96-78 (Dynamic Cooking Systems 167,950 SF) is to be located on 7.5 acres within this Planning Area. The remaining acreage (currently vacant) is expected to be developed with research and development facilities, office space, light industrial, warehouse and/or distribution uses.

Planning Area 3 is comprised of 36 acres. It is currently vacant and west of Planning Area 2, and is anticipated to be ultimately developed with office, light industrial, warehouse and distribution uses. A recently approved industrial project, Conditional Use Permit No. 96-104 (Airtech International 121,500 SF) is to be located on 5.51 acres within this Planning Area. Additionally, City staff has been informed of potential future development applications for the development of a 265,000 SF light industrial/office building to be located within Planning Area 3, north of Airtech International. This development would ultimately replace the vacant lad that was used previously for strawberry farming (see Exhibit 4). According to the Specific Plan, development patterns in Planning Area 2 and 3 will be very similar and compatible. No impacts to on-site land uses between Planning Areas 2 and 3 are anticipated.

Planning Area 4 is comprised of 35 net acres of vacant land along the northern perimeter of the project site, intended to be developed as an expansion of the current aerospace facility located in Planning Area 1 (south of Planning Area 4) and/or manufacturing, warehouse or office uses. No impacts to on-site land uses between Planning Areas 1 and 4 are anticipated.

Planning Area 5 consists of 40 acres, located at the northeast intersection of Bolsa Avenue and Bolsa Chica Street, with a significant amount of frontage on both arterials. Phase one of this planning area is complete, which includes an 8-story, 235,831 square foot office building (constructed in 1989). Phase Two is anticipated to include a 12-story, 345,551 square foot office building, restaurant, and support commercial services. Development applications for the development of a 104-room, three-story executive suite hotel to be located within Planning Area 5, has recently been submitted to the City of Huntington Beach. This development would ultimately replace a portion of the current Parking Lot R located east of Bolsa Chica Road (see Exhibit 8). Planning Area 5 is located adjacent to Planning Areas 1, 1A and 4 (described above). According to the Specific Plan, landscape buffers shall be built along the edges and/or interfaces of differing uses. This shall ensure project identity, privacy and noise control. No impacts to on-site land uses between Planning areas 5 and 1, 1A and 4 are anticipated.

Off-Site Land Use

Implementation of the proposed project will establish new land use relationships with adjacent land uses. Land uses immediately adjacent to the project site include commercial and single family residential to the east, the existing railroad track and single family residential to the north, United States Weapons Station to the west, and light industrial/business park and commercial uses to the south. The new adjacent land use relationships that will occur as a result of the proposed project include: 1) industrial, office and commercial uses (Planning Area 2) adjacent to commercial and single family residential uses across Springdale Street; 2) industrial, office, commercial, and aerospace uses (industrial, office, and commercial uses in Planning Area 2 and aerospace/industrial, office, manufacturing and R&D uses in Planning Area 4) adjacent to single family residential (i.e. homes across the railroad tracks); 3) aerospace, industrial, R&D, warehouse, manufacturing and office uses (Planning Area 4) adjacent to single family residential (i.e. homes located across Astronautics Drive and Rancho Road); 4) aerospace, industrial, office, commercial and R&D uses (Planning Area 5) adjacent to the United States' Weapons Station (across Bolsa Chica Street); and 5) aerospace, industrial, R&D, distribution, office, and commercial uses (Planning Areas 5, 1A, 3 and 2) adjacent to light industrial, business park uses (across Bolsa Avenue). Based on the type of use, proposed layout, intervening walls and distance between future uses identified in the Design Guidelines and Development Regulations sections of the Specific Plan, compatibility impacts between off-site adjacent land uses are not expected to occur. Further analysis is provided below.

An at grade spurtrack of the U.S. Navy (Railroad Right-of-Way) and Rancho Road form the northern boundary of the site. Low density residential uses are located north of the railroad tracks, on the other side of Rancho Road. Implementation of the proposed project will result in the ultimate development of aerospace, industrial, office and commercial uses along Rancho Road, across from the existing single family residential uses. According to the Specific Plan, smaller industrial projects or an expansion of the McDonnell Douglas Aerospace Facility is envisioned for Planning Area 4. Additionally, the Specific Plan indicates that project area walls screening and fencing along the perimeter arterials shall provide project identity and privacy. No significant land use compatibility impacts to adjacent off-site uses across Rancho Road are anticipated.

Land uses south of the project site consist of business park and light industrial-type uses. These uses will be adjacent to the existing Sharp building, office park, and commercial uses. The proposed uses will be similar to the existing off-site uses; therefore, no land use compatibility impacts are anticipated. Additionally, it should be noted that the existing office park and light industrial-type uses to the south will be separated by walls screening and fencing (located along perimeter arterials), which provide privacy and security. No significant land use compatibility impacts to adjacent off-site uses across Bolsa Road are anticipated.

Land uses to the west of the project site across Bolsa Chica Street include the Orange County Flood Control Channel and the U.S. Navy Weapons Station (west of the Flood Control Channel). The U.S. Weapons Station area is primarily vacant. Based on the type of use, proposed layout, intervening walls and distance between future uses identified in the Design Guidelines and Development Regulations sections of the Specific Plan, compatibility impacts between off-site adjacent land uses are not expected to occur. No land use compatibility impacts to adjacent off-site uses across Bolsa Chica Street are anticipated.

Land uses east of the project site consist of commercial and single family residential uses. These uses will be adjacent to the Sharp Electronics building, and commercial, and office uses. The commercial and single family residential uses across Springdale Street will be separated by Specific Plan-proposed intervening walls (located along the perimeter arterials), which provide privacy and security. No significant land use compatibility impacts to adjacent off-site uses across Springdale Street are anticipated.

<u>**Land Use Plans**</u>

City of Huntington Beach General Plan/Huntington Beach Zoning and Subdivision Ordinance

The proposed project will result in development that is consistent with the adopted City of Huntington Beach General Plan land use designation. Appendix C of the McDonnell Centre Business Park Specific Plan, General Plan Consistency Analysis, explains how the Specific Plan achieves consistency with the City of Huntington Beach General Plan. Appendix C of the Specific Plan provides a brief discussion of the Elements that are applicable to the Specific Plan, including a listing of applicable goals and policies. Additionally, please refer to the following discussion:

LAND USE ELEMENT

The proposed project will result in the implementation of a Specific Plan and will not require a General Plan Amendment to change the General Plan Land Use. The proposed project will comply with the intent and will be consistent with the previously stated goals of the Land Use Element. No Land Use Element impacts are anticipated with the approval of the Specific Plan.

URBAN DESIGN ELEMENT

Specific aesthetic and visual image impacts are discussed in the Aesthetics/Urban Design and Light and Glare sections of this EIR. The proposed project will comply with the intent of the Urban Design Element. No Urban Design Element impacts are anticipated.

HOUSING ELEMENT

The proposed project will not result in impacts to the Housing Element. The project site is designated as Light Industrial. The buildout of the project area is accounted for in the General Plan and future growth scenarios for the City. The project will not result in a loss of land designated for the provision of affordable housing. The Housing Element does not designate any portions of the project site for residential uses. No Housing Element impacts are anticipated.

ECONOMIC DEVELOPMENT ELEMENT

The project will comply with the intent and goals of the Economic Development Element. The Specific Plan will stimulate business opportunities within the City by allowing for and encouraging development consistent with the Specific Plan under an expedited entitlement process. Additionally, the Specific Plan provides for a range of employment opportunities in the professional, retail, service and industrial fields; thus stimulating business opportunities and widening the employment base of the community. Economic development impacts are further discussed in the Socioeconomic section of this EIR. No impacts with the Economic Development Element are anticipated.

CIRCULATION/GROWTH MANAGEMENT ELEMENTS

Buildout of the proposed project will implement the policies of the Circulation Element. The planned road capacities have been evaluated based on proposed land uses. Please refer to the Transportation/Circulation section of this EIR for a complete discussion of the transportation impacts associated with the proposed project.

PUBLIC FACILITIES AND PUBLIC SERVICES ELEMENT

This development will alter the need for various services in the area. The public services and utilities agencies involved have been contacted during preparation of this Environmental Impact Report. Specific impacts to these services are discussed in detail in the Public Services and Utilities section of this EIR. No impacts to the Public Facilities and Public Services Element are anticipated. Please refer to the Public Services and Utilities section of this EIR for a complete discussion of the public services and utilities impacts associated with the proposed project.

RECREATION AND COMMUNITY SERVICES ELEMENT

The Recreation and Community Services Element indicates a park goal of five acres per 1,000 population. Buildout of the project under the proposed Specific Plan designations would not result in new population or a need for additional parkland. The Specific Plan does provide for various landscaping and walkways to promote recreational activities. A more detailed discussion of the recreational components of the project can be found in the Public Services and Utilities section of this EIR. No impacts to the Recreation Community Services Element are anticipated.

UTILITIES ELEMENT

This development will alter the need for various services in the area. The City of Huntington Beach Public Works and other utilities agencies involved have been contacted during preparation of this Environmental Impact Report. Specific impacts to these services are discussed in detail in the Public Services and Utilities section of this EIR. No impacts to the Utilities Element are anticipated.

ENVIRONMENTAL RESOURCES/CONSERVATION ELEMENT

The proposed Specific Plan will not result in inconsistencies with the City of Huntington Beach Environmental Resources/Conservation Element. Implementation of the proposed project will allow for the timely development of the industrial/business park community on the 307-acre McDonnell Douglas site. The project will result in the development of underutilized land which has been proposed for eventual development of light industrial-type uses by the City's Land Use Element. The Specific Plan requires that future development provide sufficient landscaping to continue the Landscape Plan concept, as well as encourage the provision of open space features. No impacts to the Environmental Resources/Conservation Element are anticipated.

AIR QUALITY ELEMENT

Specific air quality impacts, both short- and long-term are discussed in the Air Quality section of this EIR. The proposed project will not comply with the goals of the Air Quality Element and this is a significant impact. Mitigation measures to reduce air quality impacts are provided in the Air Quality section of this EIR. However, because the proposed project will exceed SCAQMD's emission levels, impacts remain significant and unavoidable.

COASTAL ELEMENT

The proposed project site is not located within the Coastal Zone. Buildout of the proposed Specific Plan will not result in any impacts to the Coastal Element.

ENVIRONMENTAL HAZARDS ELEMENT

The proposed project will comply with the intent of the Environmental Hazards Element by undergoing all required geologic and seismic safety processes and programs. A more detailed discussion of geologic characteristics of the site can be found in the Earth Resources section of this EIR. No impacts to the Environmental Hazards Element are anticipated with the proposed project.

NOISE ELEMENT

Specific noise impacts, both on-site and traffic related, are discussed in the Noise section of this EIR. The proposed project will comply with the intent and goals of the Noise Element by complying with all applicable short- and long-term noise standards. No impacts to the Noise Element are anticipated.

HAZARDOUS MATERIALS ELEMENT

Potential impacts associated with proposed land uses are discussed in the Air Quality section of this EIR. The proposed project will comply with the intent and goals of the Hazardous Materials Element. No impacts to the Hazardous Materials Element are anticipated.

As discussed above, the proposed McDonnell Centre Business Park Specific Plan will not result in impacts to the Land Use, Urban Design, Housing, Economic Development, Growth Management, Circulation, Public Facilities and Public Services, Recreation and Community Services, Utilities, Environmental Resources/Conservation, Coastal, Environmental Hazards, Noise, and Hazardous

Materials Elements. The project will result in incompatibilities with the Air Quality Element. This is a significant impact.

Huntington Beach Zoning and Subdivision Ordinance

The adoption of the proposed Specific Plan will supersede the existing zoning and establish a new set of development regulations. This will not significantly change the existing industrial zoning and uses of the site. The zone change will be compatible with surrounding zoning. The proposed uses will be compatible with surrounding uses. Approval of the Specific Plan will not result in significant impacts to City zoning compatibility. No project specific impacts to the Huntington Beach Zoning and Subdivision Ordinance are anticipated.

CUMULATIVE IMPACTS

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will incrementally contribute to the cumulative impact of development in the area. The potential development of the project is consistent with the City of Huntington Beach General Plan and Subdivision and Zoning Ordinance. No significant cumulative land use consistency impacts are anticipated.

STANDARD CITY POLICIES AND REQUIREMENTS

A. Prior to submittal for building permits, the applicant/owner shall submit three copies of the site plan to the Planning Division for addressing purposes. If street names are necessary, submit proposal to Fire Department for review and approval.

B. Prior to submittal for building permits, the applicant/owner shall depict all utility apparatus, such as but not limited to backflow devices and Edison transformers, on the site plan. They shall be prohibited in the front and exterior yard setbacks unless properly screened by landscaping or other method as approved by the Community Development Director.

C. Prior to submittal for building permits, the applicant/owner shall depict colors and building materials as proposed.

D. Prior to the issuance of building permits, the applicant/owner shall submit a Landscape Construction Set to the Departments of Community Development and Public Works which must be approved. The Landscape Construction Set shall include a landscape plan prepared and signed by a State Licensed Landscape Architect and include all proposed/existing plan materials (location, type, size, quantity), and irrigation plan, a grading plan, an approved site plan, and a copy of the entitlement conditions of approval. The landscape plans shall be in conformance with Chapter 232 Landscape Improvements of the Huntington Beach Zoning and Subdivision Ordinance. The set must be approved by both departments prior to issuance of building permits. Any existing mature trees that must be removed shall be replaced at a 2 to 1 ratio with minimum 86-inch box trees, which shall be incorporated into the project's landscape plan.

E. The applicant/owner shall comply with all applicable provisions of the Ordinance Code, Building Division, and Fire Department.

F. The required landscaping and irrigation systems shall be completed and installed by the applicant/owner prior to final inspection/within 12 months.

G. All improvements (including landscaping) to the property shall be completed in accordance with the approved plans and conditions of approval specified herein.

H. All building spoils, such as unusable lumber, wire, pipe, and other surplus or unusable material, shall be disposed of at an off-site facility equipped to handle them.

MITIGATION MEASURES

No mitigation measures have been provided, since no land use compatibility impacts have been identified with implementation of the Specific Plan and Standard City Policies and Requirements.

LEVEL OF SIGNIFICANCE

No impacts related to on-site land use compatibility have been identified.

No significant impacts to the adjacent land uses are anticipated.

The proposed Specific Plan will not result in impacts to the Land Use, Urban Design, Housing, Economic Development, Growth Management, Circulation, Public Facilities and Public Services, Recreation and Community Services, Utilities, Environmental Resources/Conservation, Coastal, Environmental Hazards, Noise, Housing, and Hazardous Materials Elements.

The proposed Specific Plan will result in impacts to the Air Quality Element due to the increase in local and regional emissions. Mitigation measures to reduce air quality impacts are provided in the Air Quality section of this EIR. However, because the proposed project will exceed SCAQMD's emission levels; impacts remain significant and unavoidable. The impact remains significant and unavoidable.

The proposed Specific Plan in conjunction with other past, present, and reasonably foreseeable future projects will not result in impacts to the Land Use, Urban Design, Housing, Economic Development, Growth Management, Circulation, Public Facilities and Public Services, Recreation and Community Services, Utilities, Environmental Resources/Conservation, Coastal, Environmental Hazards, Noise, and Hazardous Material Elements. No significant cumulative land use impacts to the above stated elements are anticipated.

5.2 AESTHETICS/URBAN DESIGN

EXISTING CONDITIONS

On-Site

The visual character of the site is partially developed land, occupied by various light industrial and office facilities and outdoor storage areas. The topography of the site is flat. Windows of mature trees also exist primarily along the project's northwestern perimeter boundary and around existing surface parking areas. Typically, existing uses located north of Skylab Road are associated with manufacturing, processing, and assembly operations. Existing uses located south of Skylab Road consist of office and administrative uses. Exhibits 8 through 17 in Section 5.1 Land Use of the EIR illustrate the current on-site visual appearance.

The primary use on the site is the approximately 2,700,000 square foot McDonnell Douglas Aerospace Facility. Several other industrial-related research and development structures are located adjacent to the 235,000 square foot high-rise office building, located on the western portion of the project site (Planning Area 5). New business park developments are occurring on the eastern portion of the project site along Springdale Street, on land that was utilized in the past for farming operations. Cambro Manufacturing has constructed and occupies a 120,000 square foot facility, located northwest of Skylab Road and Springdale Street. Sharp Electronics is currently constructing a 538,859 square foot facility on the corner of Springdale Street and Bolsa Avenue. Remote parking facilities are also located throughout the project site. The following further describes major uses and their visual appearance found within each planning area on the site:

Planning Area 1

Planning Area 1 is the largest planning area (100 net acres), located in the west-central portion of the project site. This planning area contains the majority of existing facilities located on the project site, with the majority of existing parking lots located in other planning areas. The planning area includes the existing McDonnell Douglas Aerospace (MDA) facility comprised of 2,789,053 square feet of building area and related parking areas. Various facilities located within this area consist of fabrication/service, manufacturing/shipping/receiving, research and design and office facilities. Planning Area 1 also contains the "5 building complex" located in the southeast corner of the planning area. This complex contains executive offices and other various office uses.

Planning Area 1A

Planning Area 1A includes the mostly vacant frontage along Bolsa Avenue (20 net acres), east of the front entrance of the MDA facility. The front entrance to MDA, located west of the vacant area, is characterized by an oval entrance with turf in the center. Refer to Exhibit 4. The vacant area is currently surface parking for MDA employees.

Planning Area 2

Planning Area 2 consists of approximately 58 acres and is currently under various states of construction, with portions of the planning area developed, under construction, and undeveloped. The Cambro Manufacturing facility is located west of Springdale Street and north of Skylab Road. Sharp Electronics is currently constructing a 538,859 square foot facility on 23.4 acres on the northwest corner of Bolsa Avenue and Springdale Street. Cambro Manufacturing is located north of Skylab Road. This facility is a 120,000 square foot building on 11.9 acres, with an ultimate development of 280,412 square feet. The remaining 23 acres of the planning area is currently undeveloped land.

Planning Area 3

Planning Area 3 is located west of Able Lane and consists of approximately 36 acres. This area is primarily vacant. The 12-acre portion of the planning area located north of Skylab Road is currently vacant, previously utilized for seasonal strawberry fields. An 11-acre portion located in the southeast corner of the planning area is currently recreational field area, containing two (2) baseball/softball diamonds. The remainder of the planning area consists of surface parking.

Planning Area 4

Planning Area 4 consists of 35 acres and is located on the northern perimeter of the project site, south of Astronautics Drive and adjacent to the eastern border of Planning Area 1. It is currently open, vacant land. Several eucalyptus trees currently line the northern perimeter of the project site along Rancho Road, providing a visual boundary around the McDonnell Douglas facilities. The eastern portions of Planning Area 4, directly north and south of Skylab Road, consist of surface parking.

Planning Area 5

Planning Area 5 consists of approximately 40 acres and is located at the intersection of Bolsa Avenue and Bolsa Chica Street and along Bolsa Chica Street. Two buildings are currently located within this planning area. The Space Station Division, an eight story, 235,831 square foot office building, exists within this planning area. A facilities contracts/administrative building is also located within this planning area. Several eucalyptus trees currently line the northwest perimeter of the project site along Bolsa Chica Street.

Surrounding Vicinity

The proposed site is bounded by Springdale Street on the east, Bolsa Avenue on the south, Bolsa Chica Street on the west, and the U.S. Navy railroad on the north. The property is traversed by Skylab Road from east to west.

Surrounding properties which have views of the site are residential uses to the north and east of the site, commercial uses to the southeast of the site, office and manufacturing uses located to the south of the project site, and the Seal Beach Naval Weapons Station area to the west of the project site. Located along Springdale Street, east of the project site and on the opposite side of the road, is a 5 ½ - foot concrete wall, which separates the existing single-family residential area from the roadway and the project site. Adjacent to the site on the southeast corner at the intersection of Bolsa Avenue and Springdale Street is a neighborhood commercial strip center. The southwest corner of the intersection is occupied by the Springdale Plaza office/retail complex (see Exhibits 9 through 17 of this EIR).

Mature trees, mainly pines and eucalyptus, also line the entrances to the McDonnell Douglas facility and the various parking areas. These mature plantings largely screen the aerospace facility, rendering it only partially visible from the site.

IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant aesthetics/urban design effect if it will:

(b) Have a substantial, demonstrable negative aesthetic effect.

For the purposes of this EIR, a significant impact would occur if implementation of the proposed project would result in an obstruction of any scenic vista or view open to the public or result in the creation of an aesthetically offensive site open to public view. The proposed project will allow for the ultimate development of a planned Industrial/Business Park Complex, converting the remaining open areas to a variety of industrial, research and development type uses. The significance of this effect, on a project-specific and cumulative basis, is discussed below related to aesthetics and urban design.

On-Site

Buildout of the proposed Land Use Plan will permanently alter the existing visual environment of the site by developing vacant areas with additional industrial, office, and commercial uses. Exhibit 20 of this EIR is an illustrative depicting build-out of the McDonnell Centre Business Park utilizing the various guidelines described in the Specific Plan. Table E identifies the Specific Plan proposed development standards for each planning area. Implementation of the project may result in the elimination/replacement of existing mature trees. This is considered a significant impact. Implementation of Standard City Policies and Mitigation Measure 1 will reduce this to a level less than significant. The following discusses design guidelines and the landscape concept proposed for the McDonnell Centre Business Park Specific Plan area and their potential for impacts related to aesthetics:

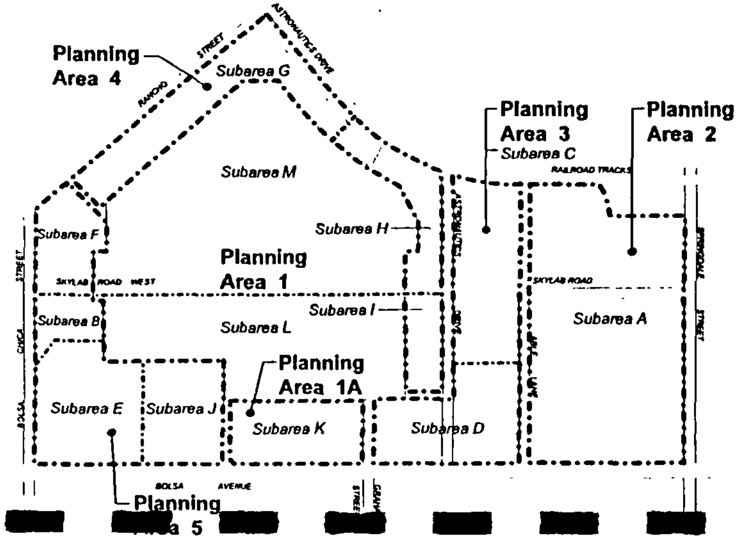
The Specific Plan includes design guidelines to establish the character and style for the development of a business park complex. The major elements of the Design Guidelines include: site planning, architecture, streetscape, landscaping, and signage. The Specific Plan includes several policies related to these elements with which all future development proposals within the Specific Plan area shall comply.

TABLE E

PROPOSED DEVELOPMENT STANDARDS

	1	1		1A	2	3		4			5			
		L	M	K	A	C	D	G	H	I	B	E	F	J
Maximum Intensity (F.A.R.)	0.75	0.75	0.65	0.75	0.65	0.65	0.75	0.65	0.65	0.65	0.75	0.75	0.75	0.75
Minimum Lot Size (AC)	NA	2.5	2.5	1.0	2.5	2.5	2.5	1.0	2.5	2.5	1.0	1.0	1.0	1.0
Minimum Lot Frontage	100'	250'	250'	250'	250'	250'	250'	250'	250'	250'	250'	250'	250'	250'
Maximum Bldg. Height	250'	50'	50'	50'	50'	50'	50'	40'	40'	50'	50'	175'	75'	75'
Maximum Lot Coverage	50%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Minimum Setback														
Front	20'	25'	35'	35'	35'	35'	35'	25'	25'	25'	35'	35'	35'	35'
Interior Side	15'	10'	15'	10'	15'	15'	10'	10'	15'	15'	10'	10'	10'	10'
Exterior Side	10'	15'	25'	15'	25'	25'	15'	15'	25'	25'	15'	15'	15'	15'
Rear		10'	15'	10'	15'*	15'*	10'	10'	15'	15'	10'	10'	10'	10'
Minimum Landscape	8%	10%	10%	15%	10%	10%	15%	10%	10%	10%	15%	15%	15%	15%
Minimum Perimeter Landscape														
Front		15'	15'	15'	15'	15'	15'	10'	15'	15'	15'	15'	15'	15'
Interior Side		5'	5'	5'	5'	5'	5'	5'	5'	5'	5'	5'	5'	5'
Exterior Side		10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
Interior Rear		5'	5'	5'	5'	5'	5'	5'	5'	5'	5'	5'	5'	5'
Exterior Side		10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
Adjacent to Arterial Hwy.		NA	NA	24'	24'	NA	24'	24'	NA	NA	24'	24'	24'	24'

* Minimum rear setback 50' when adjacent to residential areas.



The Specific Plan includes a Landscape Concept to establish the design character and visual qualities of the interior and perimeter of the project area. The landscape concept is comprised of several design elements, including: the public arterials, local and private streets, entryways, access drives, parkway areas, transitional edges and security fencing and walls to create a cohesive community landscape image.

The Landscape Concept establishes the primary unifying design element for the project area. The streetscape design is intended to preserve and enhance the existing layout and variety of landscape patterns. The Landscape Concept incorporates landscaped areas adjacent to the perimeter arterials, landscaped pedestrian walkways within the right-of-way of interior streets, where feasible, the preservation of existing tree lines, and the creation of design consistency for private drives, access points and parking lot layouts. The Specific Plan includes several policies with which all individual landscape plans for future projects located within the Specific Plan area shall comply.

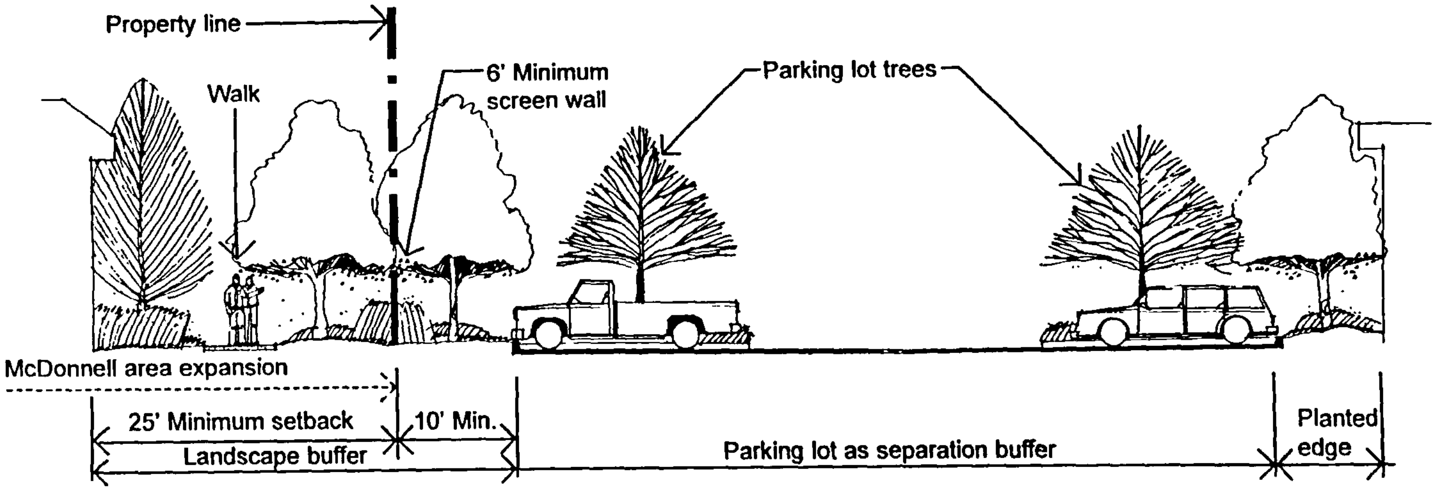
The proposed project may result in aesthetic impacts between the existing aerospace facility and any non-aerospace new development. The Specific Plan requires that landscape buffer areas be provided along the abutting edges between planning areas in order to provide for an aesthetic transition between different types of developments. The buffer areas shall be a minimum of 50 feet in width and shall include landscaping and berming to provide adequate screening between on-site uses. The buffer areas may include walls, fencing, utility easements and pedestrian walkways compatible with adjacent on-site developments. Exhibit 21 illustrates a typical landscape buffer. The landscape buffer may also be used for a private access drive and/or parking lot, provided an intensified landscape design is proposed. Exhibit 21 also illustrates a typical landscape/parking lot buffer. Implementation of the Specific Plan project with the incorporation of its design guidelines (particularly the landscape concept) will not result in aesthetic impacts between on-site uses. Mitigation Measure 2 will ensure that the Specific Plan landscape concept is implemented on future developments within the McDonnell Centre Business Park. The incorporation of Mitigation Measure 2, no significant impacts are anticipated.

<u>**Surrounding Vicinity**</u>

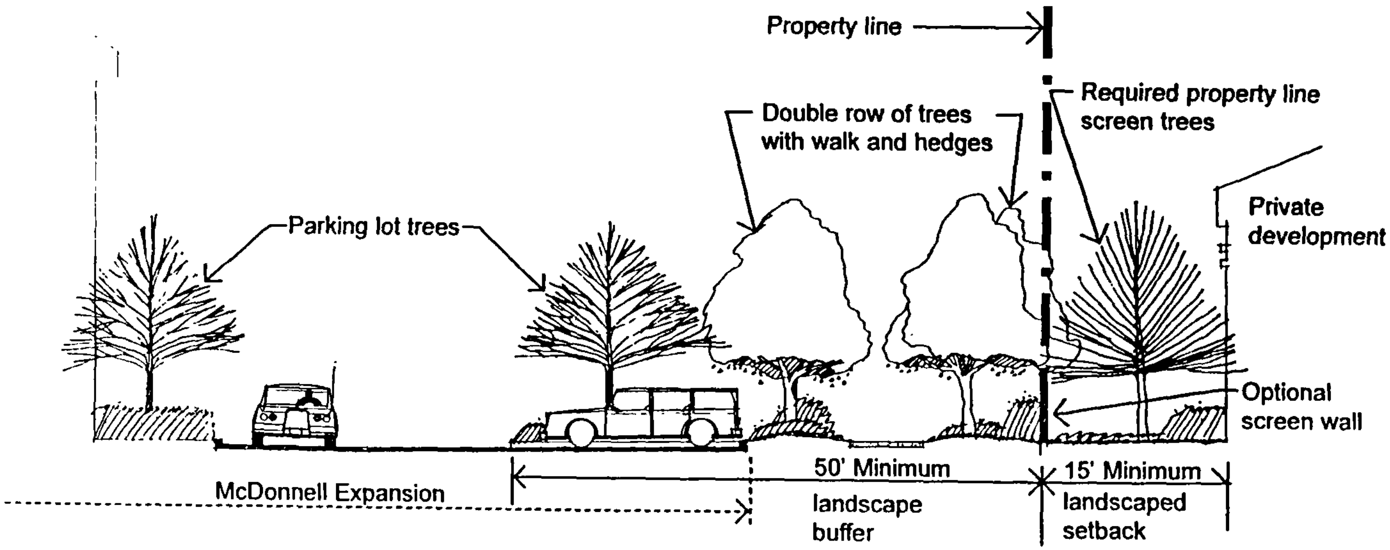
Adjacent land uses in the vicinity will experience a significant aesthetic change associated with buildout of the proposed Specific Plan. Buildout of the proposed Specific Plan will permanently alter the existing visual environment of the site by developing additional industrial, office, and commercial uses.

As indicated above, the Specific Plan includes design guidelines to establish the character and style for the development of a business park complex. The major elements of the Design Guidelines include: site planning, architecture, streetscape, landscaping, and signage. The Specific Plan includes several policies related to these elements with which all future development proposals within the Specific Plan area shall comply.

As stated previously, the Specific Plan also includes a Landscape Concept to establish the design character and visual qualities of the interior and perimeter of the project area. The landscape concept is comprised of several design elements, including: the public arterials, local and private streets, entryways, access drives, parkway areas, transitional edges and security fencing and walls to create a cohesive community landscape image.



Typical Landscape/Parking Lot Buffer



Typical Landscape Buffer

No Scale

EDAW, Inc.

Source: Adams Associates

Exhibit 21

Typical Landscape Buffers

The Landscape Concept establishes the primary unifying design element for the project area. The streetscape design is intended to preserve and enhance the existing layout and variety of landscape patterns. The Landscape Concept incorporates landscaped areas adjacent to the perimeter arterials, landscaped pedestrian walkways within the right-of-way of interior streets, where feasible, the preservation of existing tree lines, and the creation of design consistency for private drives, access points and parking lot layouts.

Off-site improvements shall include a landscape area with a six-foot sidewalk and pedestrian walkways shall be required on both sides of all public and private streets as a necessary unifying component to the landscape theme. The Specific Plan includes several policies with which all individual landscape plans for future projects located within the Specific Plan area shall comply. With implementation of the Specific Plan design guidelines and landscape concept, the project will not result in aesthetic impacts on surrounding uses. Mitigation Measure 2 will ensure that the Specific Plan landscape concept is implemented on future developments within the McDonnell Centre Business Park. The incorporation of Mitigation Measure 2, no significant impacts are anticipated.

CUMULATIVE IMPACTS

The proposed project, in conjunction with other past, present, and reasonably foreseeable future developments will incrementally contribute to changes to the perceived aesthetic quality of the local and regional area. The project's incremental contribution to this impact will be mitigated to a level less than significant with the implementation of Standard City Policies and Requirements and Mitigation Measures 1 and 2.

STANDARD CITY POLICIES AND REQUIREMENTS

A. All rooftop mechanical equipment shall be screened from any view. Said screening shall be architecturally compatible with the building in terms of materials and colors. If screening is not designed specifically into the building, a rooftop mechanical equipment plan must be submitted showing screening and must be approved.

B. Prior to the issuance of building permits, the applicant/owner shall submit a Landscape Construction Set to the Departments of Community Development and Public Works which must be approved. The Landscape Construction Set shall include a landscape plan prepared and signed by a State Licensed Landscape Architect and include all proposed/existing plan materials (location, type, size, quantity), and irrigation plan, a grading plan, an approved site plan, and a copy of the entitlement conditions of approval. The landscape plans shall be in conformance with Chapter 232 Landscape Improvements of the Huntington Beach Zoning and Subdivision Ordinance. The set must be approved by both departments prior to issuance of building permits. Any existing mature trees that must be removed shall be replaced at a 2 to 1 ratio with minimum 36-inch box trees, which shall be incorporated into the project's landscape plan.

MITIGATION MEASURES

1. Prior to issuance of grading permits within the Specific Plan, the project proponent for subsequent projects located within the Specific Plan area shall submit for review and approval, an Arborist report to the Director of Public Works. This report shall detail the location and quantity of mature trees which currently exist on the specific parcel. The final landscape plan shall illustrate which trees will be removed along with the quantity and location of replacement trees.

2. Prior to issuance of building permits within the Specific Plan, the applicant shall submit a landscape construction set for review and approval to the Public Works Department. The landscape plans shall be prepared by a registered landscape architect and shall incorporate the McDonnell Centre Business Park Specific Plan requirements. Plants that are attractive to rodents should be avoided. The landscape plan shall be approved by both Public Works and Community Development Departments.

LEVEL OF SIGNIFICANCE

No aesthetic impacts between on-site uses are anticipated with development of the proposed Specific Plan.

Off-site adjacent residential land uses located north and east of the project site will experience an aesthetic change associated with ultimate development of the McDonnell Centre Business Park. Implementation of Mitigation Measures 1 and 2 will ensure aesthetic impacts to off-site adjacent residential land uses in the vicinity of the project site are reduced to a level less than significant.

The proposed project, in conjunction with other past, present, and reasonably foreseeable future developments will incrementally contribute to changes to the perceived aesthetic quality of the local and regional area. The project's incremental contribution to this impact will be mitigated to a level less than significant with the implementation of Standard City Policies and Requirements and Mitigation Measures 1 and 2.

5.3 LIGHT AND GLARE

EXISTING CONDITIONS

On-Site

Within the project area, nighttime illumination is currently generated by the street and vehicular lights associated with the surrounding and internal roadway systems, including Springdale Street, Bolsa Avenue, Bolsa Chica Road, Able Lane, and Skylab Road. The southeastern portion of the site, which is currently undeveloped, is characterized by an absence of nighttime illumination.

Surrounding Vicinity

Nighttime illumination in the immediate vicinity is now provided by street lighting, the unobtrusive lighting of the industrial park to the south, the well lighted commercial area at the Bolsa Avenue-Springdale Street intersection, and residential lighting to the north across Rancho Road and east across Springdale. Also noticeable from the site as well as from the residential area to the north and east is the illumination from the McDonnell Douglas facility to the west and the illumination from the Westminster Mall east of Edwards Avenue.

Glare in the immediate vicinity of the project is produced primarily by the business/light industrial buildings to the south, and the vehicles traveling the surrounding roadways. The amount of glare experienced in the surrounding vicinity is typical for a suburban setting.

IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant effect if it will:

(b) Have a substantial, demonstrable negative aesthetic effect.

For the purposes of this EIR, a significant adverse light and glare impact is defined as one which has a substantial and demonstrable negative aesthetic impact. A significant light and glare impact would occur if implementation of the proposed project would result in a substantial adverse increase in light and glare in undeveloped areas of the project site.

The proposed Specific Plan may result in a substantial adverse increase in light and glare in undeveloped areas (approximately 134 acres) of the project site. The following provides a discussion of potential light and glare impacts to on-site and off-site uses resulting from development of the proposed Specific Plan.

On-Site

Buildout of the subject property will result in the development of industrial/business park uses on the project site. Required street and traffic lighting along with building security lighting will increase the sources of night lighting on the project site. This increase in lighting may be initially perceived by existing uses on the site as a significant impact. Carefully designed lighting can minimize these impacts. Normally, as development occurs, each new source of light is perceived as less of an impacting source. Furthermore, Sections 5.0 Design Guidelines and 6.0 Development Regulations of the Specific Plan identify policies to ensure that on-site exterior lighting is designed to minimize spillage and potential impacts. Additionally, implementation of Mitigation Measure 1 will reduce impacts related to on-site lighting to a level less than significant.

Planning Area 5, located at the southwest corner of the project site, allows for the potential development of commercial recreation and entertainment-type uses. The development of such uses, which could include movie theaters, shops, etc., may result in an increase in night-time activity related light, unlike that of the typical industrial and/or office uses. Implementation of Mitigation Measure 2 will reduce light impacts resulting from commercial recreation and entertainment uses within Planning Area 5 to a level less than significant.

Glare impacts are primarily related to reflective surfaces of buildings and vehicles which may be visible from one or more locations. The project proposes a majority of the site to be developed with business park/industrial uses. Frequently, reflective glass is utilized in non-residential building construction. Restrictions on reflective building materials within the project area will substantially limit the increase in glare usually associated with non-residential development, minimizing glare impacts. Implementation of Mitigation Measure 3 will reduce impacts related to reflective surface buildings to a level less than significant.

The vehicular related glare will increase proportionately with increased levels of project-generated vehicles in the immediate area. These vehicle related increases in glare are not considered significant in a suburban setting, particularly in this location where walls are currently constructed around the perimeter of existing residential areas located to the east and north of the project area.

Surrounding Vicinity

Buildout of the proposed project will incrementally increase the amount of light and glare in this area. The project contributes to general night sky illumination. This illumination will be visible from several areas within the City of Huntington Beach.

Buildout of the subject property will result in the development of a majority of the site with industrial/business park uses consistent with the Specific Plan and General Plan. Required street and traffic lighting along with building security lighting will increase the sources of night lighting within the area. This increase in lighting may be initially perceived by existing residents across Springdale Street as a significant impact. This perceived impact is anticipated to decrease over time as the proposed Business Park becomes part of the community and local residents become accustomed to these new sources of light. Carefully designed lighting can minimize these impacts. Normally, as development occurs, each new source of light is perceived as less of an impacting source. Furthermore, Sections 5.0 Design Guidelines and 6.0 Development Regulations of the Specific Plan identify policies to ensure that on-site exterior lighting is designed to minimize spillage and potential impacts. Additionally, implementation of Mitigation Measure 1 will reduce impacts related to on-site lighting to a level less than significant.

CUMULATIVE IMPACTS

Buildout of the proposed project in conjunction with other past, present, and reasonably foreseeable future projects in surrounding areas will incrementally increase the amount of light and glare in the surrounding area. The project results in the potential for increased light and glare, particularly in areas not currently lit; however, the site is located in an area that does contain uses similar to those proposed. The site contributes to general night sky illumination. Implementation of the Specific Plan policies to ensure light and glare impacts are reduced to a minimum and the following standard City policies and requirements and mitigation measures will reduce cumulative light and glare impacts to level less than significant.

STANDARD CITY POLICIES AND REQUIREMENTS

A. Prior to the submittal for building permits, the applicant/owner shall ensure that if outdoor lighting is included, high-pressure sodium vapor lamps or similar energy saving lamps shall be used. All outside lighting shall be directed to prevent "spillage" onto adjacent properties and shall be noted on the site plan and elevations.

MITIGATION MEASURES

1. Prior to the approval of building permits within the Specific Plan, all exterior lighting shall be consistent with the standards established by the Zoning Ordinance (unless otherwise addressed within the Specific Plan) to minimize on and off-site light and glare impacts. The lighting shall be approved by the Community Development and Public Works Departments.

2. Prior to approval of building permits for buildings constructed within Planning Area 5, proposed lighting shall be approved by the Community Development and Public Works Departments.

3. Buildings shall emphasize the minimization of glare by incorporating non-reflective building materials. Individual building site plans shall be reviewed and approved by the City Community Development Department to assure this measure is met prior to issuance of building permits within the Specific Plan.

LEVEL OF SIGNIFICANCE

The project will affect on-site and nearby residents' nighttime perception of light and glare. Implementation of Mitigation Measures 1-3 and standard City policies and requirements and Specific Plan policies will reduce project-specific light and glare impacts to a level less than significant.

The project will allow for the potential development of commercial recreation and entertainment-type uses in Planning Area 5. The development of such uses, which could include movie theaters, shops, etc., may result in an increase in night-time activity related light, unlike that of the typical industrial uses. Implementation of Mitigation Measure 2 will reduce light impacts resulting from commercial recreation and entertainment uses within Planning Area 5 to a level less than significant.

The project in conjunction with other past, present and reasonably foreseeable future projects will incrementally increase the amount of light and glare in the area. Over time, the project will contribute to a cumulative increase in the amount of light and glare in the vicinity. With implementation of standard City policies and requirements and mitigation measures, cumulative light and glare impacts are reduced to a level less than significant.

5.4 TRANSPORTATION/CIRCULATION

The information contained in this section is summarized from the Traffic Impact Analysis (TIA) for the McDonnell Centre Business Park in Huntington Beach, California, April 1997, prepared by Weston Pringle Traffic Engineering, Inc. (WPA). The TIA has been prepared in accordance with the City of Huntington Beach Traffic Impact Assessment Preparation Guidelines, July 1993. Discussions were held with the Cities of Huntington Beach and Westminster traffic engineering staff prior to preparation of this study to establish the project scope, methodology, and technical assumptions. The complete report is provided in Technical Appendix B of this EIR.

EXISTING CONDITIONS

Surrounding and On-Site Street System

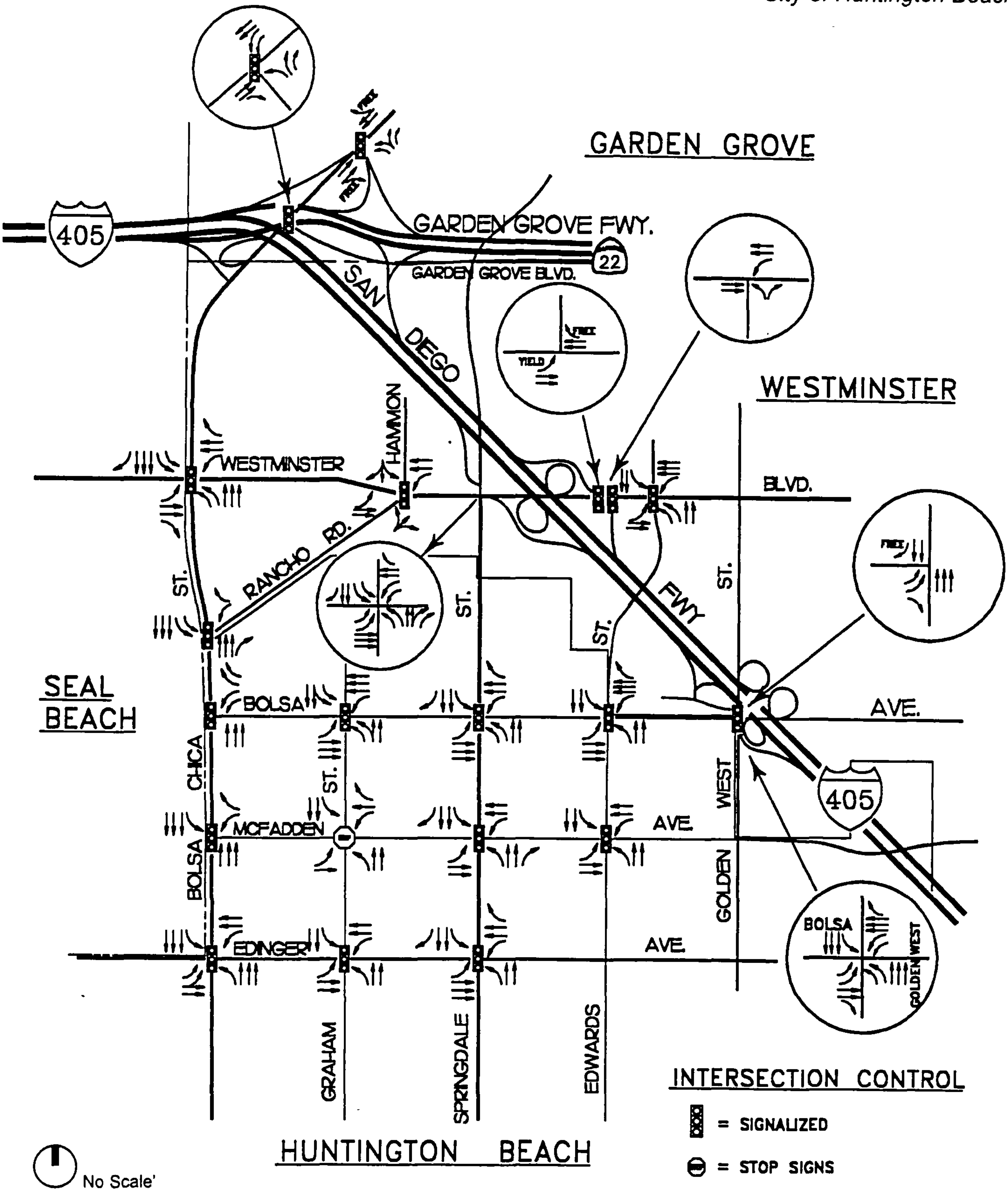
Primary regional access in Huntington Beach is provided by I-405 (San Diego Freeway), a north-south freeway located to the east of the site. Primary local east-west access to the Project site is along Bolsa Avenue and Rancho Road, while north-south access is along Bolsa Chica Street, and Springdale Street. Internal Circulation is provided by Skylab Way, Able Lane, and Astronautics Drive. A short description of the street system surrounding the Specific Plan follows. Exhibit 22 illustrates the existing street system in the vicinity of the site, including intersection and roadway link lane configurations and traffic signal locations.

Bolsa Chica Road has a north-south alignment and is west of the project site. This roadway begins south of Warner Avenue and to the north becomes Valley View Street. In the vicinity of the project site, Bolsa Chica provides six through travel lanes separated by a raised or painted median. A 50 mile per hour limit is posted. Bolsa Chica Road is designated a Major Arterial on the County of Orange Master Plan of Arterial Highways (MPAH) as well as within the City of Huntington Beach Circulation Element.

Springdale Street is also a north-south roadway. The southern terminus of Springdale is south of Slater Avenue, while to the north it becomes Holder Street in the City of Cypress. Four through lanes, separated by a painted median or a two-way left turn lane, are provided on Springdale in the vicinity of the project. The posted speed limit is 45 miles per hour. Springdale Street is designated a Primary Arterial on the County of Orange MPAH.

Bolsa Avenue is an east-west street, which begins at Bolsa Chica Road to the west and becomes First Street to the east. Bolsa Avenue provides six through lanes in the vicinity of the project, which are separated by a raised median. The posted speed limit is 45 miles per hour. Bolsa has not been improved to its ultimate roadway width along the proposed project site. Bolsa Avenue is designated a Major Arterial on the County of Orange MPAH.

Golden West Street, which runs in a north-south alignment, is a four-lane divided roadway north of the I-405 Freeway. South of the I-405 Freeway, Golden West Street is a six-lane facility. Golden West originates in the City of Huntington Beach at Pacific Coast Highway, travels through the City of Westminster to the Garden Grove Freeway where it becomes Knott Street. There is a posted speed limit ranging from 40 to 45 miles per hour. Golden West is designated a Primary Arterial on the County of Orange MPAH.



EDAW, Inc.

Exhibit 22

Source: WPA Traffic

Existing Geometrics

Edwards Street is a north-south roadway that runs between Garden Grove Boulevard to the north and Garfield Street to the south. This roadway provides four lanes of divided travel with a posted speed limit of 35-45 miles per hour. Edwards Street is designated a Primary Arterial.

Westminster Boulevard is a four-lane roadway that runs in an east-west direction between Pacific Coast Highway to the west and Fairview Street to the east. There is a posted speed limit of 40 miles per hour within the vicinity of the proposed project. Westminster Boulevard is designated a Primary Arterial on the Orange County MPAH.

Valley View Street is a six-lane divided roadway with a posted speed limit of 45 miles per hour. Valley View Street begins in Los Angeles County at Broadway and runs in a north-south direction to the I-405 Freeway, where it becomes Bolsa Chica Street. Valley View Street is designated a Major Arterial on the Orange County MPAH.

Garden Grove Boulevard, within the project vicinity of the project site, runs in an east-west direction with four lanes of undivided travel separated by a two-way left turn lane. In some segments, the travel lanes are reduced to three lanes of travel. There is a posted speed limit of 45 miles per hour and limited on-street parking. Garden Grove Blvd. runs between Bolsa Chica Road in the City of Westminster to Bristol Street in the City of Santa Ana. Garden Grove Boulevard is designated a Primary Arterial on the Orange County MPAH.

Rancho Road-Hammon Avenue is a two-lane undivided roadway that serves residential uses, as well as the McDonnell Douglas site. There is a posted speed limit of 40 miles per hour. Rancho Road is designated a Secondary Arterial within the Huntington Beach General Plan, the Westminster General Plan and the Orange County MPAH.

McFadden Avenue is an east-west street which begins at Bolsa Chica Road to the west and terminates at Newport Avenue to the east. This roadway provides four lanes of divided travel with a posted speed limit of 45 miles per hour. McFadden Avenue is designated a Secondary Arterial within the Orange County MPAH.

Edinger Avenue begins at Sunset Way East which is located in the Sunset Aquatic Park area. It extends eastward through the Cities of Westminster, Fountain Valley, Santa Ana, Tustin and becomes Irvine Center Drive at Harvard Avenue in Irvine. It is designated as a four-lane primary arterial by the Orange County MPAH. Edinger Avenue is currently configured as a two-lane facility between Sunset Aquatic Park and Bolsa Chica Street. It is a four-lane facility between Bolsa Chica Street and Edwards Street. It is a six-lane facility between Edwards Street and Beach Boulevard. It is a four-lane facility between Beach Boulevard and Newland Street. Edinger Avenue is designated a Primary Arterial on the Orange County MPAH.

Graham Street, which runs between Bolsa Avenue and Slater Avenue, is a north-south roadway that provides four lanes of travel which are separated by a two-way left turn lane. There is a posted speed limit of 45 miles per hour with no on-street parking permitted. Graham Street is designated a Secondary Arterial on the Orange County MPAH.

Existing Traffic Volumes

Average Daily Traffic (ADT) is the total volume of traffic passing on a roadway on an average day of the year. ADT data is used to determine the amount of use a given roadway segment experiences on an average day. Exhibit 23 summarizes the roadway links ADT volumes on the ten study segments. These volumes were referenced through current traffic counts compiled by WPA, the City of Westminster General Plan, and the City of Huntington Beach Traffic Flow Map (dated July, 1994). Where 24 hour traffic count data was unavailable, ADT volumes were estimated by multiplying the total PM peak hour traffic volume for the subject link by a factor of 11.5, obtained through information provided by Robert Kahn & John Kain Associates (RKJK). In addition, at several locations in close proximity to the project 24-hour traffic counts were conducted by WPA to update and verify these base data. Exhibits 24 and 25 summarize the existing AM and PM peak-hour turning movement traffic volumes, respectively, at the 22 study intersections.

Existing Intersection and Roadway Segment Level of Service (LOS)

Roadway capacity is generally limited by the ability to move vehicles through intersections. Level of Service (LOS) is a measure of "quality of flow," and as shown in Table F, there are six levels of service, A through F, which relate to traffic congestion from best to worst, respectively. In general, Level A represents free-flow conditions with no congestion. Conversely, Level F represents severe congestion with stop-and-go conditions. Levels E and F typically are considered to be unsatisfactory.

Corresponding to each level of service shown in Table G is a volume-to-capacity (V/C) ratio. Generally speaking, this is the ratio of an intersection's traffic volume (V) to its capacity (C), with capacity defined as the theoretical maximum number of vehicles that can pass through the intersection during a specified period of time. In accordance with the City of Huntington Beach *Traffic Impact Assessment Procedure Guidelines*, these level of service determinations were made using the methodology commonly referred to as Intersection Capacity Utilization (ICU). With this technique, an intersection's ICU value (i.e., a V/C ratio) is computed based upon the intersection's traffic volumes and its traffic-carrying capacity.

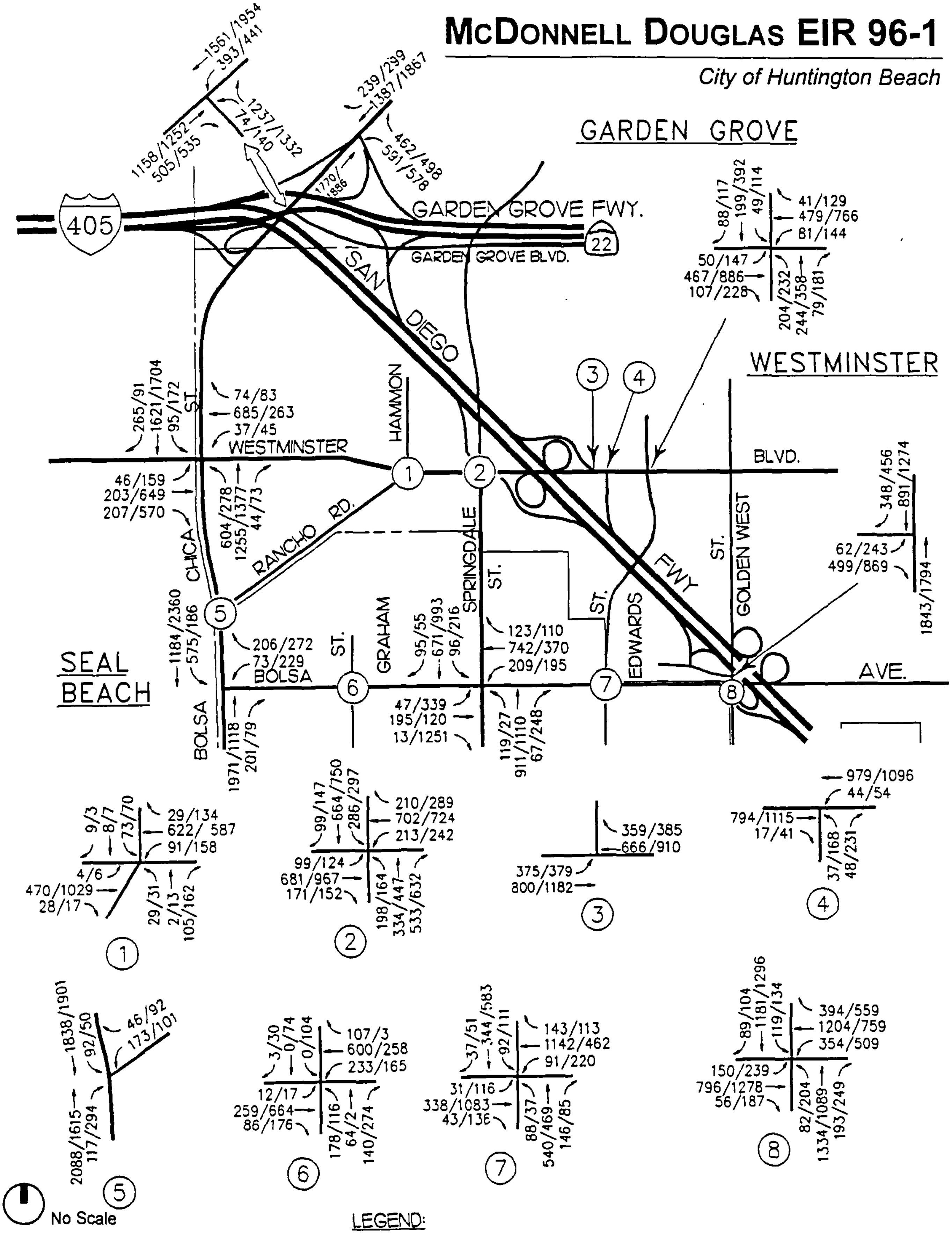
Level of service for roadway links is quantified in terms of a volume/capacity (V/C) ratio. Similar to intersection V/C ratio, this V/C ratio is a quantitative comparison of a roadway segment's demand or volume to its theoretical maximum traffic-carrying per lane capacity. Table G identifies the corresponding roadway segment's V/C ratio to each level of service.

The City of Huntington Beach has determined that LOS C or better is the acceptable standard for roadway links, while LOS D or better is the acceptable standard for intersections.

Although an acceptable LOS at a study intersection is A to D, the City of Huntington Beach indicates that if a study intersection has a LOS of D or worse, then the intersection must be reanalyzed utilizing the methodologies in the 1994 Highway Capacity Manual (94HCM). Within this methodology of intersection analysis, the operating conditions are also defined in terms of Level of Service (LOS), where "A" is considered the best and "F" is over capacity, but these calculations are based on vehicle delay. A further explanation of the relationship of delay to LOS is found in Appendix A of the TIA contained in Appendix B of the EIR.

McDonnell Douglas EIR 96-1

City of Huntington Beach

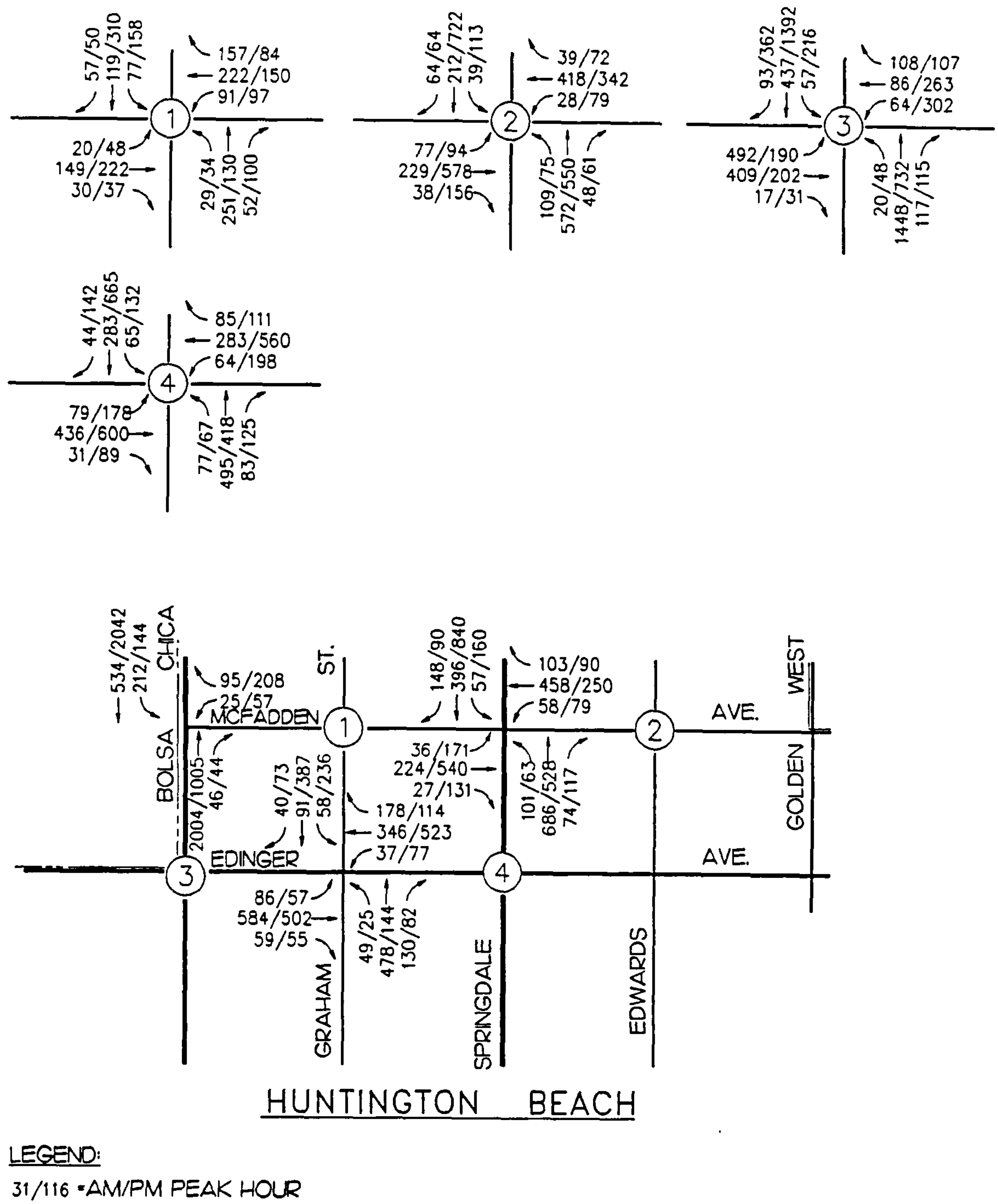


EDAW, Inc.

Source: WPA Traffic

Exhibit 23

Existing AM/PM Peak Hour Traffic Volumes



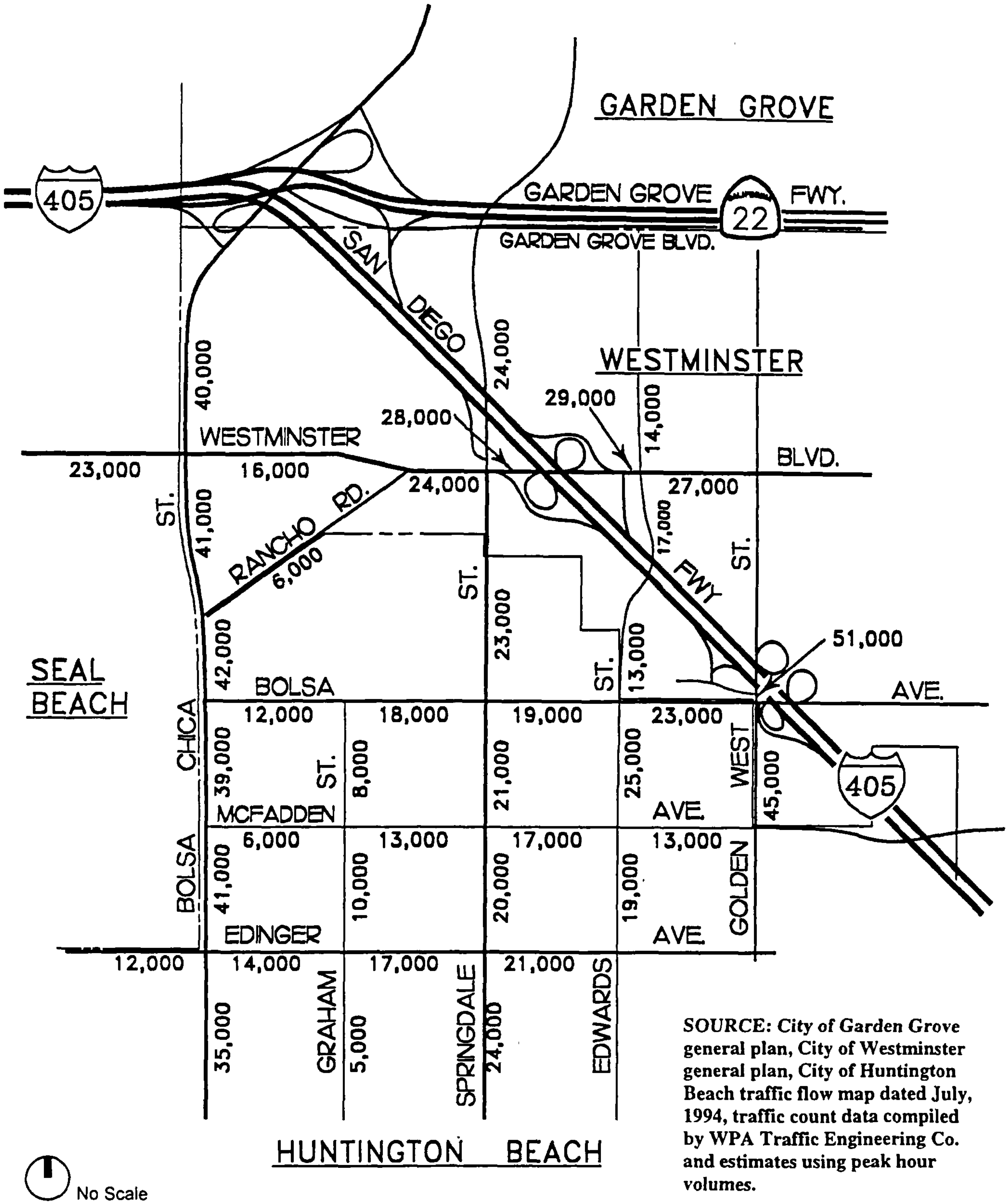
No Scale

EDAW, Inc.

Source: WPA Traffic

Exhibit 24

Existing AM/PM Peak Hour Traffic Volumes



SOURCE: City of Garden Grove general plan, City of Westminster general plan, City of Huntington Beach traffic flow map dated July, 1994, traffic count data compiled by WPA Traffic Engineering Co. and estimates using peak hour volumes.

EDAW, Inc.

Source: WPA Traffic

Exhibit 25

Existing Daily Volumes

TABLE F

LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS[1]

Level of Service	Interpretation	ICU[2]
A	Uncongested operations; all vehicles clear in a single cycle.	0.00 - 0.60
B	Uncongested operations; all vehicles clear in a single cycle.	0.61 - 0.70
C	Light congestion; occasional backups on critical approaches.	0.71 - 0.80
D	Congestion on critical approaches, but intersection functional. Vehicles required to wait through more than one cycle during short peaks. No long-standing lines formed.	0.81 - 0.90
E	Severe congestion with some long-standing lines on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements.	0.91 - 1.00
F	Total breakdown with stop-and-go operations.	1.010+

[1] Source: *Highway Capacity Manual*, Transportation Research Board Number 212, January 1990.
[2] Intersection Capacity Utilization.

TABLE G

LEVEL OF SERVICE CRITERIA FOR ROADWAY SEGMENTS[1]

Level of Service	Interpretation	Nominal Range to Volume-to-Capacity Ratio
A	Low volumes; primarily free-flow operations. Density is low, and vehicles can freely maneuver within the traffic stream. Drivers can maintain their desired speeds with little or no delay.	0.00 - 0.60
B	Stable flow with potential for some restriction of operating speeds due to traffic conditions. Maneuvering is only slightly restricted. The stopped delays are not bothersome, and drives are not subject to appreciable tension.	0.61 - 0.70
C	Stable operations; however, the ability to maneuver is more restricted by the increase in traffic volumes. Relatively satisfactory operating speeds prevail, but adverse signal coordination or longer queues cause delays.	0.71 - 0.80
D	Approaching unstable traffic flow, where small increases in volume could cause substantial delays. Most drivers are restricted in their ability to maneuver and in their selection of travel speeds. Comfort and convenience are low but tolerable.	0.81 - 0.90
E	Operations characterized by significant approach delays and average travel speeds of one-half to one-third the free-flow speed. Flow is unstable and potential for stoppages of brief duration. High signal density, extensive queuing, or progression/timing are the typical causes of the delays.	0.91 - 1.00
F	Forced-flow operations with high approach delays at critical signalized intersections. Speeds are reduced substantially, and stoppages may occur for short or long periods of time because of downstream congestion.	1.010+

[1] Source: *Highway Capacity Manual*, Transportation Research Board, 1965.

Within the 94HCM methodology, there are input data assumptions that must be made. The assumptions utilized in the intersection analyses were found to be acceptable to the City of Huntington Beach and were utilized in this report. Some of the assumptions made were a signal length of at least 120 seconds, a lost time of 3 seconds, and a yellow/red time of 5 seconds in the City of Huntington Beach and 4 seconds in the surrounding cities.

There was one study intersection, Graham/McFadden, which is currently controlled by a 4-Way STOP. This intersection was analyzed utilizing the 1995 Highway Capacity Software, which is based upon the 1994 Highway Capacity Manual (94HCM), for unsignalized intersections.

Intersection Analysis

The analysis of existing intersection levels of service was based upon the peak-hour traffic volumes illustrated on previously referenced Exhibits 24 and 25 and the existing intersection geometrics depicted on previously referenced Exhibit 22. Table H summarizes the existing levels of service at 22 existing study intersections during the AM and PM peak hours. As shown in Table H, all of the study intersections have acceptable (LOS D or better) operations, except for the study intersections of Bolsa/Springdale, Bolsa/Golden West, Golden West/I-405 SB Off-Ramp, and Graham/McFadden during the PM peak hour. These unacceptable intersection operations are considered existing deficiencies. (Note: the ICU/HCM worksheets for all the study intersections can be referenced in Appendix B of the TIA and located in Appendix B of the EIR.) Table M, contained in the "Impacts" section, identifies the proposed improvements required under Existing Conditions - Level 1. As shown in Table M, improvements were identified at six locations and are listed below.

1. **Westminster/I-405 NB On-ramp** - Signalize intersection with separate eastbound left turn phase.

2. **Bolsa Avenue/Springdale Street** - Add a northbound right turn lane. Add a third northbound through lane.

3. **Bolsa Avenue/Golden West Street** - Add a northbound right turn lane. Add a third eastbound through lane.

4. **Golden West Street/I-405 SB Off-Ramp** - Restripe the west leg to a separate eastbound left turn lane and dual eastbound right turn lanes.

5. **McFadden Avenue/Graham Street** - Signalize intersection.

6. **Westminster/Rancho** - Add a westbound left lane.

With these improvements, the study intersections would operate at acceptable Levels of Service during both the AM and PM peak hours. A discussion of the implementation status of above noted improvements is as follows.

TABLE H

EXISTING INTERSECTION LEVEL OF SERVICE

INTERSECTION	INTERSECTION CAPACITY UTILIZATION/LEVEL OF SERVICE			
	EXISTING CONDITIONS		EXISTING CONDITIONS WITH MITIGATIONS (LEVEL 1)	
	AM PK HR	PM PK HR	AM PK HR	PM PK HR
Garden Grove Fwy (S.R. 22) & Valley View Street (HCM Analyses)(1)	0.67/B (16.2/C)	0.81/D (22.3/C)	-	-
Valley View Street & Garden Grove Blvd. (HCM Analyses)(1)	0.75/C (24.5/C)	0.81/D (27.4/D)	-	-
Westminster Blvd. & Bolsa Chica Rd.	0.78/C	0.77/C	-	-
Westminster Blvd. & Rancho Rd. - Hammon Avenue	0.33/A	0.57/A(2)	-	-
Westminster Blvd. & Springdale St.	0.55/A	0.64/B	-	-
Westminster Blvd. & I-405 NB On-ramp	0.47/A(2)	0.54/A(3)	(2)	(2)
Westminster Blvd. & I-405 NB Off-ramp	0.37A	0.55A	-	-
Westminster Blvd. & Edwards St.	0.41/A	0.69/B	-	-
Bolsa Chica Street & Rancho Rd.	0.59/A	0.48/A	-	-
Bolsa Chica Street & Bolsa Avenue	0.71/C	0.59/A	-	-
Bolsa Chica Street & McFadden Avenue	0.63/B	0.57/A	-	-
Bolsa Chica Street & Edinger Avenue	0.61/B	0.68/B	-	-
Bolsa Avenue & Graham St.	0.33/A	0.43/A	-	-
Bolsa Avenue & Springdale Street (HCM Analyses)(1)	0.65/B (27.9/D)	0.95/E (*/F)	0.63/B (25.5/D)	0.88/D (38.1/D)
Bolsa Avenue & Edwards St.	0.54/A	0.65/B	-	-
Bolsa Avenue & Golden West Street (HCM Analyses)(1)	0.75/C (33.2/D)	0.92/E (*/F)	0.66/B (28.2/D)	0.78/C (33.2/D)
Golden West Street & I-405 SB Off-ramp (HCM Analyses)(1)	0.70/B (18.0/C)	0.93/E (*/F)	0.56/A (17.1/C)	0.68/B (18.4/C)
McFadden Avenue & Graham St.	A-6.4	F-*	0.35/A	0.42/A
McFadden Avenue & Springdale St.	0.47/A	0.59/A	-	-
McFadden Avenue & Edwards St.	0.43/A	0.59/A	-	-
Edinger Avenue & Graham St.	0.47/A	0.48/A	-	-
Edinger Avenue & Springdale St.	0.39/A	0.55/A	-	-

Source: WPA Traffic

Notes: (1) 94HCM analyses based upon delay. (Delay/LOS)
(2) Although not required through modeling efforts, the added westbound left turn lane was identified by the City of Westminster as an existing need which would required median and signal modification. The added westbound left also requires widening/improvement to the west side of Rancho Road.
(3) Due to an examination of the volumes, signal warrants were examined at this location. The volume to capacity is shown to be acceptable, but a traffic signal was also found to be warranted.
*** Over the Limit** - HCM Delay is not calculated if the volume to capacity "limit" is exceeded.

The intersection improvements at Westminster/I-405 NB on-ramp and Golden West Street/I-405 SB off-ramp are addressed in the City of Westminster Citywide Fee Program. Please refer to the footnotes on Table M for additional information regarding these intersection improvements. The intersection improvements at Bolsa Avenue/Golden West were identified in the Mitigated Negative Declaration for the Westminster Mall Expansion. The design/implementation of these improvements are being coordinated jointly by the Cities of Huntington Beach and Westminster.

The intersection improvements at Bolsa Avenue/Springdale Street were identified in the Sharp Electronics Traffic Study and they have been added to the City's Capital Improvement Program (CIP). The intersection improvement at McFadden Avenue/Graham Street has been added to the City's CIP program.

Additionally, although not required through modeling efforts, the added westbound left turn lane was identified by the City of Westminster as an existing need which would require median and signal modification. The added westbound left also requires widening/improvement to the west side of Rancho Road.

It should be noted that if the ICU methodology indicated a LOS D or worse, the HCM methodology was then utilized to determine the final Level of Service. The improvements shown on Table M were based upon obtaining an acceptable Level of Service D under the HCM methodology as indicated by City Staff, except where signalization mitigates conditions back to LOS A - C.

Road Segment Analysis

Road segment analyses were performed utilizing the ADT volumes shown in Exhibit 6. Roadway traffic operations are evaluated by the ratio of existing daily traffic volumes to the daily roadway capacity. The capacity guidelines for road segment volumes were referenced from both the City of Huntington Beach General Plan adopted May 13, 1996 and the City of Westminster General Plan. The capacity guidelines for each city can be found in Appendix D of the TIA contained in Appendix B of the EIR. The City of Huntington Beach acceptable Level of Service value for arterial links is LOS C and LOS D for the City of Westminster.

Table I summarizes the analysis of existing level of service for the ten (10) roadway segments identified by the City Traffic Engineer. As shown in Table I, all segments currently operate at an acceptable level of service.

Signal Warrant Analysis/Traffic Signalization

As stated previously, Exhibit 22 identifies the location of existing traffic signals in the vicinity of the project site. The intersection of McFadden Avenue and Graham Street is currently unsignalized and operating at an unacceptable LOS F during the PM peak hour. This study intersection was checked to ascertain if it satisfied the Caltrans traffic signal warrant. Warrants for the installation of traffic signals have been developed by the Federal Highway Administration and Caltrans. These warrants are based upon various factors including volumes and time periods.

TABLE I

EXISTING ROADWAY LINK LEVEL OF SERVICE

ROADWAY SEGMENT	EXISTING [a]			
	LANES/ CAPACITY	ADT	V/C RATIO	LOS
<u>BOLSA CHICA STREET:</u>				
Garden Grove to Westminster*	6D/61,930	40,000	0.65	B
Westminster to Rancho*	6D/61,930	41,000	0.66	B
Rancho to Bolsa	6D/56,300	42,000	0.75	C
Bolsa to McFadden	6D/56,300	39,000	0.69	B
McFadden to Edinger	6D/56,300	41,000	0.73	C
Edinger to Heil	6D/56,300	35,000	0.62	B
<u>GRAHAM STREET:</u>				
Bolsa to McFadden	4U/25,500	8,000	0.31	A
McFadden to Edinger	4U/25,500	10,000	0.39	A
Edinger to Heil	4U/25,500	5,000	0.20	A
<u>SPRINGDALE STREET:</u>				
I-405 Fwy. to Westminster	4D/37,500	24,000	0.64	B
Westminster to Bolsa	4D/37,500	23,000	0.61	B
Bolsa to McFadden	4D/37,500	21,000	0.56	A
McFadden to Edinger	4D/37,500	20,000	0.53	A
Edinger to Heil	4D/37,500	24,000	0.64	B
<u>EDWARDS STREET:</u>				
Westminster to I-405 Fwy.	4D/37,500	17,000	0.45	A
I-405 Fwy. to Bolsa	4D/37,500	13,000	0.35	A
Bolsa to McFadden	4D/37,500	25,000	0.67	B
McFadden to Edinger	4D/37,500	19,000	0.51	A
<u>GOLDEN WEST STREET:</u>				
I-405 Fwy. to Bolsa*	6D/61,930	51,000	0.82	D
Bolsa to McFadden	6D/56,300	45,000	0.80	C
<u>WESTMINSTER BLVD.:</u>				
Bolsa Chica to Rancho*	4D/41,250	16,000	0.39	A
Rancho to Springdale*	4D/41,250	24,000	0.58	A
Springdale to I-405 Fwy.*	4D/41,250	28,000	0.68	B
I-405 Fwy to Edwards*	4D/41,250	29,000	0.70	B
Edwards to Golden West*	4D/41,250	27,000	0.65	B

TABLE I (CONTINUED)

EXISTING ROADWAY LINK LEVEL OF SERVICE

ROADWAY SEGMENT	EXISTING [a]			
	LANES/ CAPACITY	ADT	V/C RATIO	LOS
RANCHO RD.:				
Bolsa Chica to Westminster	2U/12,500	6,000	0.48	A
BOLSA AVENUE:				
Bolsa Chica to Graham	6D/56,300	12,000	0.21	A
Graham to Springdale	6D/56,300	18,000	0.32	A
Springdale to Edwards	6D/56,300	19,000	0.34	A
Edwards to Golden West	6D/56,300	23,000	0.41	A
MCFADDEN AVENUE:				
Bolsa Chica to Graham	2U/12,500	6,000	0.48	A
Graham to Springdale	4U/25,500	13,000	0.51	A
Springdale to Edwards	4U/25,500	17,000	0.67	B
Edwards to Golden West	4U/25,500	13,000	0.51	A
EDINGER AVENUE:				
Bolsa Chica to Graham	4D/37,500	14,000	0.37	A
Graham to Springdale	4D/37,500	17,000	0.45	A
Springdale to Edwards	6D/56,300	21,000	0.37	A

Source: WPA Traffic

(a) Existing- Represents 1997 Conditions

ADT = Average Daily Trip V/C = Volume to Capacity LOS = Level of Service
— Acceptable LOS for Roadway Link Segments: City of Huntington Beach - LOS C City of Westminster - LOS D
— Italicized Road Segments are located in the City of Westminster
* Signal Coordination in place per City of Westminster Engineering Department.
D = Divided
U = Undivided

The Caltrans Peak Hour Volume Warrant (Warrant 11) was applied to the intersection of McFadden/Graham. Based upon the guidelines for determining the applicable warrant, Figure 9-9 (Rural Areas) was utilized in the analysis as indicated in the Traffic Manual[1] for streets with speed limits over 40 MPH. Appendix C of the TIA contained in Appendix B of the EIR, contains Figure 9-9 and the warrant for the unsignalized intersection of McFadden Avenue/Graham Street. As shown in Appendix C of the TIA contained in Appendix B of the EIR, the study intersection of McFadden Avenue/Graham Street currently satisfies the requirements for installation of a traffic signal under existing conditions and this is considered an existing deficiency or an impact of existing conditions. As stated above, this signal improvement has been added to the City's CIP program.

The study intersection of Westminster and the I-405 NB on-ramp is currently not controlled. The eastbound left turn movement has a "presumed" yield control. Based upon the high eastbound left turn volumes, this intersection was examined to determine if a signal is warranted. Due to the fact that there are no minor street volumes some other means of evaluation is required. The eastbound left turn movement is a conflicting movement with opposing through traffic and can be compared to operations of a T-intersection. The eastbound left turn volumes may be considered as the minor street volumes in order to evaluate signalization needs. This methodology has been an accepted practice within the traffic engineering profession.

Based upon the guidelines for determining the applicable warrant, Figure 9-8 (Urban Areas) was utilized in the analysis as indicated in the Traffic Manual[2] for streets with speed limits under 40 MPH. Appendix C of the TIA contains Figure 9-8 and the warrant for the unsignalized intersection of Westminster/I-405 NB on-ramp. As shown in Appendix C of the TIA contained in Appendix B of the EIR, the study intersection of Westminster/I-405 NB on-ramp currently satisfies the requirements for installation of a traffic signal under existing conditions and this is considered an existing deficiency or an impact of existing conditions. As stated above, this signal improvement is addressed in the City of Westminster Citywide Fee Program.

Left-Turn Phase Warrant

The intersection of Westminster/I-405 on-ramp was also analyzed to ascertain whether it met with the guidelines to consider a protected left turn phase for the eastbound direction on Westminster. The guidelines can be referenced in the Traffic Manual[3] and state that 50 or more left turning vehicles (per hour in one direction) are required, in combination with the product of the left turn movement and conflicting through traffic (during the peak hour) which exceeds 100,000 or more; would warrant protected left turn phasing. Based upon these guidelines, the eastbound left turn

1 Traffic Manual; California Department of Transportation (Caltrans); Chapter 9 "Traffic Signals and Lighting", Warrant 11; May 1992.

2 Traffic Manual; Ibid.

3 Traffic Manual; California Department of Transportation (Caltrans); Chapter 9, "Traffic Signals and Lighting," 9-01.3; May, 1992.

movement on Westminster at I-405 NB on-ramp warrants left turn phasing if the intersection is signalized. This is also considered an existing deficiency or an impact of existing conditions. As stated above, this signal improvement is addressed in the City of Westminster Citywide Fee Program.

Site Access/Circulation

Access to the existing site is currently provided by a series of driveways located along Bolsa Chica Street, Springdale Street and Bolsa Avenue. One main driveway exists along Bolsa Chica Street providing access to the MDA office tower (refer to B-17 on Exhibit 8 within Section 5.1 Land Use of this EIR). Bolsa Chica Street is intersected by Skylab Road West, and this roadway (which is internal to the site) provides further access to existing MDA facilities. The driveways along the north side of Bolsa Avenue provide access to several MDA parking lots (refer to Exhibit 8). The main entrances into MDA Facility B-16 and the Sharp Electronics Corporation are also provided via driveways along Bolsa Avenue. Able Lane intersects with Bolsa Avenue and provides further internal access to MDA parking lots (refer to Exhibit 8). Secondary access for Sharp Electronics Corporation, Dynamic Cooking and Airtech are also located off Able Lane. Springdale Street provides secondary access to Sharp Electronics Corporation. It also intersects with Skylab Road, which provides internal access to the existing Cambro warehouse, and the approved Airtech and Dynamic Cooking facilities. Driveways along Rancho Road and Astronautics Drive provide access to MDA parking lots W, Z, and U, respectively (refer to Exhibit 8). Pedestrian access is currently provided by sidewalks along the north and south side of Bolsa Avenue and the east and west sides of Bolsa Chica Street and Springdale Street.

Parking

The following is extrapolated from the February, 1997 parking analysis, prepared by Paul E. Cook and Associates, Inc., which is included in Appendix C of the EIR. The summary reflects only the existing parking and potential future parking for the MDA buildings located within Planning Area 1. The two existing office buildings located within area 5, although currently utilized solely by MDA, have their own dedicated parking lots which provide parking consistent with the Huntington Beach Zoning and Subdivision Ordinance (ZSO) Chapter 231 for each of these stand-alone buildings. None of the parking area dedicated to these two buildings is included in the summary for parking support required within Planning Area 1. The parking lots that currently exist in support of the MDA buildings in Planning Area 1 are located within Planning Areas 1, 1A, 3, 4, and 5.

Exhibit I in Appendix C of the EIR provides a summary of all of the existing MDA buildings within Planning Area 1, with the primary use, the gross square footage, and the associated code required parking. The total existing gross square footage for all of the buildings (including temporary trailers) is 2,490,877. For the existing office, manufacturing, and laboratory buildings the total code required parking is 6,681 stalls. Warehouse/storage requirements for parking are on a graduated scale, and the total for the 131,207 square feet of warehouse is an additional 62 stalls for a grand total of 6,743 existing stalls required to meet the Specific Plan code.

Exhibit II in Appendix C of the EIR shows the total parking stalls currently available and in use in support of the MDA buildings within Area 1. At the current employment level there is an abundance of empty stalls. The number of existing stalls is broken down by specific parking lot, and total 5,944 currently available stalls. Exhibit II in Appendix C of the EIR also includes a tabulation showing the potential additional surface stalls that can be provided if future demand should require. With a total of five additional surface lots, 1990 additional stalls could be provided.

IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant transportation/circulation effect if it will:

(l) cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system.

According to the City of Huntington Beach performance criteria established in the Traffic Impact Assessment Preparation Guidelines, a traffic increase is considered a significant impact if LOS C could not be achieved for the roadway links and/or if LOS D could not be achieved for the intersections impacted by the proposed project within the community. Additionally, impacts to access/internal circulation and pedestrian safety are considered a significant impact if the proposed roadways and access points do not conform to City standards. Lastly, a project will have a significant impact if it results in significant effects on existing parking facilities, or creates a demand for new parking. For purposes of this EIR, increases in a future parking demand which exceeds the future supply will be considered significant.

The proposed project will increase vehicular traffic on the existing and future roadway system. The project will establish new site access and provide an on-site circulation system including additional parking supply. Additionally, the proposed project in conjunction with past, present, and reasonably foreseeable future projects will incrementally contribute to a cumulative increase in vehicular traffic in the local vicinity. These increases and the adequacy of the on-site circulation system and parking are considered potential impacts. The significance of each is described below related to the above criteria.

Construction Traffic

Construction related traffic will result from the future buildout of the Specific Plan and would be associated with workers arriving and leaving the project site, and truck and construction vehicle traffic. Construction worker traffic is not anticipated to create a significant impact to area-wide circulation. Potential construction related impacts (associated with future projects in the Specific Plan) on local traffic and circulation would be short-term in nature. Mitigation Measure 1 will mitigate construction related impacts associated with future building permit requests to a level of less than significant.

Signal Warrant Analysis/Traffic Signalization

No significant project-specific impacts have been identified related to traffic signalization on the surrounding street system. The need for traffic signals discussed above is an existing deficiency. Please refer to the Cumulative Impacts section for a more detailed discussion of project and cumulative project impacts on the surrounding street system.

Site Access/Circulation

The proposed Circulation Plan is shown on Exhibit 6 contained within the Project Description section of the EIR. The Circulation Plan exhibit illustrates the overall McDonnell Centre site, the location of the major access points, and the planned internal connections. This plan was developed based on analyses performed by WPA Traffic Engineering, Inc., then modified by City Staff and McDonnell Douglas representatives in order to provide acceptable results. The analyses included consideration of the trip generation projections for the site, review of the modeling information, collection and analyses of street plans for the adjacent roadways, and input regarding internal roadway configurations, etc.

The projected daily traffic volumes associated with each of the major accesses are also shown on Exhibit 28 later in this section. These volumes represent portions of the total on-site traffic, which includes generation from existing developments, entitled projects, and proposed land uses. The volumes shown are actually totals that would access at or near these main access points, since some of these vehicles would actually use right turn driveways near these main accesses.

The projected traffic volumes are anticipated to be adequately served by the proposed main accesses and other secondary right turn only driveways. There is a significant amount of traffic expected to utilize the entries / exits; however, provision of added main driveways did not appear feasible given existing street geometrics, existing / proposed developments, anticipated traffic signal spacings, etc.

These access and internal circulation analyses are at a general level, since the magnitude of the project is large and the specific added uses are not well defined (i.e. Planning Area 5 could contain significant retail, but market conditions may dictate employment type uses as more viable). It is also possible that actual projects that are developed may not result in the maximum trip generations that could occur. This appears to be the current trend based on some recent projects in Planning Areas 2 and 3.

The following provides a preliminary assessment and recommended Mitigation Measures relative to the access and on-site circulation of the McDonnell Centre Business Park Specific Plan.

- The future project traffic would warrant signalization of the main access points; however, the timing would depend on the types of projects developed. Mitigation is proposed which requires signal warrants be reviewed as specific projects are identified.

- The locations of the main accesses consider the existing median locations / access needs and should allow provision of adequate storage to serve the proposed projects. It is possible that some locations may require dual left turn lanes, depending on the development levels and types that eventually occur. Mitigation is proposed which requires left turn ingress be reviewed as specific projects are proposed to assure adequate storage.

- There are three potential locations for the westerly main access at Bolsa Avenue to occur. Any one of the three locations should provide acceptable operations; the location would likely be dictated by the future development plans in this area.

- The capacity of the internal roadways is expected to be adequate to serve the maximum buildout potential of the proposed project.

- Some of the planned internal roadway widths and right-of-ways are designed (see Section 4.2 of the Specific Plan) to conform to City standards, so they can be more easily dedicated to the City as public streets.

- In an effort to prevent future operational safety problems resulting from inappropriate driveway spacing, mitigation requires that any added driveways (primarily right turn only) be reviewed and approved by Traffic Engineering / Public Works. This is expected to occur on a case-by-case basis in conjunction with specific proposed developments.

- The proposed Circulation Plan with incorporation of Specific Plan requirements (see Policies 5.1.1 through 5.1.8) and proposed Mitigation Measures 2-4 are anticipated to provide adequate access and on-site circulation to serve the proposed project. No significant Access or Internal Circulation impacts are anticipated after mitigation.

Increased activity on-site and in the vicinity of the Project could expose pedestrians and bicycles to traffic hazards. Access to the project area will be provided as depicted in Exhibit 6. In an effort to reduce pedestrian traffic hazards at main access point locations, WPA has recommended the above discussed mitigation be required. Mitigation Measure 3 also requires future truck access points (associated with specific industrial/manufacturing development proposals) be reviewed against the City's truck turning radius standards to ensure that the current configurations meet City Standards. Sidewalks within the Specific Plan shall also be constructed to City Standards and Americans with Disabilities Act (ADA) requirements and Mitigation Measure 4 will ensure this occurs.

Parking

Implementation of the proposed project will create an additional demand for parking. Exhibit III in Appendix C of the EIR is a site plan of the entire 307-acre McDonnell Centre, and shows:

- The existing parking lots listed in Exhibit II contained in Appendix C of the EIR.

- Potential future surface parking lots, if additional surface parking is ever required. These lots, shown as areas 1, 2, 3, 4, and 5, provide a total potential area for 1,990 stalls also as summarized on Exhibit II.

- Potential future parking structures that could be constructed in parking lots C, E, F, K, and U. The total number of potential stalls provided by these structures is dependent on the number of levels for each structure, however, as an example, a five level structure in parking lot C could provide an additional 2,500 stalls, and a five level structure in parking lots E and F could provide an additional 2, 900 stalls.

With either surface methods or with parking structures, there should be adequate potential for providing additional future parking to meet Specific Plan code requirements should the demand ever become a reality. Because the above analysis under "Existing Conditions" only covers the MDA uses, there is the potential for parking impacts if the parking demands of future Specific Plan uses exceed the parking supply. Implementation of Mitigation Measure 2 will ensure that parking impacts will be mitigated to a less than significant level. Additionally, the Specific Plan requires future development proposals provide a parking supply (i.e. required code parking) consistent with the Huntington Beach Zoning and Subdivision Ordinance (ZSO) Chapter 231 (Refer to Section 6.0 of the Specific Plan).

Project Traffic

The proposed project will generate an increase in existing daily vehicle trips. Due to increases in vehicles, roadway capacity will be impacted. This impact is discussed in greater detail below. A three step process was utilized to estimate project-related traffic impacts and evaluate their significance at various points on the street network. First, the traffic which will be generated by the proposed development was determined. Secondly, the traffic volumes were geographically distributed to major attractions of trips, such as employment centers, commercial centers, recreational areas or residential areas. Finally, the trips were assigned to specific roadways and the project-related traffic volumes are analyzed using ICU/LOS techniques.

Traffic Generation

Due to the size of the project and recommendation from City of Huntington Beach staff, the Santa Ana River Area (SARA) model was utilized. The City of Huntington Beach has trip generation rates that are specifically designed to coincide with the model. These rates were provided by the City and utilized in this study. In addition, trip generation rates for uses not found in the SARA Trip Generation Rates were referenced from Trip Generation[4] and provided to staff for their review.

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[4] Trip Generation, Fifth Edition; Institute of Transportation Engineers (ITE); January, 1991.

Table J lists the proposed project by planning area, land use assumption, and the daily trip generation rates utilized within the model. The appropriate rates were applied to the proposed land uses resulting in the project trip generation of 56,445 daily trip ends. The total site traffic, which also includes existing and entitled land uses, is addressed later in this section, as Table J focuses on the current project.

Trip Generation - Interim Analyses

The short term analyses are important to determine if any "immediate" improvements are needed in order to accommodate the proposed project. The need for mitigations could be the result of background traffic growth and/or the proposed project traffic. The potential impacts of the proposed interim project are evaluated below which would allow a portion of the project to be developed based upon some interim level of mitigation measures.

Within the interim analyses only 60 percent of each land use in each planning area of the proposed project is assumed to be built. Table K lists the interim project daily trip generation at 60 percent development for each planning area. If specific land use information is desired, Table J can be referenced.

As discussed earlier in the project description section of this EIR, currently there are existing and entitled uses on the proposed site, which would need to be considered to show the entire development potential for the site. The existing and entitled information was also taken into account within the model runs. Table K documents the existing and entitled trip generation assumptions for the proposed site that were incorporated in the modeling.

Trip Distribution and Assignment

As mentioned previously, the model generates the peak hour volumes for the proposed project and distributes these trips onto the street system based upon the SARA Traffic Analysis Zone (TAZ) structure, traffic loading points, existing and proposed street system. The trip distribution is also a function of the project land use assumptions which were specifically input into the model and are representative of the proposed project. In addition, the model consultant visited the project site, examined the access opportunities and revised the project site loadings to best represent proposed project conditions. Given these efforts, the traffic model was utilized to distribute and assign project traffic to the surrounding street system.

CUMULATIVE IMPACTS

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will impact existing and future roadways and intersections. To assess the significance of these impacts project traffic was combined with existing traffic and traffic from other surrounding developments and evaluated related to previous stated criteria. The significance of these cumulative impacts is discussed below.

TABLE J

PROJECT TRIP GENERATION

PLANNING AREA / LAND USE	*SIZE*	*DAILY TRIP RATE* [a]	*DAILY TRIP GENERATION*
PLANNING AREA 1:			
Manufacturing	253,312 SF	3.85 per TSF [b]	975
Warehouse	76,472 SF	5 per TSF	380
Office / Office Park	148,164 SF	15 per TSF	2,220
SUBTOTAL	**477,948 SF**	-----	**3,575**
PLANNING AREA 1A:			
Office / Office Park	261,360 SF	15 per TSF	3,920
R & D	261,360 SF	7.7 per TSF [b]	2,010
SUBTOTAL	**522,720 SF**	-----	**5,930**
PLANNING AREA 2:			
Light Industrial	298,309 SF	13 per TSF	3,880
Warehouse	149,154 SF	5 per TSF	750
Office / Office Park	149,154 SF	15 per TSF	2,240
Hotel	96,000 SF/ 120 Rooms	10 per Room	1,200
Restaurant	4,000 SF	350 per TSF	1,400
SUBTOTAL	**696,617 SF**	-----	**9,470**
PLANNING AREA 3:			
Light Industrial	470,448 SF	13 per TSF	6,120
Warehouse	235,224 SF	5 per TSF	1,180
Office / Office Park	235,224 SF	15 per TSF	3,530
SUBTOTAL	**940,896 SF**	-----	**10,830**
PLANNING AREA 4:			
Light Industrial	457,380 SF	13 per TSF	5,950
Warehouse	228,690 SF	5 per TSF	1,140
Office / Office Park	228,690 SF	15 per TSF	3,430
SUBTOTAL	**914,760 SF**	-----	**10,520**
PLANNING AREA 5:			
Light Industrial	98,450 SF	13 per TSF	1,280
Office / Office Park	134,169 SF	15 per TSF	2,010
R & D	107,399 SF	7.7 per TSF [b]	830
Hotel	120,000 SF/ 150 Rooms	10 per Room	1,500
Retail	150.000 SF	70 per TSF	10,500
SUBTOTAL	**610,018 SF**	-----	**16,120**
		TOTAL	**56,445**

Source: WPA Traffic

Notes: (a) TRIP RATE SOURCE: SARA Traffic Model
(b) ITE *Trip Generation, Fifth Edition* Rates; January, 1991.

TABLE K

INTERIM PROJECT TRIP GENERATION
DEVELOPMENT TRIP "BUDGET"

PLANNING AREA	*SIZE*	*DAILY TRIP GENERATION "BUDGET"*
PLANNING AREA 1:		
Proposed Project*	286,769 SF	2,145
Existing	2,789,053 SF	20,890
SUBTOTAL	**3,075,822 SF**	**23,035**
PLANNING AREA 1A:		
Proposed Project*	313,632 SF	3,558
Vacant	-	-
SUBTOTAL	**313,632 SF**	**3,558**
PLANNING AREA 2:		
Proposed Project*	417,970 SF	5,682
Existing	120,000 SF	600
Entitled	699,271 SF	4,350
SUBTOTAL	**1,237,241 SF**	**10,632**
PLANNING AREA 3:		
Proposed Project*	564,538 SF	6,498
Vacant	-	-
SUBTOTAL	**564,538 SF**	**6,498**
PLANNING AREA 4:		
Proposed Project*	548,856 SF	6,312
Vacant	-	-
SUBTOTAL	**548,856 SF**	**6,312**
PLANNING AREA 5:		
Proposed Project*	366,011 SF	9,672
Existing	235,831 SF	3,540
Entitled	369,151 SF	10,470
SUBTOTAL	**970,993 SF**	**23,682**
	TOTAL	**73,717**

Source: WPA Traffic and MDRC

* The proposed interim project represents 60% of the proposed project buildout. For specific land use assumptions the Buildout trip generation (Table J) can be referenced.

Surrounding Development

Cumulative analyses were completed for the years 2000 and 2015 respectively. Future traffic volumes include (a) ambient traffic volume growth and (b) volumes which will be generated by other developments. Buildout traffic forecasts for post 2015 conditions were evaluated based upon daily and peak hour intersection impacts for the City's SARA traffic model land use and circulation assumptions for the proposed project.

The Buildout baseline condition SARA model run was used to prepare both Buildout conditions ADT forecasts and turning movement forecasts for conditions with and without the project. The specific listing of cumulative projects outlined in Section 4.0 of this EIR was reviewed by WPA and the City's modeling consultant to ensure that traffic resulting from the specific cumulative projects is covered by the City's traffic model. Based on the modeling consultant's review, they concluded that the amount of traffic included in the modeling is not only expected to address the impacts of the listed cumulative projects, it should provide analysis of other unspecified traffic growth as well.

Interim 2000 Non-Project (Baseline) Traffic Volumes/Levels of Service

In order to evaluate the relative traffic impacts of the proposed Project, it is first necessary to establish the future Non-Project traffic condition, i.e., the "base" condition to which Project-related traffic impacts can be compared. The future Non-Project traffic volumes were developed by the modeling consultant utilizing the City's transportation model (SARA Model). This baseline condition illustrates traffic operations prior to consideration of the proposed project traffic and required roadway improvements under this condition are also identified. The forecasted Non-Project traffic volumes are referred to as Cumulative Background traffic volumes.

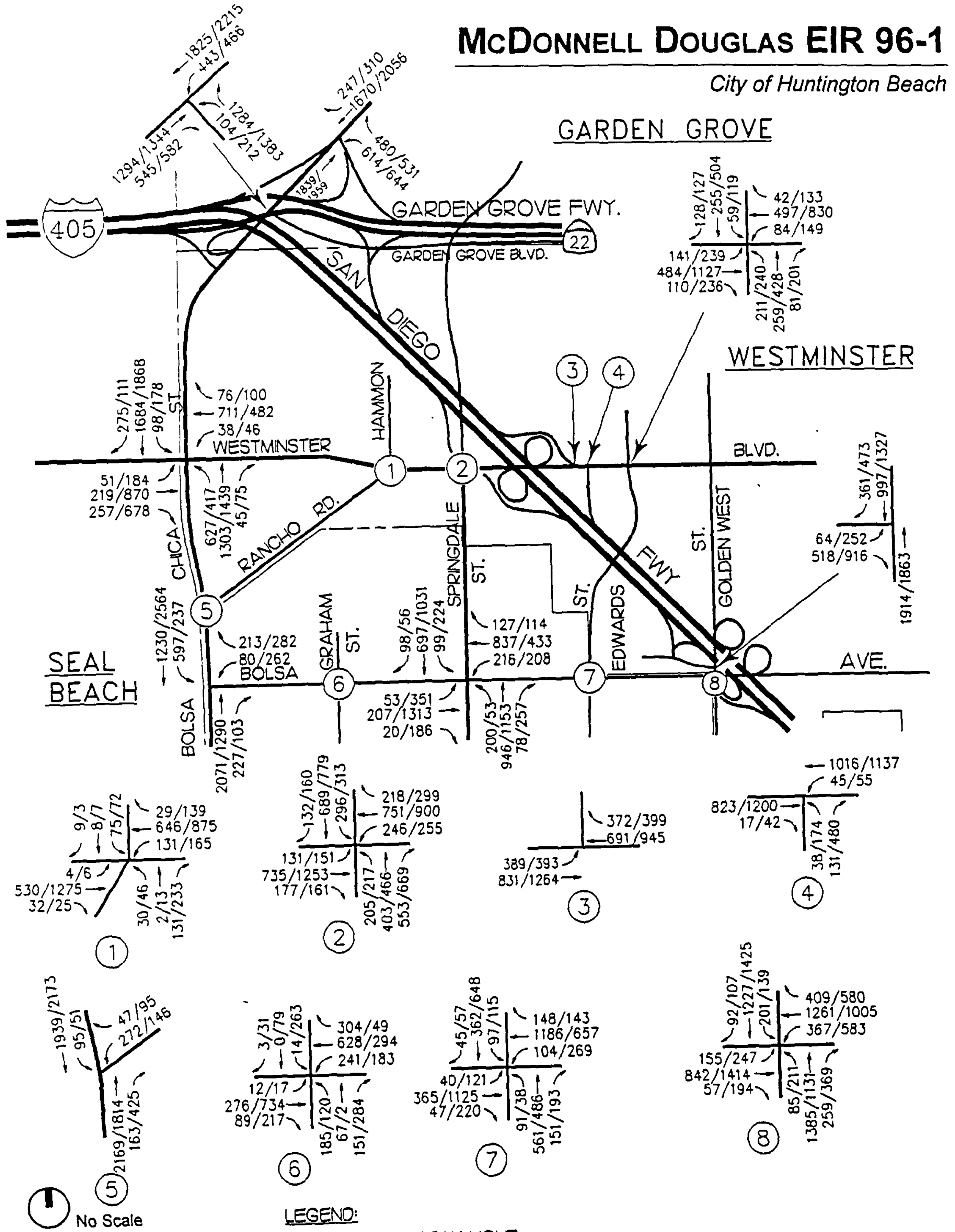
Intersection Analysis

Intersection analyses were performed at all 22 study intersections based upon the model generated traffic volume turning movement forecasts, which are presented in Exhibits 26 and 27, and assuming Level 1 improvements. Table H lists the intersection analyses results under interim conditions without the project.

Under the ICU analyses, two of the 22 study intersections were operating at an unacceptable Level of Service. Additional HCM analyses was completed for intersections with a LOS D or worse based on the City of Huntington Beach thresholds. With the additional analyses, all of the study intersections would have an acceptable (LOS D or better) operation, except for the study intersections of Westminster/Bolsa Chica, Westminster/Rancho-Hammon, Bolsa/ Springdale, and Bolsa/Golden West during the PM peak hour. This is considered an impact of cumulative background traffic excluding the project. (The ICU/HCM worksheets for all the study intersections can be referenced in Appendix B of the TIA, located in Appendix B of the EIR.)

McDONNELL DOUGLAS EIR 96-1

City of Huntington Beach

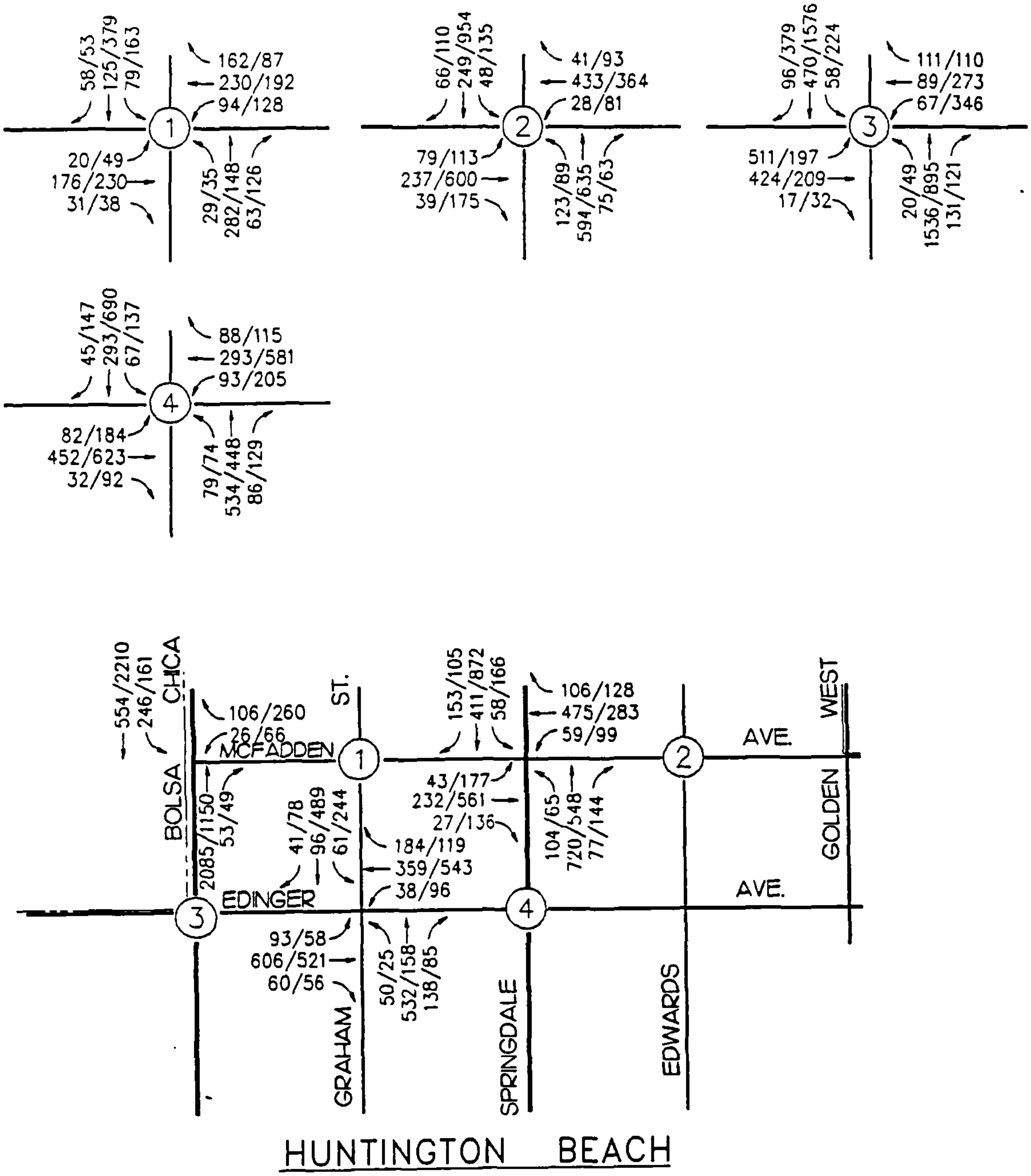


EDAW, Inc.

Source: WPA Traffic

Exhibit 26

Interim Year Without Project Peak Hour Traffic Volumes



LEGEND:

31/116 =AM/PM PEAK HOUR

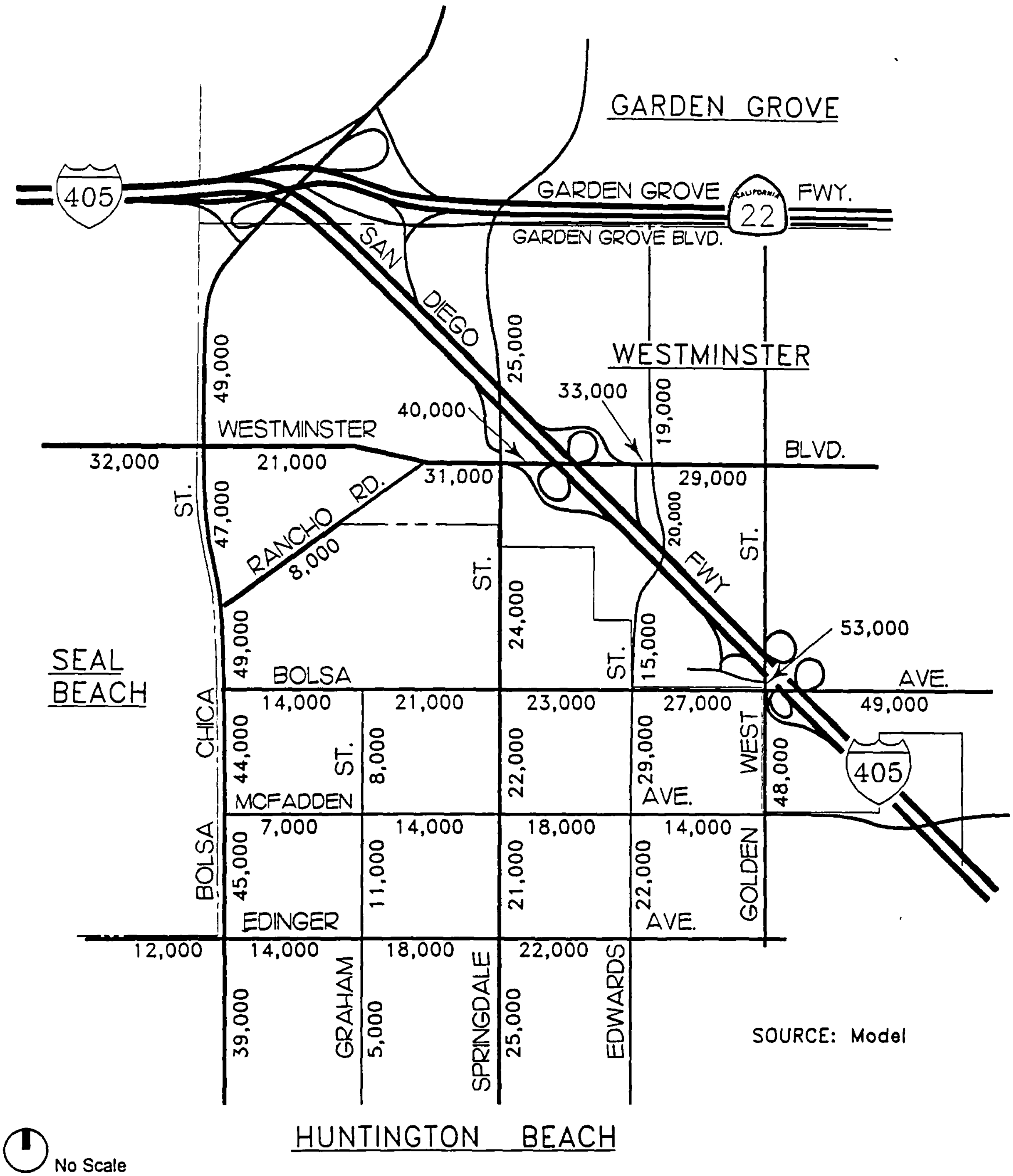
No Scale

EDAW, Inc.

Source: WPA Traffic

Exhibit 27

Interim Year Without Project Peak Hour Traffic Volumes



EDAW, Inc.

Source: WPA Traffic

Exhibit 28

Interim Year Without Project Daily Traffic Volumes

TABLE L

INTERSECTION ANALYSES SUMMARY - INTERIM CONDITIONS

INTERSECTION	*INTERSECTION CAPACITY UTILIZATION (ICU) / LEVEL OF SERVICE (LOS)*							
	INTERIM CONDITIONS WITHOUT PROJECT		*INTERIM CONDITION WITHOUT PROJECT WITH MITIGATIONS (LEVEL 2)*		*INTERIM CONDITION WITH PROJECT (60% DEVELOPMENT)*		*INTERIM CONDITION WITH PROJECT WITH MITIGATIONS (LEVEL 3)*	
	AM PK HR	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*
Garden Grove Fwy (S.R. 22) & Valley View St. (HCM Analyses)(1)	0.75/C (18.2/C)	0.88/D (24.6/C)	-	-	0.77/C (19.0/C)	0.89/D (24.8/C)	-	-
Valley View Street & Garden Grove Blvd. (HCM Analyses)(1)	0.81/D (25.6/D)	0.86/D (29.8/D)	-	-	0.81/D (26.2/D)	0.90/D (29.8/D)	-	-
Westminster Blvd. & Bolsa Chica Rd. (HCM Analyses)(1)	0.80/C (36.6/D)	0.98/E (*/F)	0.80/C (36.4/D)	0.83/D (38.1/D)	0.83/D (35.8/D)	0.86/D (39.8/D)	-	-
Westminster Blvd. & Rancho Rd.-Hammon Avenue (HCM Analyses)(1)	0.40/A (24.8/C)	0.70/B (*/F)	- (24.5/C)	- (30.9/D)	0.49/A (30.4/D)	0.85/D (*/F)	- (30.6/D)	- (32.8/D)
Westminster Blvd. & Springdale St. (HCM Analyses)(1)	0.62/B (28.8/D)	0.81/D (33.7/D)	-	-	0.62/B (29.3/D)	0.82/D (35.0/D)	-	-
Westminster Blvd. & I-405 NB On-ramp	0.48/A	0.56/A	-	-	0.51/A	0.56/A	-	-
Westminster Blvd. & I-405 NB Off-ramp	0.43/A	0.71/C	-	-	0.44/A	0.74/C	-	-
Westminster Blvd. & Edwards St.	0.44/A	0.80/C	-	-	0.46/A	0.80/C	-	-
Bolsa Chica Street & Rancho Rd.	0.67/B	0.57/A	-	-	0.73/C	0.64/B	-	-
Bolsa Chica Street & Bolsa Avenue	0.74/C	0.63/B	-	-	0.76/C	0.65/B	-	-

TABLE L (CONTINUED)

INTERSECTION ANALYSES SUMMARY - INTERIM CONDITIONS

INTERSECTION	INTERSECTION CAPACITY UTILIZATION (ICU) / LEVEL OF SERVICE (LOS)							
	INTERIM CONDITIONS WITHOUT PROJECT		INTERIM CONDITION WITHOUT PROJECT WITH MITIGATIONS (LEVEL 2)		INTERIM CONDITION WITH PROJECT (60% DEVELOPMENT)		INTERIM CONDITION WITH PROJECT WITH MITIGATIONS (LEVEL 3)	
	AM PK HR	PM PK HR	AM PK HR	PM PK HR	AM PK HR	PM PK HR	AM PK HR	PM PK HR
Bolsa Chica Street & McFadden Avenue	0.67/B	0.63/B	-	-	0.70/B	0.64/B	-	-
Bolsa Chica Street & Edinger Avenue	0.64/B	0.75/C	-	-	0.65/B	0.77/C	-	-
Bolsa Avenue & Graham St.	0.34/A	0.50/A	-	-	0.39/A	0.60/A	-	-
Bolsa Avenue & Springdale St. (HCM Analyses)[1]	0.67/B (26.4/D)	0.93/E (43.7/E)	0.60/A (26.3/D)	0.82/D (34.8/D)	0.67/B (29.1/D)	0.89/D (*/F)	- (29.1/D)	- (35.6/D)
Bolsa Avenue & Edwards St.	0.57/A	0.74/C	-	-	0.61/B	0.77/C	-	-
Bolsa Avenue & Golden West St. (HCM Analyses)[1]	0.74/C (30.9/D)	0.86/D (*/F)	- (30.5/D)	- (38.4/D)	0.76/C (31.0/D)	0.88/D (42.7/E)†	-	-
Golden West Street & I-405 SB Off-ramp	0.58/A	0.71/C	-	-	0.58/A	0.71/C	-	-
McFadden Avenue & Graham St.	0.38/A	0.47/A	-	-	0.39/A	0.47/A	-	-
McFadden Avenue & Springdale St.	0.49/A	0.62/B	-	-	0.53/A	0.67/B	-	-
McFadden Avenue & Edwards St.	0.47/A	0.69/B	-	-	0.47/A	0.73/C	-	-
Edinger Avenue & Graham St.	0.51/A	0.49/A	-	-	0.50/A	0.50/A	-	-
Edinger Avenue & Springdale St.	0.41/A	0.58/A	-	-	0.44/A	0.60/A	-	-

Source: WPA Traffic

(1) 94HCM Analyses based upon delay. (Delay/LOS)

† Based upon the City of Huntington Beach TIA guidelines, the mitigation measures utilized for Bolsa/Golden West have not only mitigated any project impacts but also mitigated impacts made by other area project and a portion of the existing problems as well.

Table M identifies the proposed improvements required for Interim Conditions without the interim project. These are the intersection improvements that would be required prior to consideration of the McDonnell Centre project and are described as "Level 2" improvements. As shown in Table M, there are four intersections that need improvements and they are listed below.

1. **Westminster/Bolsa Chica Road** - Construct an eastbound FREE right turn lane. Add a third eastbound through lane.
2. **Westminster/Rancho-Hammon** - Add a northbound right turn lane.
3. **Bolsa Avenue/Springdale Street** - Add a second southbound left turn lane.
4. **Bolsa/Golden West** - Add a southbound right turn lane.

With these improvements, the study intersections would operate at acceptable Levels of Service during both the AM and PM peak hours. Under this Level 2 condition, the proposed project traffic is not resulting in the specific need for the identified improvements at four identified intersections, and therefore, project-specific mitigation is not necessary. Although project-specific mitigation is not required under this condition, Mitigation Measure 5 in the following section will assist the City of Huntington Beach in implementing the identified Level 2 intersection improvements. Additionally, the applicant (MDRC) has agreed to perform Mitigation Measure 6 provided in the following section, which ensures implementation of the Level 2 improvements at the intersection of Westminster and Rancho within the City of Westminster. Since the City of Westminster's recently adopted General Plan and Citywide Fee do not address the intersection of Westminster and Rancho, the mitigation for this intersection has been proposed. The Level 2 improvements at the intersection of Westminster and Bolsa Chica are part of the City of Westminster's General Plan and Citywide Fee Program.

Road Segment Analysis

The average daily traffic (ADT) volumes for the surrounding street system under interim conditions were also obtained through the model data. The interim Year 2000 ADT volumes, without the project, utilized in this analysis are shown on Exhibit 28.

Road segment analyses were performed utilizing these ADT volumes. Table N shows a comparison of the interim daily traffic volumes, without the project, to the estimated roadway capacity. As shown in Table N, the following road segment links are operating at an unacceptable level.

1. Bolsa Chica Street: Rancho Rd. to Bolsa Avenue - (LOS D)
2. Golden West Street: Bolsa Avenue to McFadden - (LOS D)
3. Westminster Blvd.: Springdale Street to I-405 - (LOS E)

Table N, presented earlier, identifies the proposed improvements required for Interim Conditions without the interim project. These are the road segment improvements that would be required prior to consideration of the McDonnell Centre project. The improvements for the three road segments which are operating at unacceptable Levels of Service are as follows:

TABLE M

PROPOSED INTERSECTION IMPROVEMENTS

INTERSECTION	PROPOSED IMPROVEMENTS				
	LEVEL 1 (Existing)	LEVEL 2 - YEAR 2000 (Interim Without Project)	LEVEL 3 - YEAR 2000 (Interim With Project)	LEVEL 4 - YEAR 2015 (Buildout Without Project)	LEVEL 5 - YEAR 2015 (Buildout With Project)
Valley View & S.R. 22 Freeway[a] (Garden Grove)				☐ Convert SB Freeway Only Lane to through/right option	
Valley View & Garden Grove[b] (Westminster)				☐ Add a third NB through lane ☐ Add a third SB through lane	
Westminster & Bolsa Chica[c] (Westminster)		☐ Construct an EB FREE right turn lane ☐ Add a third EB through lane		☐ Add a third WB through lane	
Westminster & Rancho (Westminster)	☐Add a WB left turn lane[d]	☐ Add a NB right turn lane	☐ Add a NB right turn overlap phase and restrict SB U-turns		☐ Add a third EB through lane ☐ Add a third WB through lane
Westminster & Springdale[e] (Westminster)				☐ Add a EB right turn lane	
Westminster & I-405 NB On-ramp[f] (Westminster)	☐Signalize Intersection with separate EB left turn phase				
Westminster & I-405 NB Off-ramp[g] (Westminster)				☐ Convert NB left turn lane to a left/right combination lane	
Westminster & Edwards[h] (Westminster)				☐ Add a second EB left turn lane ☐ Add an EB right turn lane ☐ Add a third EB through lane	
Bolsa Chica & Edinger[i] (Huntington Beach)				☐ Add a NB right turn lane ☐ Add a SB right turn lane ☐ Restripe WB through to a left/through combo lane	
Bolsa & Springdale[j] (Huntington Beach)	☐Add a NB right turn lane ☐Add a third NB through lane	☐Add a second SB left turn lane	☐ Add an EB right turn lane		☐ Add a third SB through lane and take out SB right turn lane

TABLE M (CONTINUED)

PROPOSED INTERSECTION IMPROVEMENTS

INTERSECTION	*PROPOSED IMPROVEMENTS*				
	LEVEL 1 (Existing)	*LEVEL 2 - YEAR 2000 (Interim Without Project)*	*LEVEL 3 - YEAR 2000 (Interim With Project)*	*LEVEL 4 - YEAR 2015 (Buildout Without Project)*	*LEVEL 5 - YEAR 2015 (Buildout With Project)*
Bolsa & Edwards[k] (Huntington Beach & Westminster)				☐ Add an EB right turn lane	
Bolsa & Golden West[l] (Huntington Beach & Westminster)	☐Add a NB right turn lane ☐Add a third EB through lane	☐Add a southbound right turn lane[k]			
Golden West & I-405 SB Off-ramp[m] (Westminster)	☐ Restripe West Leg to: - one EB left turn lane - dual EB right turn lanes				
McFadden & Graham[n] (Huntington Beach)	☐Signalize Intersection				
Edwards & McFadden[o] (Huntington Beach)				☐ Add a SB right tun lane	

Source: WPA Traffic

(a) These Level 4 Buildout improvements are consistent with the Westminster General Plan improvements identified for the intersection immediately south (Bolsa Chica/Garden Grove Boulevard).
(b) These Buildout mitigations are identified in the Westminster General Plan and Citywide Fee study.
(c) The Level 2 mitigation is a part of the Westminster General Plan (G.P.) and Citywide Fee Program. The Level 4 improvements would require changes to the Westminster long range plans for this location. The City of Westminster has indicated a preference for added EB and WB left turn lanes. These improvements will be considered as the intersection is improved.
(d) Although not required through modeling efforts, the added westbound left turn lane was identified by the City of Westminster as an existing need which would require median and signal modification. The added westbound left also requires widening/improvement to the west side of Rancho Road. The northbound right turn overlap phase requires striping and signal modification.
(e) The added eastbound right turn lane requires widening and acquisition of right-of-way on the west leg, south side of Westminster.
(f) This intersection is addressed in the Westminster Citywide Fee. If a traffic signal is implemented at this location it should be coordinated with the adjacent signals on Westminster Blvd.
(g) This intersection is addressed in the Westminster Citywide Fee. The improvements are expected to involve restriping for Buildout conditions.
(h) This intersection was not addressed in the Westminster General Plan. These Buildout improvements may involve some intersection widening.
(i) The added right turn improvements are expected to require some intersection widening to implement.
(j) The Level 1 and Level 2 improvements were identified in the Sharp Electronics traffic study. The Level 3 and Level 5 mitigations were not previously identified. The Huntington Beach General Plan indicates Springdale Street to be upgraded to a six-lane facility.
(k) This improvement is expected to require some intersection widening to implement.
(l) The Level 1 improvements were identified in the Mitigated Negative Declaration for the Westminster Mall Expansion and proposed payment of a "fair share" was identified.
(m) Should be a relatively minor improvement which involves restriping of an existing lane.
(n) This intersection meets traffic signal warrants for existing conditions. Signalization is shown to improve the PM peak hour from over capacity to acceptable operations.
(o) This improvement is expected to require some intersection widening to implement.

Note: The improvements included in this table are based on the results of the HCM analysis.

TABLE N

COMPARISON OF AVERAGE DAILY TRAFFIC VOLUMES TO ESTIMATED ROADWAY CAPACITY

ROADWAY SEGMENT	EXISTING				INTERIM WITHOUT PROJECT				INTERIM WITH PROJECT				BUILDOUT WITHOUT PROJECT				BUILDOUT WITH PROJECT			
	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS
BOLSA CHICA STREET:																				
Garden Grove to Westminster*	6D / 61,930	40,000	0.65	B	6D / 61,930	49,000	0.79	C	6D / 61,930	51,400	0.83	D	6D / 61,930	50,000	0.81	D	6D / 61,930	55,000	0.89	D
Westminster to Rancho*	6D / 61,930	41,000	0.66	B	6D / 61,930	47,000	0.76	C	6D / 61,930	51,200	0.83	D	**6D / 61,930**	**57,000**	**0.92**	**E**	8D / 82,500	64,000	0.78	C
(Proposed Improvement)													(8D/82,500)	-	(0.69)	(B)				
Rancho to Bolsa	6D / 56,300	42,000	0.75	C	**6D / 56,300**	**49,000**	**0.87**	**D**	8D / 75,100	54,400	0.72	C	**8D / 75,100**	**61,000**	**0.81**	D**	**8D / 75,100**	**70,000**	**0.97**	E**
(Proposed Improvement)					(8D/75,100)	-	(0.65)	(B)												
Bolsa to McFadden	6D / 56,300	39,000	0.69	B	6D / 56,300	44,000	0.78	C	6D / 56,300	45,200	0.80	C	**6D / 56,300**	**52,000**	**0.92**	**E**	8D / 75,100	54,000	0.76	C
(Proposed Improvement)													(8D/75,100)	-	(0.69)	(B)				
McFadden to Edinger	6D / 56,300	41,000	0.73	C	6D / 56,300	45,000	0.80	C	**6D / 56,300**	**46,200**	**0.82**	**D**	8D / 75,100	51,000	0.68	B	8D / 75,100	53,000	0.74	C
(Proposed Improvement)									(8D/75,100)	-	(0.62)	(B)								
Edinger to Heil	6D / 56,300	35,000	0.62	B	6D / 56,300	39,000	0.69	B	6D / 56,300	39,600	0.70	B	6D / 56,300	45,000	0.80	C	**6D / 56,300**	**46,000**	**0.82**	**D**
(Proposed Improvement)																	(8D/71,500)	-	(0.64)	(B)
GRAHAM STREET:																				
Bolsa to McFadden	4U / 25,500	8,000	0.31	A	4U / 25,500	8,000	0.31	A	4U / 25,500	9,200	0.36	A	4U / 25,500	9,000	0.35	A	4U / 25,500	11,000	0.43	A
McFadden to Edinger	4U / 25,500	10,000	0.39	A	4U / 25,500	11,000	0.43	A	4U / 25,500	11,000	0.43	A	4U / 25,500	13,000	0.51	A	4U / 25,500	13,000	0.51	A
Edinger to Heil	4U / 25,500	5,000	0.20	A	4U / 25,500	5,000	0.20	A	4U / 25,500	5,600	0.22	A	4U / 25,500	6,000	0.24	A	4U / 25,500	7,000	0.27	A
SPRINGDALE STREET:																				
I-405 Fwy. to Westminster	4D / 37,500	24,000	0.64	B	4D / 37,500	25,000	0.67	B	4D / 37,500	25,000	0.67	B	4D / 37,500	26,000	0.69	B	4D / 37,500	26,000	0.69	B
Westminster to Bolsa	4D / 37,500	23,000	0.61	B	4D / 37,500	24,000	0.64	B	4D / 37,500	25,200	0.67	B	4D / 37,500	25,000	0.67	B	4D / 37,500	27,000	0.72	C
Bolsa to McFadden	4D / 37,500	21,000	0.56	A	4D / 37,500	22,000	0.59	A	4D / 37,500	22,000	0.59	A	4D / 37,500	23,000	0.61	B	4D / 37,500	23,000	0.61	B
McFadden to Edinger	4D / 37,500	20,000	0.53	A	4D / 37,500	21,000	0.56	A	4D / 37,500	21,000	0.56	A	4D / 37,500	22,000	0.59	A	4D / 37,500	22,000	0.59	A
Edinger to Heil	4D / 37,500	24,000	0.64	B	4D / 37,500	25,000	0.67	B	4D / 37,500	25,000	0.67	B	4D / 37,500	26,000	0.69	B	4D / 37,500	26,000	0.69	B
EDWARDS STREET:																				
Westminster to I-405 Fwy.	4D / 37,500	17,000	0.45	A	4D / 37,500	20,000	0.53	A	4D / 37,500	19,400	0.52	A	4D / 37,500	24,000	0.64	B	4D / 37,500	23,000	0.61	B
I-405 Fwy. to Bolsa	4D / 37,500	13,000	0.35	A	4D / 37,500	15,000	0.40	A	4D / 37,500	14,400	0.38	A	4D / 37,500	19,000	0.51	A	4D / 37,500	18,000	0.48	A
Bolsa to McFadden	4D / 37,500	25,000	0.67	B	4D / 37,500	29,000	0.77	C	4D / 37,500	29,000	0.77	C	**4D / 37,500**	**36,000**	**0.96**	**E**	6D / 56,300	36,000	0.64	B
(Proposed Improvement)													(6D/56,300)	-	(0.64)	(B)				
McFadden to Edinger	4D / 37,500	19,000	0.51	A	4D / 37,500	22,000	0.59	A	4D / 37,500	22,000	0.59	A	4D / 37,500	27,000	0.72	C	4D / 37,500	27,000	0.72	C

TABLE N (CONTINUED)

COMPARISON OF AVERAGE DAILY TRAFFIC VOLUMES TO ESTIMATED ROADWAY CAPACITY

ROADWAY SEGMENT	EXISTING				INTERIM WITHOUT PROJECT				INTERIM WITH PROJECT				BUILDOUT WITHOUT PROJECT				BUILDOUT WITH PROJECT			
	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS
GOLDEN WEST STREET:																				
I-405 Fwy. to Bolsa*	6D / 61,930	51,000	0.82	D	6D / 61,930	53,000	0.86	D	6D / 61,930	53,000	0.86	D	6D / 61,930	56,000	0.90	D	6D / 61,930	56,000	0.90	D
Bolsa to McFadden	6D / 56,300	45,000	0.80	C	**6D / 56,300**	**48,000**	**0.85**	**D**	8D / 75,100	49,200	0.66	B	8D / 75,100	52,000	0.69	B	8D / 75,100	54,000	0.72	C
(Proposed Improvement)					(8D/75,100)	-	(0.64)	(B)												
WESTMINSTER BLVD.:																				
Bolsa Chica to Rancho*	4D / 41,250	16,000	0.39	A	4D / 41,250	21,000	0.51	A	4D / 41,250	20,400	0.49	A	4D / 41,250	30,000	0.73	C	4D / 41,250	29,000	0.70	B
Rancho to Springdale*	4D / 41,250	24,000	0.58	A	4D / 41,250	31,000	0.75	C	4D / 41,250	32,200	0.78	C	**4D / 41,250**	**42,000**	**1.02**	F	6D / 61,930	44,000	0.71	C
(Proposed Improvement)													(6D/61,930)	-	(0.68)	(B)				
Springdale to I-405 Fwy.*	4D / 41,250	28,000	0.68	B	**4D / 41,250**	**40,000**	**0.96**	E	6D / 61,930	41,800	0.67	B	6D / 61,930	46,000	0.74	C	6D / 61,930	49,000	0.79	C
(Proposed Improvement)					(6D/61,930)	-	(0.65)	(B)												
I-405 Fwy to Edwards*	4D / 41,250	29,000	0.70	B	4D / 41,250	33,000	0.80	C	4D / 41,250	34,800	0.84	D	**4D / 41,250**	**40,000**	**0.97**	E	6D / 61,930	43,000	0.69	B
(Proposed Improvement)													(6D/61,930)	-	(0.65)	(B)				
Edwards to Golden West*	4D / 41,250	27,000	0.65	B	4D / 41,250	29,000	0.70	B	4D / 41,250	30,200	0.73	C	4D / 41,250	33,000	0.80	C	4D / 41,250	34,000	0.82	D
RANCHO RD.:																				
Bolsa Chica to Westminster	2U / 12,500	6,000	0.48	A	2U / 12,500	8,000	0.64	B	**2U / 12,500**	**11,000**	**0.88**	**D**	4U / 25,500	11,000	0.43	A	4U / 25,500	16,000	0.63	B
(Proposed Improvement)									(4U/25,500)	-	(0.43)	(A)								
BOLSA AVENUE:																				
Bolsa Chica to Graham	6D / 56,300	12,000	0.21	A	6D / 56,300	14,000	0.25	A	6D / 56,300	20,000	0.36	A	6D / 56,300	18,000	0.32	A	6D / 56,300	28,000	0.50	A
Graham to Springdale	6D / 56,300	18,000	0.32	A	6D / 56,300	21,000	0.37	A	6D / 56,300	24,600	0.44	A	6D / 56,300	25,000	0.44	A	6D / 56,300	31,000	0.55	A
Springdale to Edwards	6D / 56,300	19,000	0.34	A	6D / 56,300	23,000	0.41	A		26,600	0.47	A	6D / 56,300	29,000	0.52	A	6D / 56,300	35,000	0.62	B
Edwards to Golden West	6D / 56,300	23,000	0.41	A	6D / 56,300	27,000	0.48	A	6D / 56,300	28,200	0.50	A	6D / 56,300	33,000	0.59	A	6D / 56,300	35,000	0.62	B
									6D / 56,300											
MCFADDEN AVENUE:																				
Bolsa Chica to Graham	2U / 12,500	6,000	0.48	A	2U / 12,500	7,000	0.56	A	2U / 12,500	7,000	0.56	A	2U / 12,500	9,000	0.72	C	2U / 12,500	9,000	0.72	C
Graham to Springdale	4U / 25,500	13,000	0.51	A	4U / 25,500	14,000	0.55	A	4U / 25,500	14,000	0.55	A	4U / 25,500	15,000	0.59	A	4U / 25,500	15,000	0.59	A
Springdale to Edwards	4U / 25,500	17,000	0.67	B	4U / 25,500	18,000	0.71	C	4U / 25,500	18,600	0.73	C	4U / 25,500	19,000	0.75	C	4U / 25,500	20,000	0.78	C
Edwards to Golden West	4U / 25,500	13,000	0.51	A	4U / 25,500	14,000	0.55	A	4U / 25,500	15,200	0.60	A	4U / 25,500	16,000	0.63	B	4U / 25,500	18,000	0.71	C

TABLE N (CONTINUED)

COMPARISON OF AVERAGE DAILY TRAFFIC VOLUMES TO ESTIMATED ROADWAY CAPACITY

ROADWAY SEGMENT	EXISTING				INTERIM WITHOUT PROJECT				INTERIM WITH PROJECT				BUILDOUT WITHOUT PROJECT				BUILDOUT WITH PROJECT			
	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS	LANES/ CAPACITY	ADT	V/C RATIO	LOS
EDINGER AVENUE:																				
Bolsa Chica to Graham	4D / 37,500	14,000	0.37	A	4D / 37,500	14,000	0.37	A	4D / 37,500	14,000	0.37	A	4D / 37,500	15,000	0.40	A	4D / 37,500	15,000	0.40	A
Graham to Springdale	4D / 37,500	17,000	0.45	A	4D / 37,500	18,000	0.48	A	4D / 37,500	18,000	0.48	A	4D / 37,500	19,000	0.51	A	4D / 37,500	19,000	0.51	A
Springdale to Edwards	6D / 56,300	21,000	0.37	A	6D / 56,300	22,000	0.39	A	6D / 56,300	22,000	0.39	A	6D / 56,300	23,000	0.41	A	6D / 56,300	23,000	0.41	A

Source: WPA Traffic

❑ ADT = Average Daily Trip ❑ V/C = Volume to Capacity ❑ LOS = Level of Service
◆ Acceptable LOS for Road Segments: City of Huntington Beach - LOS C City of Westminster - LOS D
◆ *Italicized Road Segments are located in the City of Westminster*
◆ Road Segments that are operating at an unacceptable LOS are **highlighted.**
* Signal Coordination in place per City of Westminster Engineering Department.
** Additional improvements are determined to be infeasible
D = Divided
U = Undivided.

1. **Bolsa Chica Street: Rancho to Bolsa** - Currently 6 lanes divided improved to 8 lanes divided. (LOS B)
2. **Golden West Street: Bolsa to McFadden** - Currently 6 lanes divided improved to 8 lanes divided. (LOS B)
3. **Westminster Blvd.: Springdale to I-405** - Currently 4 lanes divided improved to 6 lanes divided. (LOS B)

Acceptable operations on the road segments would be achieved with the improvements shown above. Under this Level 2 condition, the proposed project traffic is not resulting in the specific need for the identified improvements at the three roadway segments and, therefore, project-specific mitigation is not necessary. Although project-specific mitigation is not required under this condition, Mitigation Measure 5 in the following section will assist the City of Huntington Beach in implementing the identified Level 2 improvements at the roadway segments in the City of Huntington Beach. Additionally, the Level 2 improvements at the roadway segment of Westminster Boulevard: Springdale to I-405 are part of the City of Westminster's General Plan.

<u>**Interim 2000 (With Project) Traffic Volumes/Levels of Service**</u>

In the Year 2000, a "worst case" assumption is that a maximum of 60 percent of the proposed project would be built. Therefore, the proposed interim project represents 60 percent of the trip generation totals for the proposed project buildout which defines a "trip budget" for these interim conditions. Table K, which was presented earlier in this section, lists the daily trip ends generated by the interim project, existing uses and entitled development. In order to determine the project impacts to the interim year baseline conditions, the model runs for Buildout conditions both with and without the project were examined.

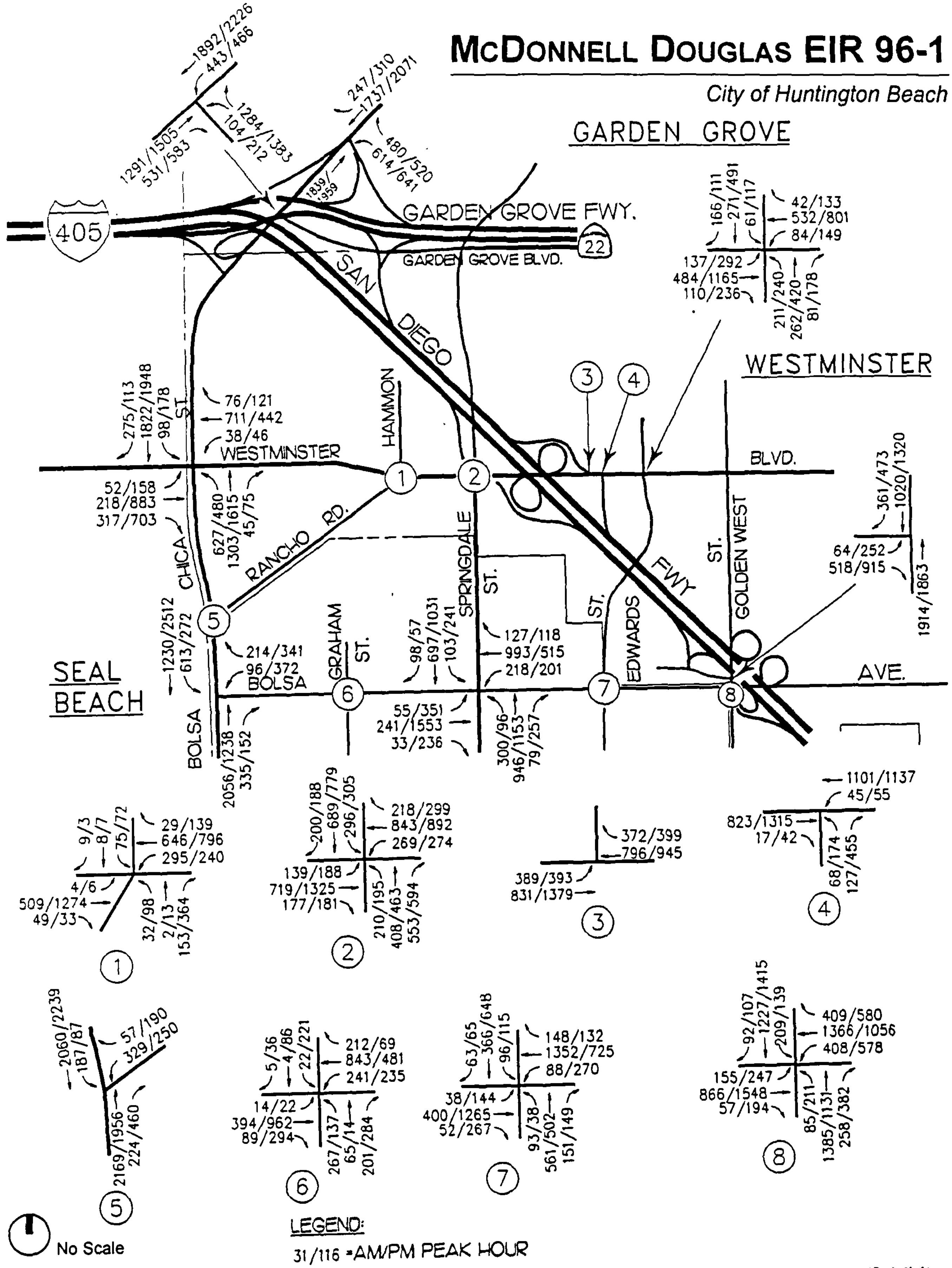
A comparison between the model run for Buildout conditions without the project and Buildout conditions with the project at each of the study intersections allows for the determination of the total project impact at each intersection assuming full project development. For purposes of this analysis it is assumed that the interim project impacts would be generally proportional to the full project impacts at each of the study intersections and road segments. The project volume impacts for interim conditions were assumed to be 60 percent of buildout and were added to the interim baseline conditions without the project. These volumes are presented on Exhibits 29 and 30. The number of project generated trip ends added to each of the study intersections are also documented on the ICU/HCM worksheets contained in Appendix B of the TIA, located in Appendix B of the EIR.

Intersection Analysis

Intersection analyses were again performed at all 22 study intersections based upon the model generated turning movements for the baseline interim condition, the trip ends generated by the project at 60 percent development and assumed Level 2 improvements. Table L lists the intersection analyses results under interim conditions with the project. Under the ICU intersection analyses methodology, all of the study intersections have acceptable (LOS D or better) operations.

McDonnell Douglas EIR 96-1

City of Huntington Beach

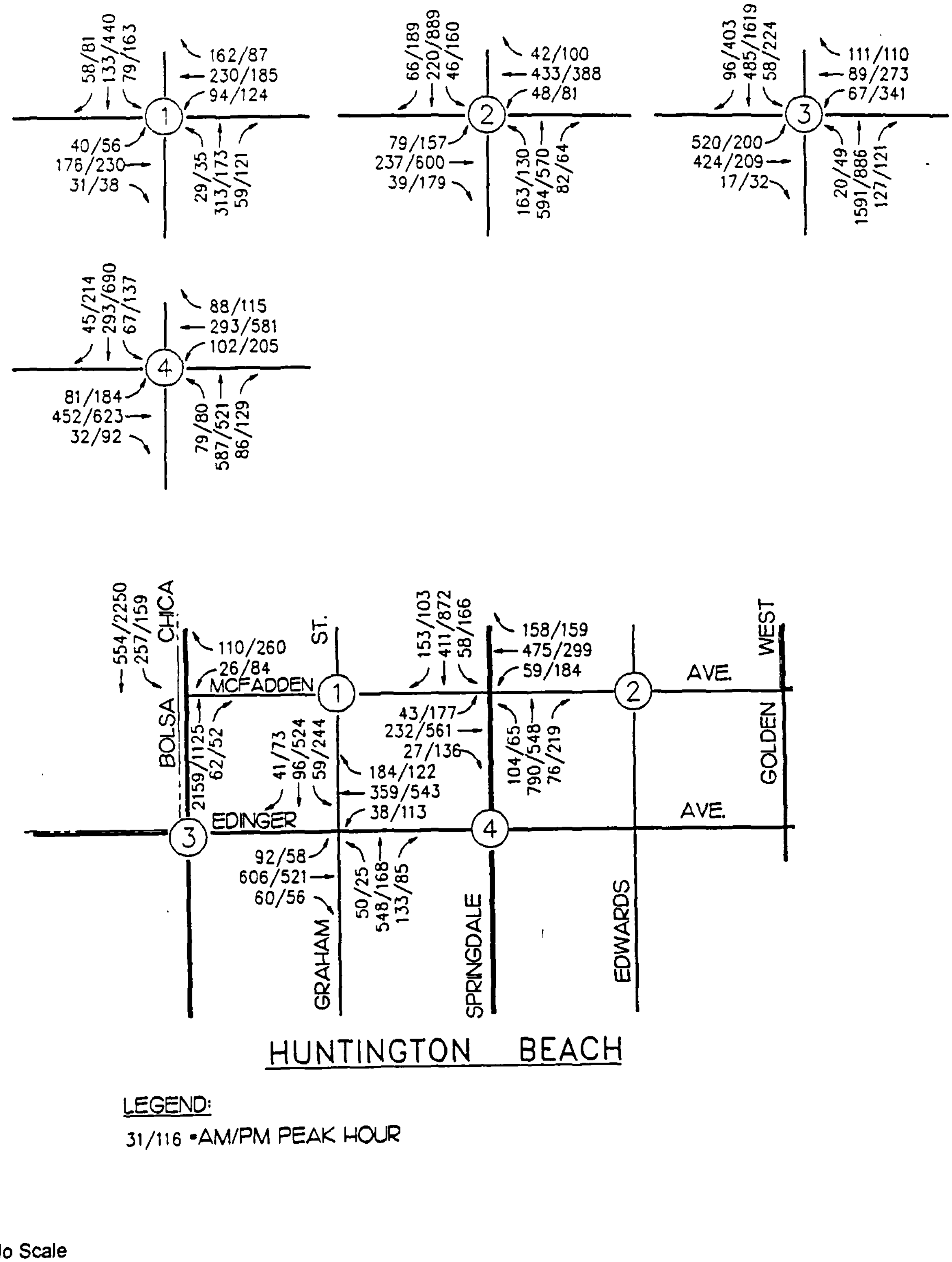


EDAW, Inc.

Source: WPA Traffic

Exhibit 29

Interim Year With Project Peak Hour Traffic Volumes



EDAW, Inc.

Source: WPA Traffic

Exhibit 30

Interim Year With Project Peak Hour Traffic Volumes

However, utilizing the City's guidelines, the HCM methodology of intersection analyses was applied to all intersections with a LOS of D or worse. Under the HCM methodology, three study intersections would operate at unacceptable Levels of Service during the PM peak hour. These intersections include Westminster/Ranch-Hammon, Bolsa/Springdale and Bolsa/Golden West. The projects contribution to the unacceptable levels of service at the three intersections is considered a project-specific impact. (The ICU/HCM worksheets for all the study intersections can be referenced in Appendix B of the TIA, located in Appendix B of the EIR.)

Table M identifies the proposed improvements required for Interim Conditions with the interim project. These are the intersection improvements that would be required with 60 percent of the McDonnell Centre project development and are described as "Level 3" improvements. As shown in Table M, two of the three study intersections which have improvements are listed below.

1. **Westminster/Rancho-Hammon** - Add a northbound right turn overlap phase and restrict southbound U-turns.
2. **Bolsa Avenue/Springdale Street** - Add an eastbound right turn lane.

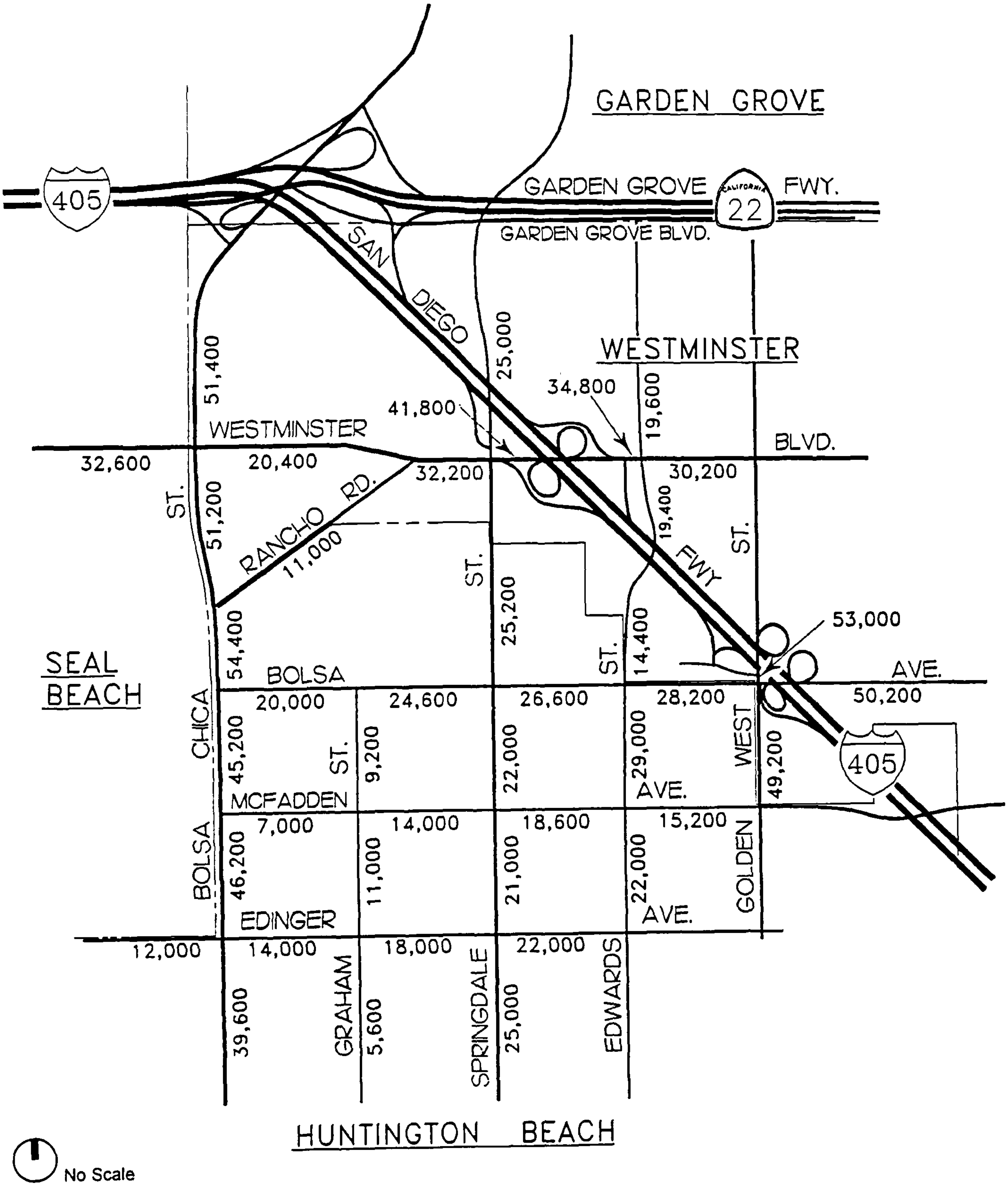
With these improvements, the two study intersections of Westminster/Rancho-Hammon and Bolsa/Springdale would operate at acceptable Levels of Service during both the AM and PM peak hours. The study intersection of Bolsa/Golden West would operate at a LOS D during the AM peak hour and a LOS E during the PM peak hour. Although LOS E is an unacceptable Level of Service, under existing conditions the study intersection of Bolsa/Golden West is currently operating at a LOS F during the PM peak hour. Based upon the City of Huntington Beach TIA guidelines, the proposed improvements for Bolsa/Golden West have not only mitigated any project impacts but also mitigated impacts made by other area projects and some of the existing problems as well.

Under this Level 3 condition, the proposed interim project traffic is contributing to the need for the identified improvements at the above three intersections. This is considered a project-specific impact. Mitigation Measure 5 in the following section has been required to reduce the project's incremental impact at the intersections of Bolsa Avenue/Springdale Street and Bolsa Avenue/Golden West to a less than significant level. Additionally, Mitigation Measure 7 has been provided in the following section to reduce the project's incremental impact at Westminister/Rancho-Hammon to a less than significant level.

Road Segment Analysis

The ADT volumes for the interim project were added to the baseline interim conditions so the road segment analysis could be updated. The interim ADT volumes, with the project, utilized in this analyses are shown on Exhibit 31. Table N shows a comparison of the interim daily traffic volumes, with the project, to the estimated roadway capacity at Level of Service E. As shown in Table N, the following road segment links are operating at an unacceptable level.

1. Bolsa Chica Street: McFadden Avenue to Edinger Avenue - (LOS D)
2. Rancho Road: Bolsa Chica to Westminster Blvd. - (LOS D)



EDAW, Inc.

Source: WPA Traffic

Exhibit 31

Interim Year With Project Daily Traffic Volumes

Table N identifies the proposed improvements required for Interim Conditions with the interim project and the results are summarized below. Acceptable operations on the road segments would be achieved with the improvements shown below.

1. **Bolsa Chica Street: McFadden to Edinger** - Currently 6 lanes divided improved to 8 lanes divided. (LOS B)
2. **Rancho Road: Bolsa Chica to Westminster** - Currently 2 lanes undivided improved to 4 lanes undivided. (LOS A)

Under this Level 3 condition, the proposed interim project traffic is contributing to the need for the identified improvements at the two roadway segments. This is considered a project-specific impact. Mitigation Measure 5 in the following section has been required to reduce the project's incremental impact at the two street segments to a less than significant level. Additionally, the above noted segment improvement to Rancho Road was addressed in the City of Westminster General Plan and Citywide Fee Program.

Post-2015 Non-Project (Cumulative Background) Traffic Volumes/Levels of Service

The Buildout baseline condition or no project condition, was developed utilizing the City's transportation model (SARA Model). These projections account for traffic growth throughout the City of Huntington Beach as well as the surrounding regional area. Some specific cumulative projects (see Section 4.0 of this EIR) were provided by City staff to assure they were addressed in the analyses. The list of projects was reviewed by WPA and the modeling consultant.

Based on the modeling consultant's review, they concluded that the amount of traffic included in the modeling is not only expected to address the impacts of the listed project, it should provide analyses of other unspecified traffic growth as well. The Buildout baseline condition SARA model run was used to prepare both Buildout conditions ADT forecasts and turning movement forecasts for conditions with and without the project.

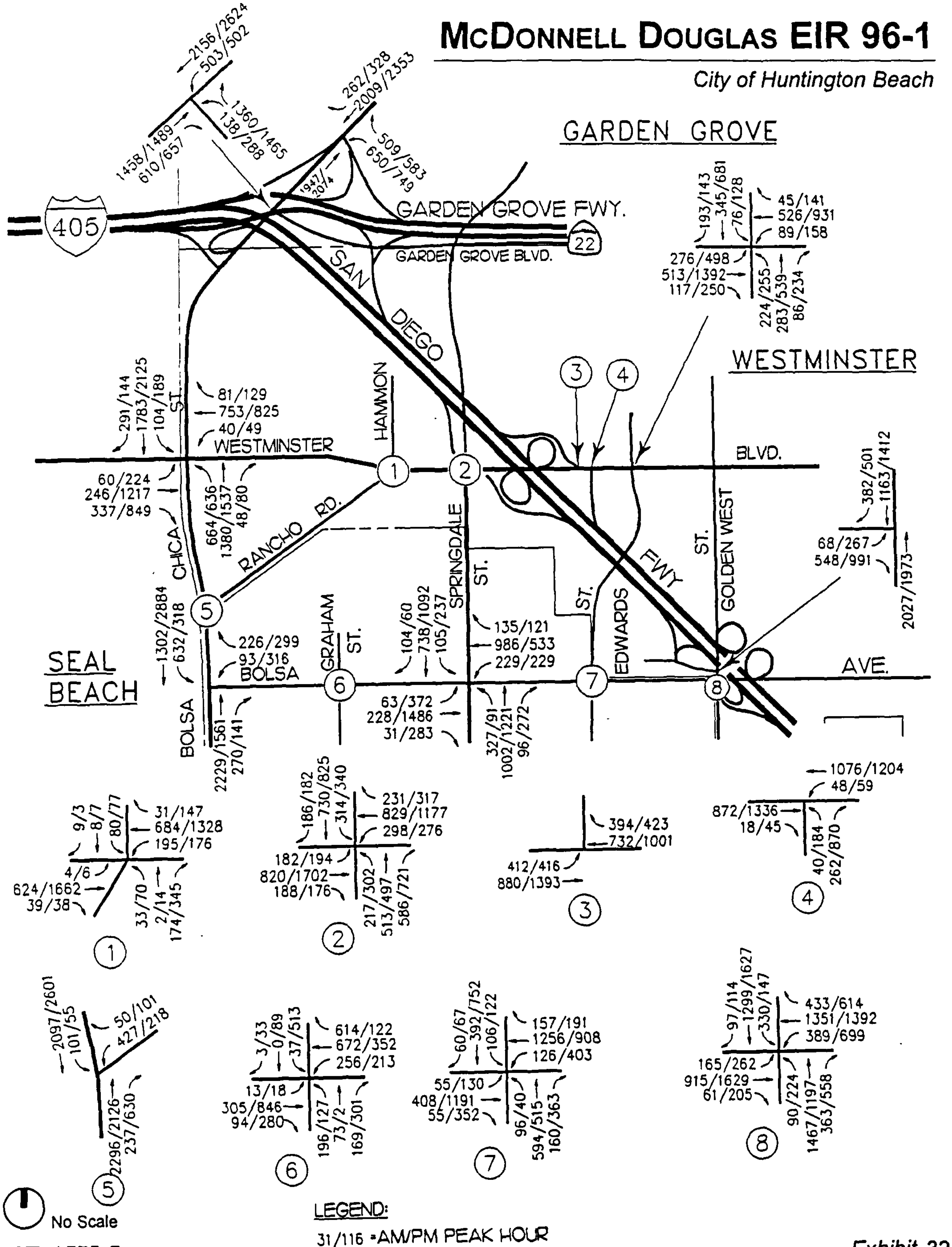
Intersection Analyses

Intersection analyses were performed at all 22 study intersections based upon the model generated traffic volume turning movement forecasts, which can be found in Exhibits 32 and 33, and Levels 1, 2 and 3 improvements. Table O lists the intersection analyses results under Buildout conditions without the project. Of the 22 study intersections, 12 intersections have acceptable (LOS D or better) operations during both the AM and PM peak hours. The ICU/HCM worksheets for all the study intersections can be referenced in Appendix B of the TIA, located in Appendix B of the EIR.

Table M identifies the proposed improvements required under Buildout (without project) baseline conditions - Level 4. As shown in Table M, there are nine study intersections where proposed improvements are listed.

McDONNELL DOUGLAS EIR 96-1

City of Huntington Beach

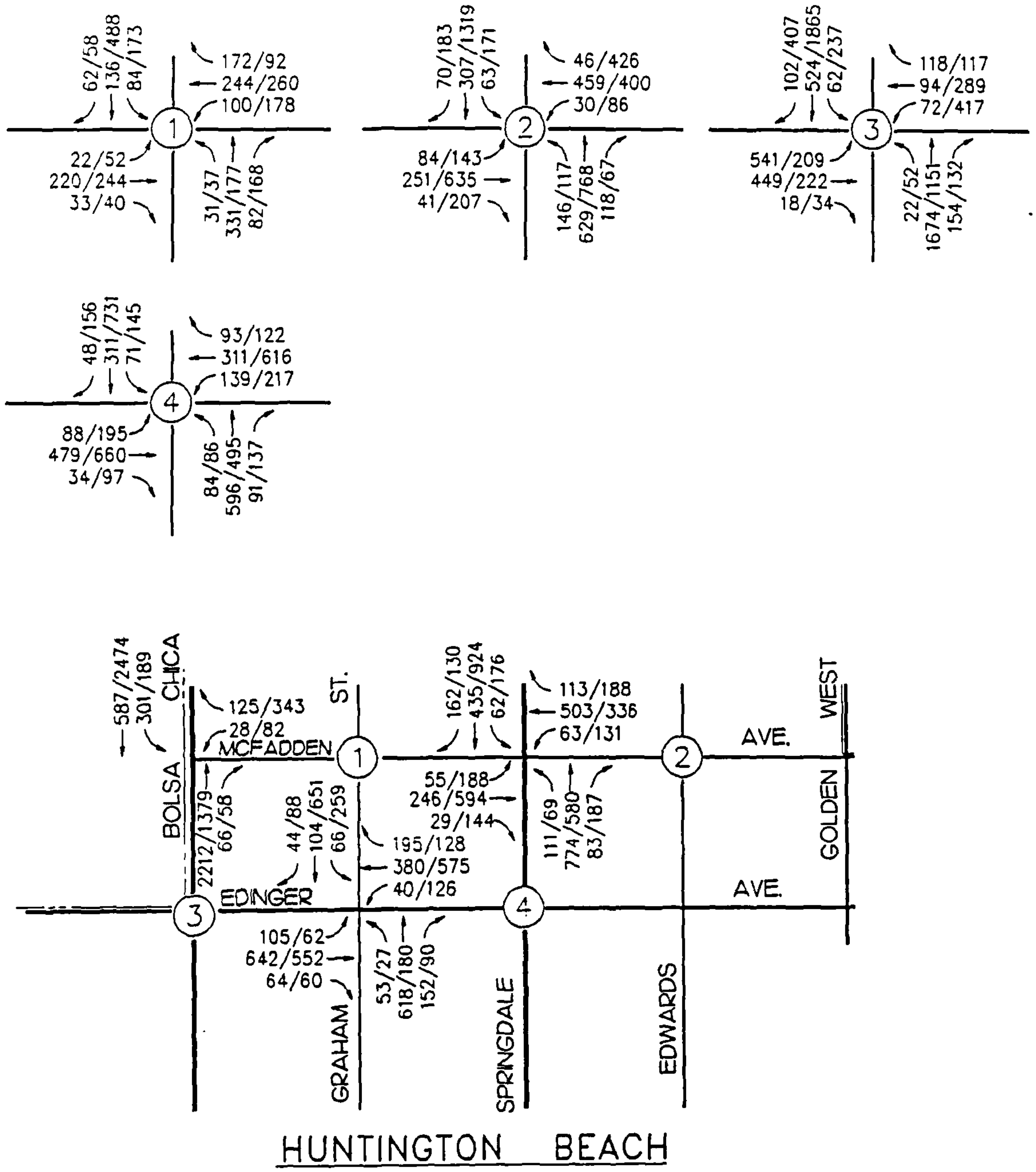


EDAW, Inc.

Exhibit 32

Source: WPA Traffic

Buildout Without Project Peak Hour Traffic Volumes



LEGEND:

31/116 =AM/PM PEAK HOUR

No Scale

EDAW, Inc.

Source: WPA Traffic

Exhibit 33

Buildout Without Project Peak Hour Traffic Volumes

TABLE O

INTERSECTION ANALYSES SUMMARY - BUILDOUT CONDITIONS

INTERSECTION	*INTERSECTION CAPACITY UTILIZATION (ICU) / LEVEL OF SERVICE (LOS)*							
	BUILDOUT CONDITIONS WITHOUT PROJECT		*BUILDOUT CONDITIONS WITHOUT PROJECT WITH MITIGATIONS (LEVEL 4)*		*BUILDOUT CONDITIONS WITH PROJECT*		*BUILDOUT CONDITIONS WITH PROJECT WITH MITIGATIONS (LEVEL 5)*	
	AM PK HR	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*
Garden Grove Fwy (S.R. 22) & Valley View St. (HCM Analyses)[1]	0.87/D (25.4/D)	1.00/E (*/F)	0.73/C (17.0/C)	0.84/D (21.4/C)	0.75/C (17.2/C)	0.84/D (21.2/C)	-	-
Valley View St. & Garden Grove Blvd. (HCM Analyses)[1]	0.88/D (*/F)	0.99/E (*/F)	0.74/C (20.8/C)	0.77/C (19.7/C)	0.73/C (20.8/C)	0.82/D (20.4/C)	-	-
Westminster Blvd. & Bolsa Chica Rd. (HCM Analyses)[1]	0.86/D (37.1/D)	1.05/F (*/F)	0.80/C (33.3/D)	0.98/E (*/F)^	0.84/D (*/F)	1.00/E (*/F)	^	^
Westminster Blvd. & Rancho Rd.-Hammon Ave. (HCM Analyses)[1]	0.48/A (25.7/D)	0.90/D (39.2/D)	-	-	0.58/B (33.7/D)	0.88/D (*/F)	- -	- ^
Westminster Blvd. & Springdale St. (HCM Analyses)[1]	0.65/B (30.2/D)	0.84/D (*/F)	- (29.7/D)	- (34.6/D)	0.71/C (31.2/D)	0.90/D (39.9/D)	-	-
Westminster Blvd. & I-405 NB On Ramp	0.51/A	0.58/A	-	-	0.56/A	0.58/A	-	-
Westminster Blvd. & I-405 NB Off Ramp (HCM Analyses)[1]	0.52/A (29.6/D)	0.98/E (*/F)	0.46/A (27.3/D)	0.78/C (35.3/D)	0.51/A (28.4/D)	0.83/D (37.7/D)	-	-
Westminster Blvd. & Edwards St. (HCM Analyses)[1]	0.55/A (29.6/D)	0.94/E (*/F)	0.48/A (27.3/D)	0.87/D (35.3/D)	0.50/A (28.4/D)	0.91/E (37.7/D)	0.50/A (-)	0.87/D (-)
Bolsa Chica St. & Rancho Rd. (HCM Analyses)[1]	0.78/C	0.69/B	-	-	0.88/D (23.8/C)	0.81D (25.1/D)	-	-
Bolsa Chica St. & Bolsa Ave. (HCM Analyses)[1]	0.80/C	0.71/C	-	-	0.83/D (30.3/D)	0.75/C (16.5/C)	-	-

TABLE O (CONTINUED)

INTERSECTION ANALYSES SUMMARY - BUILDOUT CONDITIONS

INTERSECTION	*INTERSECTION CAPACITY UTILIZATION (ICU) / LEVEL OF SERVICE (LOS)*							
	BUILDOUT CONDITIONS WITHOUT PROJECT		*BUILDOUT CONDITIONS WITHOUT PROJECT WITH MITIGATIONS (LEVEL 4)*		*BUILDOUT CONDITIONS WITH PROJECT*		*BUILDOUT CONDITIONS WITH PROJECT WITH MITIGATIONS (LEVEL 5)*	
	AM PK HR	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*
Bolsa Chica St. & McFadden Ave.	0.75/C	0.74/C	-	-	0.79/C	0.75/C	-	-
Bolsa Chica St. & Edinger Ave. (HCM Analyses)(1)	0.69/B (34.2/D)	0.87/D (*/F)	- (32.1/D)	- (39.3/D)	0.71/C (33.7/D)	0.88/D (38.8/D)	-	-
Bolsa Ave. & Graham St.	0.41/A	0.60/A	-	-	0.47/A	0.75/C	-	-
Bolsa Ave. & Springdale St. (HCM Analyses)(1)	0.70/B (30.7/D)	0.91/E (35.5/D)	0.70/B (-)	0.88/D (-)	0.83/D (31.1/D)	0.99/E (*/F)	0.78/C (38.6/D)	0.87/D (38.6/D)
Bolsa Ave. & Edwards St. (HCM Analyses)(1)	0.61/B (27.8/D)	0.92/E (*/F)	0.61/B (27.7/D)	0.85/D (39.7/D)	0.66/B (30.1/D)	0.88/D (40.0/D)	-	-
Bolsa Ave. & Golden West St. (HCM Analyses)(1)	0.84/D (*/F)	0.99/E (*/F)	0.84/D (^)	0.97/E^ (^)	0.89/D (*/F)	1.00/E^ (*/F)	- (^)	^ (^)
Golden West St. & I-405 SB Off Ramp	0.55/A	0.76/C	-	-	0.56/A	0.75/C	-	-
McFadden Ave. & Graham St.	0.43/A	0.52/A	-	-	0.44/A	0.54/A	-	-
McFadden Ave. & Springdale St.	0.53/A	0.66/B	-	-	0.59/A	0.74/C	-	-
McFadden Ave. & Edwards St. (HCM Analyses)(1)	0.51/A (26.7/D)	0.86/D (*/F)	- (26.7/D)	- (36.4/D)	0.51/A (29.0/D)	0.91/E (39.6/D)	0.51/A (-)	0.82/D (-)
Edinger Ave. & Graham St.	0.55/A	0.54/A	-	-	0.55/A	0.57/A	-	-
Edinger Ave. & Springdale St.	0.47/A	0.62/B	-	-	0.51/A	0.65/B	-	-

Source: WPA Traffic
(1) 94HCM Analyses based upon delay. (Delay/LOS)
^ There is the potential that these intersections under buildout conditions may operate at an unacceptable LOS. There may be existing / cumulative / project traffic impacts that remain.

Improvements for the nine impacted study intersections operating at unacceptable Levels of Service for buildout, without project conditions, are listed below.

1. **Valley View/S.R. 22 Freeway** - Convert the southbound "Freeway Only" lane to through/right option.
2. **Valley View/Garden Grove** - Add a third northbound through lane. Add a third southbound through lane.
3. **Westminster/Bolsa Chica Road** - Add a third westbound through lane.
4. **Westminster/Springdale Street** - Add a third eastbound through lane.
5. **Westminster/I-405 NB Off-ramp** - Convert northbound left turn lane to a left/right combination lane.
6. **Westminster/Edwards Street** - Add a second eastbound left turn lane. Add an eastbound right turn lane. Add a third eastbound through lane.
7. **Bolsa Avenue/Edinger** - Add a northbound right turn lane. Add a southbound right turn lane. Restripe westbound through to a left/through combination lane.
8. **Bolsa Avenue/Edwards Street** - Add an eastbound right turn lane.
9. **Edwards Street/McFadden Avenue** - Add a southbound right turn lane.

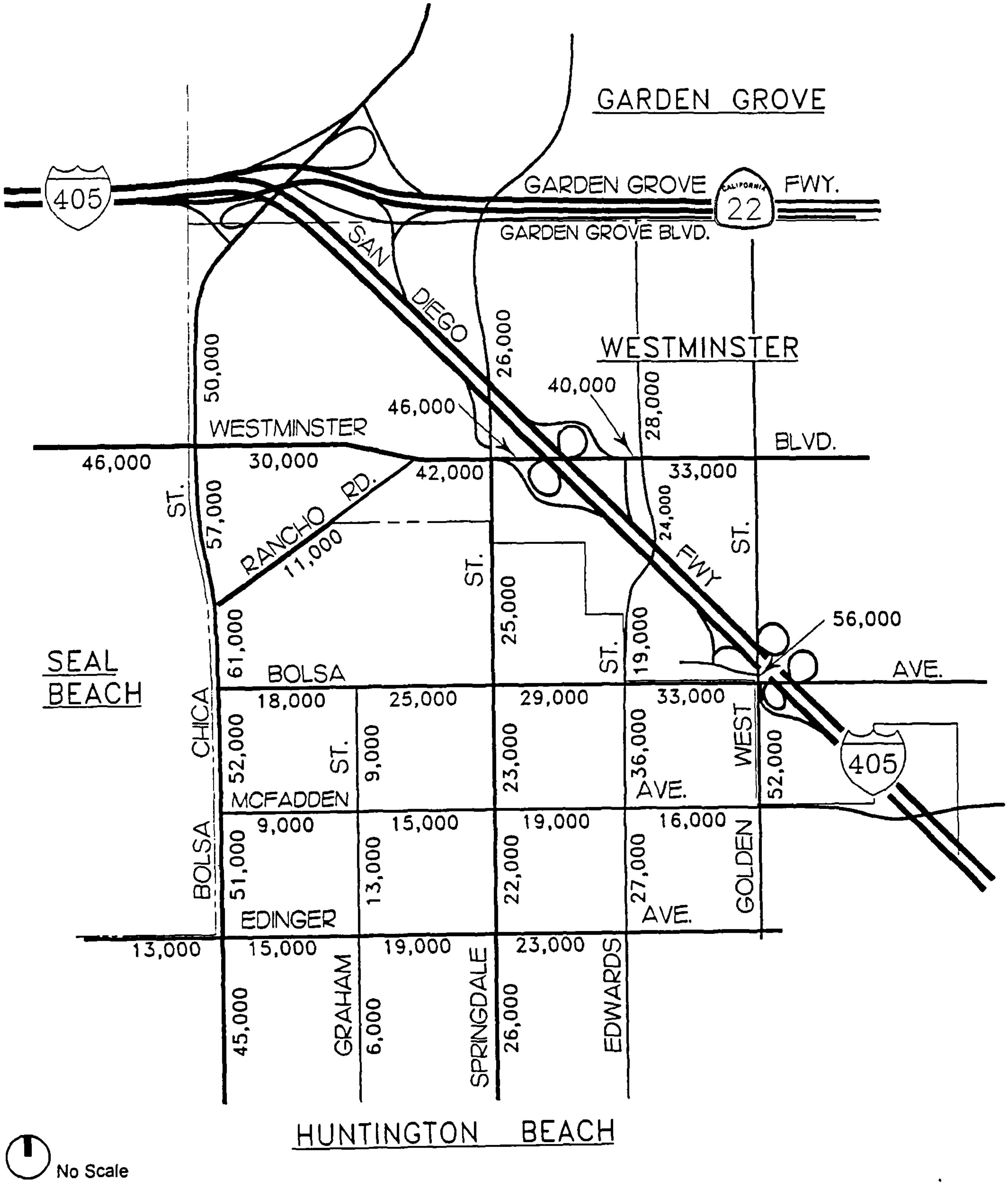
With these improvements, the nine study intersections above would operate at acceptable Levels of Service during both the AM and PM peak hours, except for the intersection of Westminster/Bolsa Chica where no added improvements were found to be feasible. The intersection of Bolsa/Golden West cannot be fully improved to operate below LOS E in the PM peak hour. It is improved from the existing operating conditions. Under this Level 4 condition, the proposed project traffic is not resulting in the specific need for the identified improvements at the identified intersections, and therefore, project-specific mitigation is not necessary. The results of this Year 2015 long-term buildout analysis are subject to change based upon the actual buildout of the Specific Plan project and other projects assumed in the SARA traffic model.

Although project specific mitigation is not required under this condition, Mitigation Measures 8 and 9 are proposed in the following section to assist the City of Huntington Beach in implementing the Level 4 improvements at the intersections in the City of Huntington Beach.

Road Segment Analysis

The daily traffic volumes for the Buildout conditions were referenced from the SARA model data and are shown on Exhibit 34. Table N shows a comparison of the Buildout baseline daily traffic volumes, to the estimated roadway capacity at Level of Service E. The General Plan's for the cities of Huntington Beach and Westminster were referenced to obtain any improvements to the road system to be completed for the Buildout conditions. As shown in Table N, the following road segment links are operating at an unacceptable level.

1. Bolsa Chica Street: Westminster Blvd. to Rancho Rd. - (LOS E)
2. Bolsa Chica Street: Rancho Rd. to Bolsa Avenue - (LOS D)
3. Bolsa Chica Street: Bolsa Avenue to McFadden Avenue - (LOS E)
4. Edwards Street: Bolsa Avenue to McFadden Avenue - (LOS E)



EDAW, Inc.

Source: WPA Traffic

Exhibit 34

Buildout Without Project
Daily Traffic Volumes

5. Westminster Blvd.: Rancho Rd. to Springdale Street - (LOS F)
6. Westminster Blvd.: I-405 to Edwards Street - (LOS E)

Table N identifies the proposed improvements required for Buildout conditions without the project. The following proposed improvements achieved acceptable Levels of Service for all road segments, except for Bolsa Chica Street between Rancho Road and Bolsa Avenue where an unacceptable LOS D is maintained. Additional proposed improvements beyond 8 lanes on this segment of Bolsa Chica Street would not be considered feasible and there would be remaining impacts along this segment. Under this Level 4 condition, the proposed project traffic is not resulting in the specific need for the identified improvements at the identified road segments, and therefore, project-specific mitigation is not necessary.

1. **Bolsa Chica Street: Westminster to Rancho** - Currently 6 lanes divided improved to 8 lanes divided. (LOS B)
2. **Bolsa Chica Street: Bolsa to McFadden** - Currently 6 lanes divided improved to 8 lanes divided. (LOS B)
3. **Edwards Street: Bolsa to McFadden** - Currently 4 lanes divided improved to 6 lanes divided. (LOS B)
4. **Westminster Blvd.: Rancho to Springdale** - Currently 4 lanes divided improved to 6 lanes divided. (LOS B)
5. **Westminster Blvd.: I-405 Fwy. to Edwards** - Currently 4 lanes divided improved to 6 lanes divided. (LOS B)

Although project specific mitigation is not required under this condition, Mitigation Measures 8 and 9 are proposed in the following section to assist the City of Huntington Beach in implementing the Level 4 improvements to roadway segments in the City of Huntington Beach.

<u>Post-2015 Total (With Project) Traffic Volumes/Levels of Service</u>

Buildout conditions were also completed for the proposed project conditions based on traffic model data. The project traffic volumes were added to the baseline volumes, within the model, and the intersection volumes and daily volumes were provided to us. As mentioned earlier in this section, the project buildout assumptions can be found in Table J. The buildout trip generation for the site which includes existing site plus projects which are already entitled and the proposed project is shown on Table P. Intersection and road segment analyses were completed so the proposed project's long term impacts could be evaluated.

Intersection Analyses

Intersection analyses were performed at all 22 study intersections based upon the model generated traffic volume turning movement forecasts, which can be found in Exhibits 35 and 36, and Level 4 improvements. Table O, which was presented earlier, lists the intersection analyses results under Buildout plus project conditions. All of the study intersections operate at an acceptable (LOS D or better) Level of Service during both the AM and PM peak hours, except for the four study intersections of Westminster/Bolsa Chica, Westminster/Rancho Hammon, Bolsa/Springdale, and Bolsa/Golden West. The ICU/HCM worksheets for all the study intersections can be referenced in Appendix B of the TIA, located in Appendix B of the EIR.

TABLE P

BUILDOUT TRIP GENERATION
(Existing Plus Entitled Plus Project)

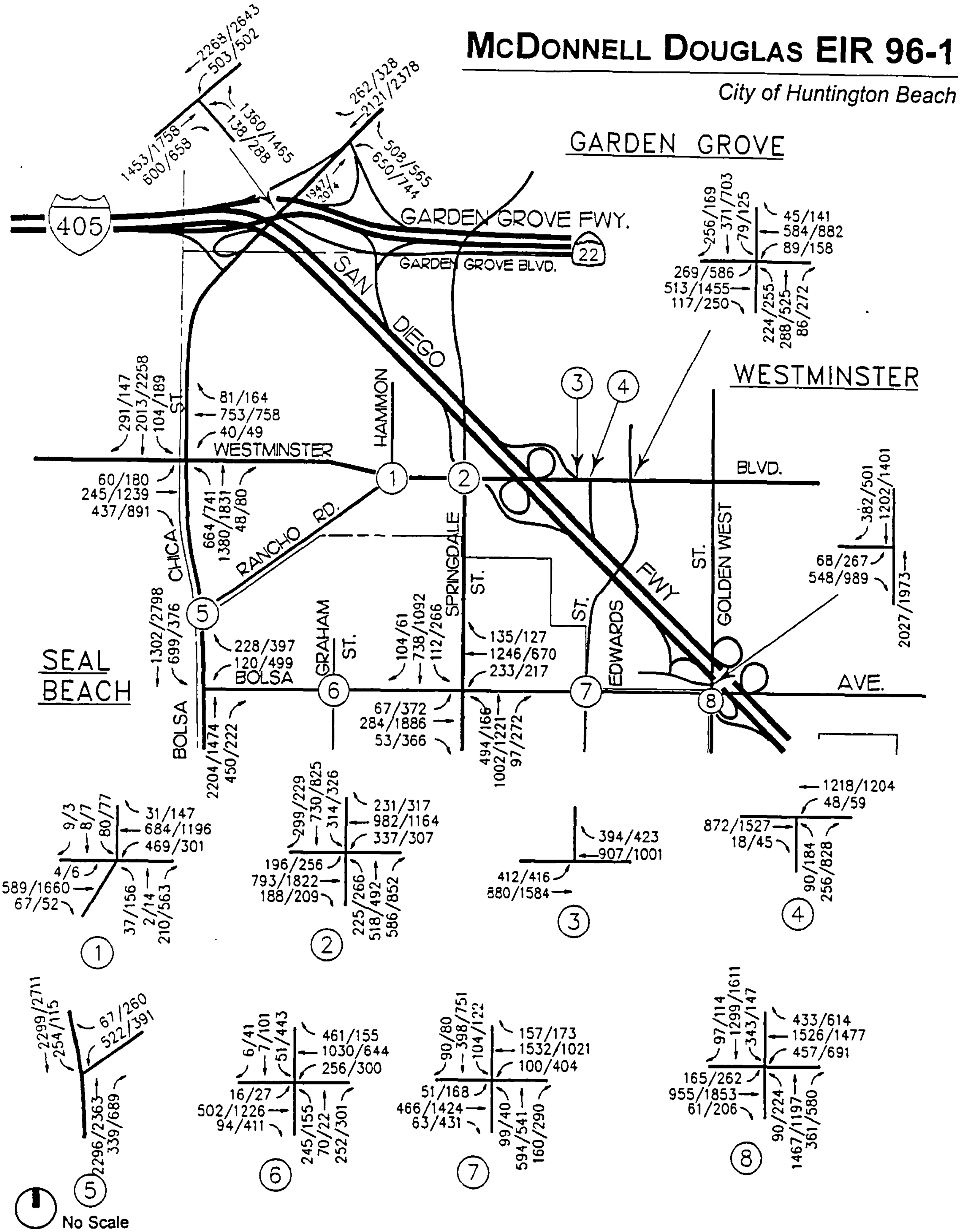
PLANNING AREA	*SIZE*	*DAILY TRIP GENERATION*
PLANNING AREA 1:		
Proposed Project	477,948 SF	3,575
Existing	2,789,053 SF	20,890
SUBTOTAL	**3,267,001 SF**	**24,465**
PLANNING AREA 1A:		
Proposed Project	522,720 SF	5,930
Vacant	-	-
SUBTOTAL	**522,720 SF**	**5,930**
PLANNING AREA 2:		
Proposed Project	696,617 SF	9,470
Existing	120,000 SF	600
Entitled	699,271 SF	4,350
SUBTOTAL	**1,515,888 SF**	**14,420**
PLANNING AREA 3:		
Proposed Project	940,896 SF	10,830
Vacant	-	-
SUBTOTAL	**940,896 SF**	**10,830**
PLANNING AREA 4:		
Proposed Project	914,760 SF	10,520
Vacant	-	-
SUBTOTAL	**914,760 SF**	**10,520**
PLANNING AREA 5:		
Proposed Project	610,018 SF	16,120
Existing	235,831 SF	3,540
Entitled	369,151 SF	10,470
SUBTOTAL	**1,215,000 SF**	**30,130**
	TOTAL	**96,295**

Source: WPA Traffic

For specific land use assumptions for the proposed project, please refer to Table B of this document.

McDonnell Douglas EIR 96-1

City of Huntington Beach

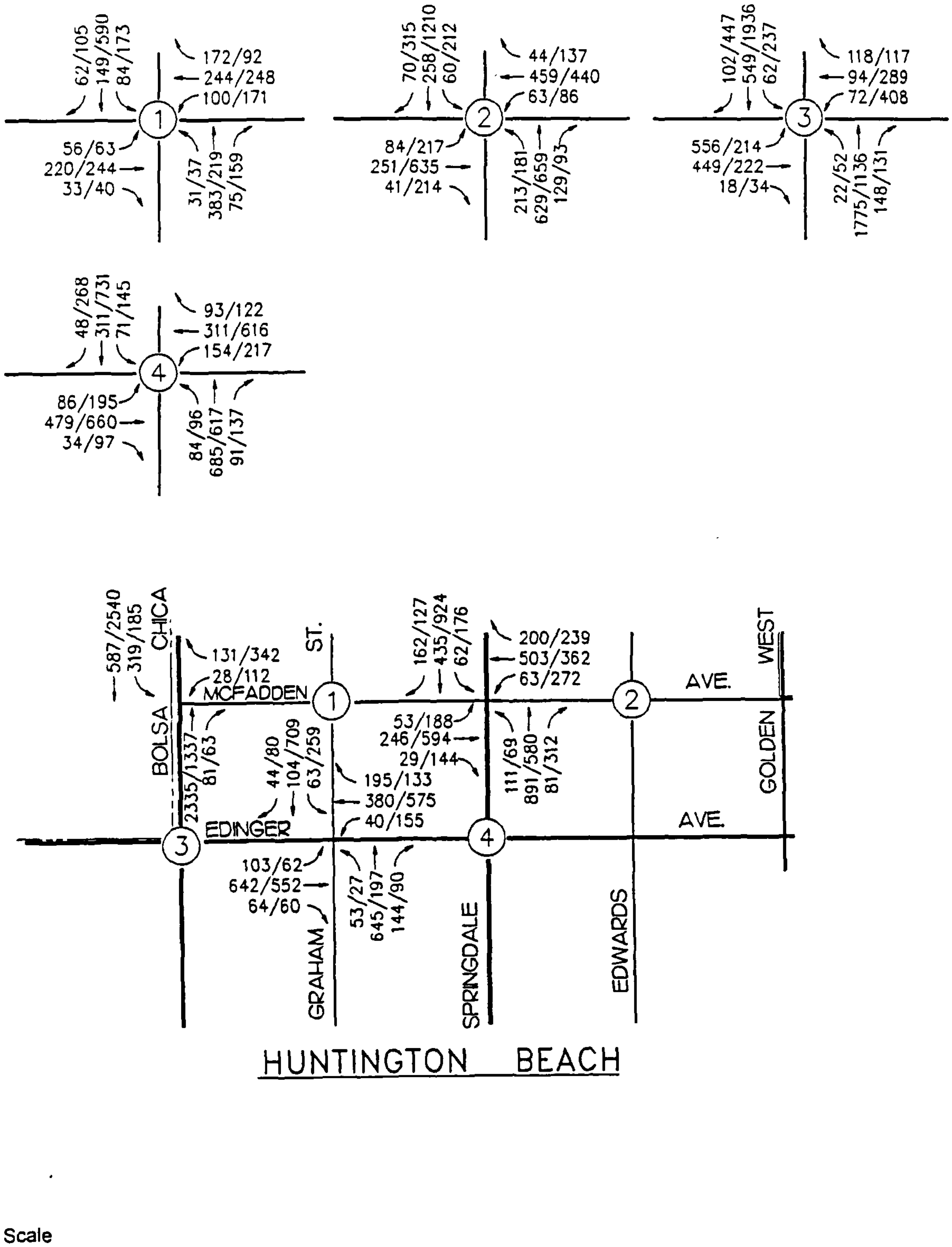


EDAW, Inc.

Source: WPA Traffic

Exhibit 35

Buildout With Project Peak Hour Traffic Volumes



EDAW, Inc.

Source: WPA Traffic

Exhibit 36

Buildout With Project
Peak Hour Traffic Volumes

Table M identifies the proposed improvements required under Buildout plus project conditions - Level 5. As shown in Table M, there are two study intersections where proposed improvements are listed. The intersections of Westminster/Bolsa Chica and Bolsa Avenue/Golden West cannot be fully mitigated with feasible improvements; therefore, some significant traffic impacts remain for Buildout conditions. Improvements for the two study intersections operating at unacceptable Levels of Service, where improvements are possible, are listed below.

1. **Bolsa Avenue/Springdale Street** - Add a third southbound through lane and take out southbound right turn lane
2. **Westminster/Rancho Hammon** - Add a third eastbound and westbound through lane

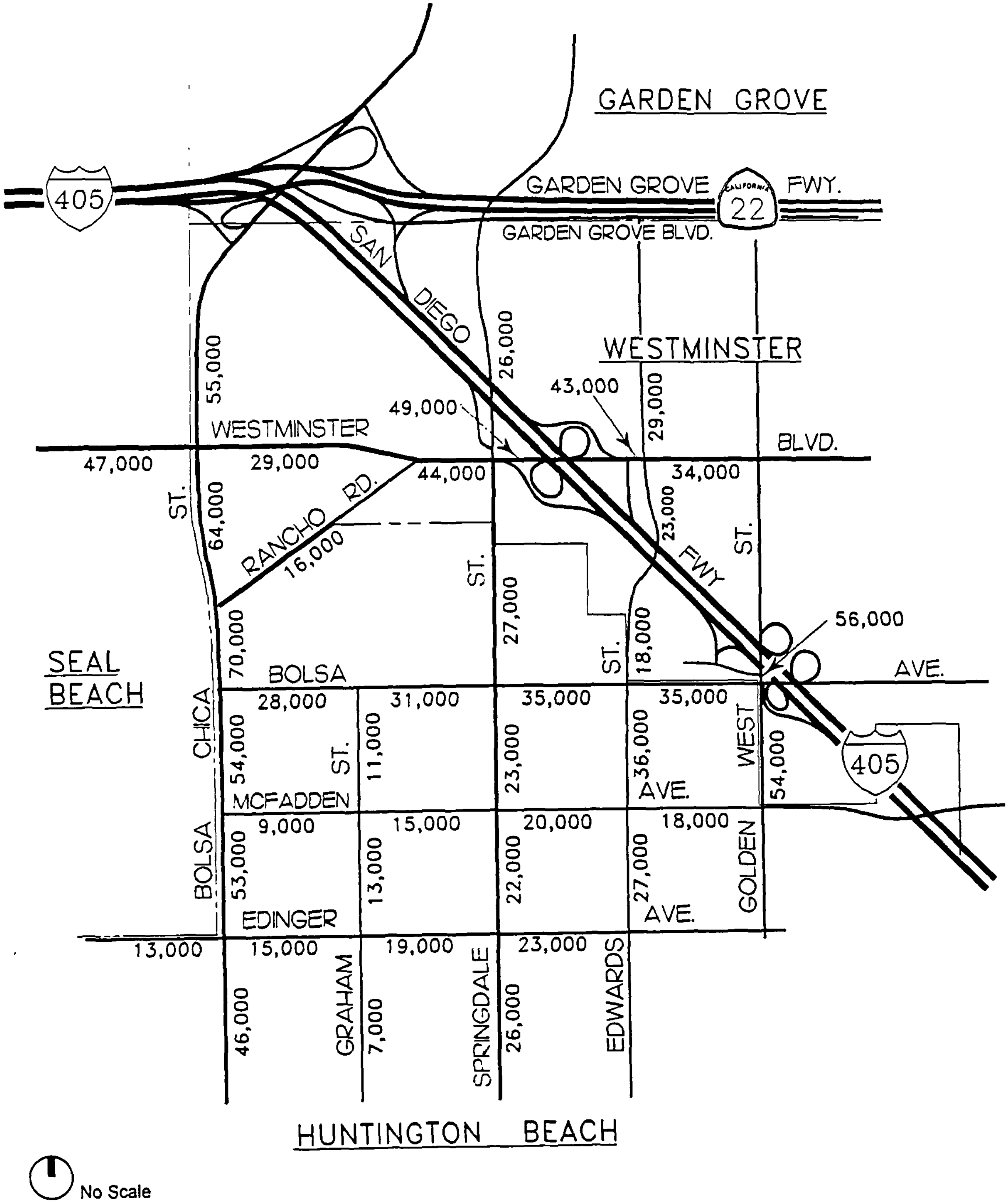
With these improvements, the study intersections of Bolsa/Springdale and Westminster/Rancho Hammon would operate at an acceptable Levels of Service during both the AM and PM peak hours.

Under this Level 5 condition, the proposed buildout project traffic is contributing to the need for the identified improvements at the above intersections. This is considered a project-specific impact. Mitigation Measure 7 in the following section has been required to reduce the project's incremental impact at the intersection of Westminster/Rancho Hammon to a less than significant level. Mitigation Measure 8 in the following section has been required to reduce the project's incremental impact at the intersection of Bolsa Avenue/Springdale Street to a less than significant level. Because feasible improvements do not exist to bring the other two (2) intersections to acceptable operating levels, this is considered a long-term significant, unavoidable cumulative impact to which the project traffic contributes. The results of this Year 2015 long-term buildout analysis are subject to change based upon the actual buildout of the Specific Plan project and other projects assumed in the SARA traffic model. Mitigation Measures 8 and 9 are proposed in the following section to reduce the project's contribution to the Year 2015 long-term impacts (beyond the 60% interim trip budget) to the extent feasible. Because feasible mitigation is not available for the three intersections, this impact remains unavoidable even with the mitigation.

Road Segment Analysis

The daily traffic volumes for the Buildout conditions with the project were referenced from the SARA model data and are shown on Exhibit 37. Table N shows a comparison of the Buildout plus project daily traffic volumes, to the estimated roadway capacity at Level of Service E. As shown in Table N, the following road segment links are operating at an unacceptable level.

1. Bolsa Chica Street: Rancho Rd. to Bolsa Avenue - (LOS E)
2. Bolsa Chica Street: Edinger Avenue to Heil Avenue - (LOS D)



EDAW, Inc.

Source: WPA Traffic

Exhibit 37

Buildout With Project Daily Traffic Volumes

Table N identifies the proposed improvements required for Buildout conditions with the project. The following proposed improvements achieved acceptable Levels of Service for the road segment of Edinger to Heil along Bolsa Chica Street. The road segment of Rancho to Bolsa along Bolsa Chica Street would remain at an unacceptable LOS E. Additional improvements beyond 8 lanes divided on this segment of Bolsa Chica Street would not be considered feasible, which would result in some remaining significant impacts at this location.

1. **Bolsa Chica Street: Edinger to Heil** - Currently 6 lanes divided improved to 8 lanes divided. (LOS B)

Under this Level 5 condition, the proposed buildtout project traffic is contributing to the need for the identified improvements at the two roadway segments. This is considered a project-specific impact. Mitigation Measure 8 in the following section has been required to reduce the project's incremental impact at the street segments of Bolsa Chica Street: Edinger Avenue to Heil Avenue to a less than significant level. Because feasible improvements do not exist to bring the other roadway segment to acceptable operating levels. This is considered a long-term, significant, and unavoidable impact to which the project traffic contributes.

The results of this Year 2015 long-term buildout analysis are subject to change based upon the actual buildout of the Specific Plan project and other projects assumed in the SARA traffic model. Mitigation Measures 8 and 9 are proposed in the following section to reduce the project's contribution to the Year 2015 long-term impacts (beyond the 60% interim trip budget) to the extent feasible. Because feasible mitigation is not available for the road segment, this impact remains unavoidable even with the mitigation.

<u>**Site Access/Circulation**</u>

The impacts associated with on-site circulation and pedestrian/bicycle safety are project specific issues and are therefore not impacted further by cumulative buildout.

<u>**Signal Warrant Analysis/Traffic Signalization**</u>

No significant cumulative 2015 buildout impacts have been identified related to traffic signal warrants.

<u>**Parking**</u>

The impacts associated with on-site parking are project specific issues and are therefore not impacted by further cumulative buildout.

STANDARD CITY POLICIES AND REQUIREMENTS

A. Prior to issuance of building permits (or certificate of occupancy, if determined appropriate by the Traffic Division and Planning Division), a Trip Generation Analysis shall be submitted for review and approval by the Public Works Department, Traffic Engineering Division. The analysis shall be used to determine the project's Traffic Impact Fee. This has been accomplished; refer to Appendix B of this EIR. The traffic impact fees shall be paid prior to issuance of the certificate of occupancy.

B. All applicable Public Works fees shall be paid.

C. An interim parking and/or building materials storage plan shall be submitted to the Department of Community Development to assure adequate parking is available for employees, customers, contractors, etc., during the project's construction phase.

MITIGATION MEASURES

The interim roadway geometrics (60%) are presented in Exhibits 5A and 5D of the TIA contained in Appendix B of the EIR, while the mitigated levels of service are shown in Tables M and N.

1. Prior to the issuance of building permits within the Specific Plan, each applicant shall coordinate with the City of Huntington Beach in developing a truck and construction vehicle routing plan. This plan shall specify the hours in which transport activities can occur and methods to minimize construction related impacts to adjacent residences. The final plan shall be approved by the City Engineer and Community Development Director.

2. Prior to the issuance of building permits within the Specific Plan, each applicant shall coordinate with the City of Huntington Beach Public Works Department to ensure the following is accomplished:

   a. necessary review of signal warrants
   b. review/approval of turn ingress/egress
   c. review/approval of any added driveways
   d. parking analysis demonstrating parking supplies meet or exceed the demands

   The purpose of the above review is to: 1) ensure site specific impacts from individual projects are reduced to a level less than significant and 2) identify the timing of future signal installations/improvements.

3. Prior to the issuance of building permits within the Specific Plan, the applicant shall demonstrate to the satisfaction of the City Traffic Engineer that truck access points depicted on their "Final" site plan(s), meet the City's minimum truck turning radius standards.

4. Prior to the issuance of building permits within the Specific Plan, the applicant shall demonstrate to the satisfaction of the City Traffic Engineer that standards (including ADA) regarding pedestrian/bicycle safety along the perimeter sidewalks have been met.

5. The City of Huntington Beach shall collect its traffic impact fee as "interim" levels of development occurs prior to the issuance of building permits. These fees will relieve the developer of traffic mitigation obligations (as detailed for Levels 1, 2, and 3 as shown in Tables

M and N of the Traffic Impact Assessment) resulting from the interim levels of development. The specific Level 1-3 improvements detailed in Table M and N shall be added to the City's CIP and implemented in a reasonable time frame.

6. Prior to the issuance of the first building permit within the Specific Plan, the applicant (MDRC) shall complete the intersection improvements for Westminster and Rancho identified in Table M under the Level 2 - Year 2000 (Interim without Project) condition.

7. Prior to the issuance of the first building permit within the McDonnell Centre Specific Plan, the applicant (MDRC) shall post a bond with the City of Westminster for the Specific Plan's fair-share contribution to complete the intersection improvements for Westminster and Rancho identified in Table M under the Levels 1 and 3 and Level 5 - Year 2015 (Buildout with Project) conditions. The bond shall not exceed $30,000 based on today's dollars and would be adjusted based upon the Engineering News Record Construction Cost Index. It would be activated at the time when the City of Westminster completes the identified intersection improvements. This mitigation would be unnecessary if the Cities of Westminster or Huntington Beach acquire intersection improvement funding through other efforts.

8. An updated Traffic Impact Assessment (TIA) shall be prepared at the expense of McDonnell Douglas or successor in interest as the interim trip budget is reached. This updated TIA shall be commenced when 90% of the interim trip budget is built or has approved development applications (entitled) and no further development shall be entitled or constructed (beyond that development that generates 100% of trips for the interim trip budget) until the updated TIA and required mitigations are reviewed and approved by the City. The purpose of the updated TIA is to determine whether the trips projected for the interim condition are consistent with the actual trips and the required traffic mitigation measures for the remaining buildout of the McDonnell Center Specific Plan Area (currently estimated in Levels 4 & 5 as shown in Table 4 of the TIA). This revised TIA shall not relieve the developer of any obligation to pay any traffic impact fees (should the present or any other traffic impact fee program be in place) or provide for mitigation measures for development at the time of developments.

9. Throughout the Specific Plan project's implementation, the City shall maintain and update an annual trip budget monitoring report to determine the status of the constructed and approved development applications (entitled) development and resulting expected trips within the McDonnell Center Specific Plan area. This annual trip budget monitoring report shall be based upon building permits issued and (entitled) development within the McDonnell Center. The trip budget monitoring report shall include gross and usable square footages of the constructed and/or entitled usages, a description of the land usage, and the trip generation rates used for the land usage proposed. The trip rates used in the monitoring report shall be those rates contained in the latest *Trip Generation* manual published by the Institute of Transportation Engineers (currently the 5th edition and 5th edition update) or another reliable source (i.e., another traffic study) as approved by the City Traffic Engineer.

LEVEL OF SIGNIFICANCE

Project Specific

No significant project-specific impacts have been identified related to traffic signal warrants on the surrounding street system.

Construction related traffic will result from the buildout of the Specific Plan. Mitigation Measure 1 will mitigate potential construction related impacts (associated with projects in the Specific Plan) to a level less than significant.

The proposed Specific Plan project may result in significant parking impacts. Mitigation Measure 2 will reduce impacts to a level less than significant.

Increased activity on-site and in the vicinity of the project could expose pedestrians and bicycles to traffic hazards. Implementation of Mitigation Measures 2-4 will mitigate exposure of pedestrians and bicycles to traffic hazards to a level less than significant.

Cumulative

The proposed project in conjunction with other past, present, and reasonably foreseeable projects will impact existing and future roadways and intersections (see below).

Interim 2000 Non-Project (Baseline) Traffic Volumes/Level of Service

Intersection Analysis

Under the Level 2 Condition, the proposed project traffic is not resulting in the specific need for the identified improvements at four identified intersections, and therefore, project-specific mitigation is not necessary.

Road Segment Analysis

Under the Level 2 Condition, the proposed project traffic is not resulting in the specific need for the identified improvements at the three roadway segments and, therefore, project-specific mitigation is not necessary.

Interim 2000 (with Project) Traffic Volumes/Levels of Service

Intersection Analysis

Under the Level 3 Condition, the proposed interim project traffic is contributing to the need for the identified intersection improvements. Mitigation Measure 5 will reduce the project's incremental impact at the intersections of Bolsa Avenue/Springdale Street and Bolsa Avenue/Golden West to level less than significant. Mitigation Measure 7 will reduce the project's incremental impact at Westminister/Rancho-Hammon to a level less than significant.

Road Segment Analysis

Under the Level 3 condition, the proposed interim project traffic is contributing to the need for improvements at the two roadway segments. This is considered a project-specific impact. Mitigation Measure 5 will reduce the project's incremental impact at the two street segments to a level less than significant.

Post-2015 Non-Project (Cumulative Background) Traffic Volumes/Levels of Service

Intersection Analyses

Under the Level 4 condition, the proposed project traffic is not resulting in the specific need for improvements at the identified intersections, and therefore, project-specific mitigation is not necessary.

Road Segment Analysis

Under the Level 4 condition, the proposed project traffic is not resulting in the specific need for the identified improvements at the identified road segments, and therefore, project-specific mitigation is not necessary.

Post-2015 Total (With Project) Traffic Volumes/Levels of Service

Intersection Analyses

Under the Level 5 condition, the proposed buildout project traffic is contributing to the need for the identified improvements at Westminster/Bolsa Chica, Westminster/Rancho-Hammon, Bolsa/Springdale, and Bolsa/Golden West. This is considered a project-specific impact. Mitigation Measure 7 will reduce the project's incremental impact at Westminster/Rancho-Hammon to a level less than significant. Mitigation Measure 8 will reduce the project's incremental impact at the intersection of Bolsa Avenue/Springdale Street and Westminster/Rancho-Hammon to a less than significant level. Because feasible improvements do not exist to bring the other two (2) intersections to acceptable operating levels, this is considered a long-term significant, unavoidable cumulative impact to which project traffic contributes. The results of this Year 2015 long-term buildout analysis are subject to change based upon the actual buildout of the Specific Plan project intersections to acceptable operating levels, this is considered a long-term significant, unavoidable cumulative impact to which project traffic contributes. The results of this Year 2015 long-term buildout analysis are subject to change based upon the actual buildout of the Specific Plan project and other projects assumed in the SARA traffic model. Mitigation Measures 8 and 9 are proposed in the following section to reduce the project's contribution to the Year 2015 long-term impacts (beyond the 60% interim trip budget) to the extent feasible. Because feasible mitigation is not available for the two intersections, this impact remains unavoidable even with the mitigation.

Road Segment Analysis

Under the Level 5 condition, the proposed buildout project traffic is contributing to the need for improvements at Edinger to Heil along Bolsa Chica Street and Rancho to Bolsa along Bolsa Chica Street. This is considered a project-specific impact. Mitigation Measure 8 will reduce the project's incremental impact at the street segments of Bolsa Chica Street: Edinger Avenue to Heil Avenue to a less than significant level. Because feasible improvements do not exist to bring the other roadway segment to acceptable operating levels. This is considered a long-term, significant, and unavoidable impact to which project traffic contributes. The results of this Year 2015 long-term buildout analysis are subject to change based upon the actual buildout of the Specific Plan project and other projects assumed in the SARA traffic model. Mitigation Measures 8 and 9 are proposed to reduce the project's contribution to the Year 2015 long-term impacts (beyond the 60% interim trip budget) to the extent feasible. Because feasible mitigation is not available for the road segment, this impact remains unavoidable even with the mitigation.

Site Access/Circulation

Impacts associated with on-site circulation and pedestrian/bicycle safety are project specific issues and are therefore not impacted further by cumulative buildout.

Signal Warrant Analysis/Traffic Signalization

No significant cumulative 2015 buildout impacts have been identified related to traffic signal warrants.

Parking

Impacts associated with on-site parking are project-specific and are therefore not impacted by further cumulative buildout.

5.5 AIR QUALITY

INTRODUCTION

This section addresses the potential impacts related to air quality associated with the proposed McDonnell Centre project. The information contained in this section is consistent with the 1993 South Coast Air Quality Management District CEQA Handbook for Air Quality Analysis. The assumptions and air quality calculations prepared by EDAW, Inc. March 1997 are provided in Technical Appendix D of this EIR. The traffic assumptions used in the air quality assessment are from the traffic study prepared by WPA Traffic Engineering, Inc., May 1997. A copy of the traffic study is provided in Technical Appendix B of this EIR.

EXISTING CONDITIONS

Meteorology/Climate

The climate around the project site, as with all of Southern California, is controlled largely by the strength and position of the subtropical high pressure cell over the Pacific Ocean. The climate is characterized by moderate temperatures and comfortable humidity. The Pacific high pressure zone dominates the local weather patterns and creates a repetitive pattern of frequent early morning cloudiness, hazy afternoon sunshine, daytime onshore breezes and little temperature change throughout the year. This usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, and Santa Ana winds. Precipitation is limited to a few storms during the wet winter season. Temperatures are normally mild with rare extremes above 100°F or below freezing. The annual mean temperature of 62°F has little seasonal variation.

Winds in the project area are typically driven by the dominant land/sea breeze circulation system. Regional wind patterns are dominated by daytime onshore sea breezes. At night, the wind generally slows and reverses direction traveling offshore to the sea.

In addition, winds control the rate and direction of pollution dispersal. Southern California is notorious for strong temperature inversions that limit the vertical depth through which pollution can be mixed. These inversions are characterized by seasonal differences. In summer, coastal areas are characterized by a sharp discontinuity between the cool marine air at the surface and the warm, sinking air aloft within the high pressure cell over the ocean to the west. This marine/subsidence inversion allows for good local mixing, but acts as a giant lid over the basin. Air starting onshore at the beach is relatively clean, but becomes progressively more polluted as sources continue to add pollution from below without any dilution from above. A second type of inversion forms on cold early winter mornings. These inversions are ground based inversions, sometimes referred to as radiation inversions. Under conditions of a ground based inversion, very little mixing or turbulence occurs and pollutants concentrate near their sources (i.e. roadways).

Most of the air pollutants are confined to the air volume below the base of any inversion, or in a very shallow layer near the ground in the case of a surface inversion.

Air Quality Management

The proposed project is located in the South Coast Air Basin. This area is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD) and the California Air Resources Board (CARB). The SCAQMD sets and enforces regulations for stationary sources in the basin. The CARB is responsible for controlling motor vehicle emissions.

In 1987 Senate Bill 151 became law giving the SCAQMD significant authority. The law instructs the SCAQMD to develop new transportation control measures and to develop rules for indirect emission sources. Indirect sources are shopping centers, stadiums, and facilities which attract a large number of vehicles. The SCAQMD is also required to develop further programs and regulations that will increase ride sharing and limit heavy-duty truck traffic on freeways during rush hours.

Every three years, SCAQMD prepares an overall plan for air quality improvement. Each iteration of the plan is an update of the previous plan and has a 20 year horizon. The SCAQMD, in coordination with the Southern California Association of Governments (SCAG), adopted the 1994 Air Quality Management Plan (AQMP) for the South Coast Air Basin in September of 1994. At that time, the South Coast Air Basin was designated as a non-attainment area (i.e., does not attain either Federal or State air quality standards) area for ozone, carbon monoxide, nitrogen dioxide, and fine particulate matter (PM_{10}) by the Environmental Protection Agency (EPA) and CARB. Table Q provides the ambient air quality standards and the relevant harmful effects for each pollutant.

Comparing the 1994 AQMP with the 1991 AQMP, the basic control strategy remains the same in many respects. There are some refinements proposed with this revision. For example, what were called Tier I measures in the 1991 AQMP are now referred to as short- and intermediate-term measures in the 1994 AQMP. Additionally, what were called Tier II and Tier III measures in the 1991 AQMP have been consolidated, and are now referred to as long-term measures.

Short- and intermediate-term emission reduction measures are those that can be adopted using currently available technological applications, statutory authority, and management practices. Such measures have been defined for stationary, mobile and area source categories.

Long-term emission reduction measures include already-demonstrated but commercially unavailable control technologies and "on-the-horizon" technologies requiring advancements that can reasonably be expected to occur in the near future. This category also includes measures that require commitments for research, development, and widespread commercial application of technologies that may not exist yet, but may be reasonably expected given the rapid technological advances gained over the past 20 years. The federal Clean Air Act recognized the need to develop new technology control measures and specifically provided "extreme" ozone non-attainment areas the necessary time to develop these control measures [Section 182(e)(5)]. Many of the long-term emission reduction measures which rely on technologies that are not currently developed are considered as meeting Section 182(e)(5) requirements.

TABLE Q

AMBIENT AIR QUALITY STANDARDS

	STATE STANDARD	FEDERAL STANDARD	MOST RELEVANT EFFECTS
Pollutant	**Concentration, Averaging Time**	**Concentration, Averaging Time**	
Ozone	>0.09 ppm,1-hr. avg.	>0.12 ppm,1-hr avg.	(a) Short-term exposures: (1) Pulmonary function decrements and localized lung edema in humans and animals. (2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (c) Vegetation damage; (d) Property damage
Carbon Monoxide	>9.0 ppm,8-hr avg. >20 ppm,1-hr avg.	>9 ppm,8-hr avg. >35 ppm,1-hr avg.	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses
Nitrogen Dioxide	>0.25 ppm,1-hr avg.	>0.053 ppm, ann. avg.	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration
Sulfur Dioxide	>0.04 ppm,24-hr avg. >0.25 ppm,1-hr. avg.	>0.03 ppm, ann. avg. >0.14 ppm,24-hr avg.	(a) Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma
Suspended Particulate Matter (PM_{10})	>30 μg/m3,ann. Geometric mean >50 μg/m3,24-hr avg.	>50 g/m3,ann. arithmetic mean >150 g/m3,24-hr avg.	(a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory disease; (b) Excess seasonal declines in pulmonary function, especially in children
Sulfates	≥25 μg/m3,24-hr avg.		(a) Decrease in ventilator function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage
Lead	≥1.5 μg/m3,30-day avg.	>1.5 g/m3,calendar quarter	(a) Increased body burden; (b) Impairment of blood formation and nerve conduction

TABLE Q (CONTINUED)

AMBIENT AIR QUALITY STANDARDS

	STATE STANDARD	FEDERAL STANDARD	MOST RELEVANT EFFECTS
Pollutant	**Concentration, Averaging Time**	**Concentration, Averaging Time**	
Visibility-Reducing Particles	In sufficient amount to reduce the visual range to less than 10 miles at relative humidity less than 70%, 8-hour average (10am - 6pm)		(a) Increased body burden; (b) Impairment of blood formation and nerve conduction

Source: SCAQMD 1996

ppm	parts by volume per million parts of air
mg/m^3	milligrams per cubic meter of air
$\mu g/m^3$	micrograms per cubic meter of air
avg.	average
ann.	annual

The Draft 1997 Air Quality Management Plan (AQMP) is based on the 1994 AQMP, and carries forward most of the innovative strategies crafted in that AQMP. The current Draft AQMP places a greater focus on particulate matter (PM_{10}), since this is the first plan required by federal law to demonstrate attainment of the federal PM_{10} ambient air quality standards. The Draft Plan also updates the demonstration of attainment for ozone and carbon monoxide, and includes a maintenance plan for nitrogen dioxide (NO_2), as the South Coast Air Basin now qualifies for attainment of that federal standard.

The 1997 Draft AQMP proposes policies and measures to achieve federal and state standards for healthful air quality in the Basin and those portions of the Mojave Desert and Salton Sea Air Basins (formerly named the Southeast Desert Air Basin) that are under South Coast Air Quality Management District (District) jurisdiction (namely, Antelope Valley and Coachella Valley). The target attainment dates for Federal and State standards are depicted in Table R. This draft version of the AQMP was approved by the South Coast Air Quality Management District Board of Directors on November 8, 1996. The final draft was printed in February 1997.

Federal Requirements

In November 1990, Congress enacted a series of amendments to the Clean Air Act intended to intensify air pollution control efforts across the nation. One of the primary goals of the 1990 amendments to the Clean Air Act (CAA) was an overhaul of the planning provisions for those areas not currently meeting National Ambient Air Quality Standards (NAAQS). The CAA identifies specific emission reduction goals, requires both a demonstration of reasonable further progress and attainment, and incorporates more stringent sanctions for failure to attain or to meet interim milestones.

In addition, the CAA requires the District to develop: a Federal Attainment Plan for Ozone (Ozone Plan) as given in Section 182 (c)(2)(A); a post-1996 Rate-of-Progress Plan as required in Section 182(c)(2)(B); Ozone Attainment Demonstrations for the Los Angeles county portion of the SEDAB (Antelope Valley) and the Riverside Non-attainment area of the SEDAB (Coachella - San Jacinto Planning Area); and a PM_{10} State Implementation Plan (SIP) which incorporates best available control measures (BACM) for fugitive sources (referred to as the PM_{10} BACM SIP), as required by Section 189(b)(1)(B).

State Requirements

The California Clean Air Act (CCAA) was signed into law on September 30, 1988. Through its many requirements, the CCAA serves as the centerpiece of the Basin's attainment planning efforts since it is generally more stringent than the 1990 federal Clean Air Act Amendments.

TABLE R

DRAFT 1997 AQMP TARGET ATTAINMENT DATES

POLLUTANT	FEDERAL	STATE
Nitrogen Dioxide	met	met
Carbon Monoxide	2000	2000
PM_{10}	2006	2010+
Ozone	2010	2010+

Source: SCAQMD 1996

Key CCAA requirements that the District addresses in the 1994 AQMP are to: apply Best Available Retrofit Control Technology; reduce non-attainment pollutants and their precursors at a rate of five percent per year, or, if this cannot be done, include all feasible measures and an expeditious implementation schedule; achieve an average vehicle ridership during peak commute hours of 1.5 persons per vehicle by 1999; ensure no net increase in mobile source emissions after 1997; reduce population exposure to severe non-attainment pollutants (i.e., ozone, carbon monoxide, and nitrogen dioxide for the Basin) according to a prescribed schedule; and, rank control measures by cost-effectiveness and implementation priority. Additionally, state law requires market-based programs proposed as part of the AQMP to meet specific design requirements. Finally, state law requires the plan to provide for attainment of the federal and state ambient air quality standards (Health & Safety Code Section 40462).

__Existing Air Quality__

The air quality of the South Coast Air Basin is determined both by the primary pollutants added daily to the air mass and by the secondary pollutants, specifically ozone, represent the major air quality problems basinwide. The air quality of the project site is determined by primary pollutants emitted locally, the existing regional ambient air quality, and the specific meteorological factors which influence the site.

Southern California has frequent temperature inversions which inhibit the dispersion of pollutants. Inversions may be either ground-based or elevated. Ground-based inversions, sometimes referred to as radiation inversions, are most severe during clear, cold early morning winter mornings. Under conditions of a ground-based inversion, very little mixing or turbulence occurs. High concentrations of primary pollutants may occur locally to major roadways. Elevated inversions can be generated by a variety of meteorological phenomena. Elevated inversion dispersion is not restricted. Mixed inversions are lower in the summer and more persistent. This low summer inversion acts as a lid over the South Coast Air Basin. It is responsible for the high levels of ozone observed during summer months in the air basin.

There has been a significant improvement in air quality in the South Coast Air Basin over previous years' air pollution levels. Between 1976 and 1993, the number of days the federal standard was exceeded decreased by 47 percent. The calendar year 1993, for example, represents one of the cleanest years on record for the Basin. The federal standards were exceeded at one or more locations in the Basin on 147 days, which is more frequently than any other area of the nation.

Basinwide, of the federal and state standards which are exceeded in 1995, the ozone standard was exceeded most frequently, followed by carbon monoxide, and PM_{10}. Sulfur dioxide, nitrogen dioxide, sulfate and lead concentrations were below both the state and federal standards.

Despite its improved air quality over the past years, the South Coast Air Basin has the worst ozone air quality in the nation and is the only area designated as "extreme" non-attainment for ozone. The Basin is the only area in non-attainment of the federal nitrogen dioxide air quality standard. In 1992, the Basin recorded the greatest number of exceedances of the federal carbon monoxide standard in the nation. PM_{10} levels are also very high compared to most other areas.

The nearest monitoring station is the Los Alamitos station which is located approximately 3 miles north of the project site. This monitoring station monitors ozone and sulfur dioxide. Data for carbon monoxide and nitrogen dioxide was obtained from the Costa Mesa station located approximately 7 miles east of the project site. Table S summarizes the last five years of monitoring data and depicts the number of days on which pollution levels exceeded state standards.

Air quality data in Table S indicates that ozone is the air pollutant of primary concern in the project area. Ozone is a secondary pollutant and is not directly emitted. Ozone is the result of the chemical reactions of other pollutants, most importantly hydrocarbons and nitrogen dioxide, in the presence of bright sunlight. Pollutants emitted from upwind cities react during transport downwind to produce the oxidant concentrations experienced in the project vicinity.

All areas of the South Coast Air Basin contribute to the ozone levels experienced at both the Costa Mesa and the Los Alamitos monitoring stations with the more significant areas being those directly upwind. The ozone levels at the Los Alamitos station have significantly decreased over the past few years.

Carbon monoxide standards have not been exceeded over the past several years at the Costa Mesa station. This station is located adjacent to Harbor Boulevard and it is very likely that the carbon monoxide concentrations recorded at this station are influenced by the motor vehicle activity on this roadway. Carbon monoxide is generally considered to be a local pollutant. Carbon monoxide is directly emitted from several sources (most notably motor vehicles) and the highest concentrations experienced are directly adjacent to the source.

Particulate concentrations monitored at other stations in Orange County should be representative of the level currently experienced at the project site. Particulates are particles of dust, smoke and minute droplets of liquids called aerosols. These are the particles which have the potential to do the greatest harm to human health because they can pass through the body's natural filtering system and become lodged in the lungs. Inhaled particulates reduce lung capacity and may carry materials into the body

Project Site

Presently, the project site is occupied by the McDonnell Douglas Aeronautics Facility along with mixed office and industrial uses with associated parking, support structures, landscaping, and lighting. The site currently generates traffic and is assumed to generate noticeable mobile and stationary source air emissions typical of industrial and office uses.

IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant air quality effect if it will:

TABLE S

NUMBER OF DAYS EXCEEDING STATE AIR QUALITY STANDARDS ORANGE COUNTY AIR QUALITY MONITORING SUMMARY 1992-1995

POLLUTANT/STANDARD	1992	1993	1994	1995
Ozone				
1-HR > 0.09 ppm	21	22	3	3
Carbon Monoxide				
1-HR > 20 ppm	0	0	0	0
8-HR > 9 ppm	1	0	0	0
Nitrogen Dioxide				
1-HR > 0.25 ppm	0	0	0	0
Sulfur Dioxide				
24-HR > 0.05 ppm	0	0	0	0
Suspended Particulate Matter (PM_{10})				
24 Hr 50 $\mu g/m^3$	4*	0	11**	14**

Source: California Environmental Protection Agency (Air Resources Board) Air Quality Data, 1991 through 1995.

ppm parts per million parts of air, by volume
ug/m^3 micrograms per cubic meter
-- pollutant not monitored
* Newport Beach station
** Anaheim station

(x) violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentration.

For the purposes of this EIR, actions that violate federal standards for criteria pollutants (i.e. primary standards designed to safeguard the health of people considered to be sensitive receptors while outdoors) and secondary standards (designed to safeguard human welfare) are considered significant impacts. Additionally, actions that violate State standards developed by CARB or SCAQMD, including thresholds for criteria pollutants are considered significant impacts.

Threshold criteria for determining environmental significance has been established by the 1993 South Coast Air Quality Management District CEQA Handbook for Air Quality Analysis. These are:

Short-term/Construction Emissions

- 2.5 tons per quarter of reactive organic compounds (ROC)
- 2.5 tons per quarter of nitrogen oxides (NO_x)
- 24.75 tons per quarter of carbon monoxide (CO)
- 6.75 tons per quarter of PM_{10}
- 6.75 tons per quarter of sulfur oxides (SO_x)

Long-term/Operational Emissions

- 55 pounds per day of reactive organic compounds (ROC)
- 55 pounds per day of nitrogen oxides (NO_x)
- 550 pounds per day for carbon monoxide (CO)
- 150 pounds per day of PM_{10}
- 150 pounds per day of sulfur oxides (SO_x)

Impacts to air quality can be separated into short-term and long-term impacts. Short-term impacts usually are related to construction activities. During construction, the preparation of foundations and footings, demolition of existing structures, and building assembly will create temporary emissions of dusts, fumes, equipment exhaust and other air contaminants throughout the project construction period.

Long-term air quality impacts would result from two types of emissions sources, stationary and mobile. Stationary sources include the emissions produced from on-site energy use for heating, cooling, operation of electrical machinery, lighting, appliances, and other equipment that consumes electricity or natural gas. Mobile sources are emissions generated by vehicles.

Secondary project-related impacts derive from a number of other small, growth-connected emissions sources. Such sources include but are not limited to: evaporative emissions at gas stations or from paints, thinners or solvents used in construction and maintenance or light industrial uses, increased air travel from business travelers, dust from tire wear and re-suspended roadway dust, etc. All these emissions points are either temporary, or they are so small in comparison to project-related automotive sources that their impact would not be significant.

Emission increases from additional development within the airshed, even if they do not of themselves cause standards to be violated, should be considered cumulatively significant because they impede future regional attainment of clean air standards.

The impacts related to the above criteria are discussed below.

<u>Short-term Impacts</u>

The proposed project will have a short-term impact on air quality from construction activities. Grading of the project site, the construction of the buildings, and construction worker trips will create temporary emissions of dust, fumes, equipment exhaust, and other air contaminants throughout the project construction period. Pollutant emissions can vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing weather.

With a project that has defined construction plans, the 1993 South Coast Air Quality Management District CEQA Handbook for Air Quality Analysis would normally be used to evaluate the project emissions. Due to the nature of the project, no actual development plans are being submitted at this time. Therefore it is impossible to accurately calculate short-term construction related emissions related to project implementation at this time. An analysis of the future buildout emissions would be considered "speculative" under CEQA and therefore not required. Based on the size of the project and EDAW's experience with other analyzes for short-term construction impacts, it is anticipated that the project will generate a substantial amount of short-term air emissions. For the purposes of this worst-case EIR analysis, it is anticipated that the proposed project will exceed SCAQMD's daily threshold emission levels for short-term air emissions. The exceedance of the thresholds is a short-term air quality impact. In addition, the addition of emissions to an air basin designated as non-attainment is considered under CEQA to be an impact. Implementation of Mitigation Measures 1 through 6 will reduce this impact to the extent feasible. This impact, after mitigation, remains an unavoidable adverse impact.

<u>Long-Term Impacts</u>

The development of the proposed project will result in long–term air quality impacts. Long–term air quality emissions associated with the proposed project would result from two types of sources: stationary and mobile. Stationary sources include the emissions produced from on–site energy use for heating, cooling, operation of electrical machinery, lighting, appliances, and other equipment that consumes electricity or natural gas. Odor emissions associated with certain types of industrial uses are also considered stationary source emissions. Mobile sources are emissions generated by increased vehicular trips which will result from project implementation. The pollutants generated in the largest quantities would be CO, NO_x, SO_x, and PM_{10}. Hydrocarbons (HC) would be emitted in smaller quantities. Long-term impacts associated with the proposed project's implementation are discussed under the heading Total Emissions later in this section.

Stationary Source Emissions

Stationary sources can be divided into two major subcategories: point and area sources. Point sources are generally large emitters with one or more emission sources at a facility with an identified location (e.g., power plants, refinery boilers). Area sources generally consist of many small emission sources (e.g., residential water heaters, architectural coatings) which are distributed across the region.

Implementation of the proposed project will result in the development of industrial uses which have the potential to generate objectionable odors that could affect nearby sensitive receptors. Because specific users are unknown at this time, a specific analysis of odors would be "speculative" under CEQA and is therefore not required. The following discussion including mitigation measures is provided to reduce potential future odor impacts to a level less than significant.

Assessing odor impacts depends upon such variables as wind speed, wind direction, and the sensitivities of receptors to different odors. The facility that is, or will be, producing the odor can relocate equipment so that fumes can be emitted at locations to take the best advantage of wind patterns. Projects that may cause odors can also change stack heights and add additional control technology. In some cases, a project proponent for development of a sensitive receptor may be able to mitigate potential impacts by paying for mitigation at the source. Mitigation Measure 7 in the following section has been proposed and requires that future uses within the Specific Plan be reviewed to determine if odors are an issue. If it is determined that the proposed use may result in odor impacts, then an air quality analysis including a quantitative assessment of potential odors and meteorological conditions shall be performed. The analysis shall include a quantitative assessment of odors, consistent with the American Society of Testing Materials (ASTM, Standard Method D 1391 or Standard Method E679-79). Project design measures or additional control technology shall be implemented to ensure odor emissions comply with SCAQMD standards.

Stationary emissions will be generated on-site by the combustion of natural gas for space heating and water heating. Off-site emissions will be generated due to electrical usage. The generation of electrical energy by the combustion of fossil fuels results in additional off–site emissions. Emission factors were obtained from the 1993 South Coast Air Quality District's Air Quality Handbook. The factors in this handbook were obtained from Southern California Gas and Southern California Edison.

Projections of the proposed project's generated stationary source emissions for the year 2015 are presented in column 1 of Table T. The calculations for the projections are contained in the Appendix E of this EIR.

Mobile Source Emissions

Mobile source emissions will be generated by vehicle trips as a result of the proposed project. Mobile source or indirect emissions projected to result from implementation of the proposed project are vehicular pollutants released by increases in vehicular traffic. Several pollutants are directly emitted from motor vehicles. These include CO, NO_x, PM_{10}, and HC. CO is the primary pollutant of major concern along roadways since air quality standards for CO along roadways are exceeded more frequently than the other pollutant standards.

TABLE T

PROJECT 1997 ESTIMATED EMISSIONS (POUNDS/DAY)

Emission	Stationary Sources	Mobile Sources[1]	Total Emissions	SCAQMD Threshold	Exceeds Threshold	Percent Exceeded
Carbon Monoxide	20.6	2,612.4	2,633.0	550	Yes	379%
Nitrogen Oxides	120.3	421.4	541.7	55	Yes	885%
Sulfur Oxides	7.4	54.9	62.3	150	No	--
Particulates (PM_{10})	2.5	81.2	83.7	150	No	--
Hydrocarbons	2.8	267.3	270.1	55	Yes	391%

Source: EDAW, Inc., 1997.

[1] Estimates of emissions were calculated using Urbemis5, an emission analysis program developed and circulated by the California Air Resources Board (CARB).

For the purpose of quantifying mobile source air quality impacts, the California Air Resources Board's (CARB) Urbemis5 air quality model was used. Urbemis5 estimates automobile emissions based on different land use types. The model utilizes EMFAC7F emission rates and trip lengths by type according to project location. The one way trip lengths in the model program for this area at buildout in the year 2015 are as follows: home-based work - 8.8 miles, home-based shop - 3.2 miles, home-based other - 5.2 miles, commercial-based work - 8.1 miles, commercial-based non-work - 5.5 miles.

The traffic assumptions are from the traffic study prepared by WPA Traffic Engineering, Inc. A copy of the traffic study is provided in Appendix B of this EIR. The Urbemis5 model provides trip rates according to the land use type unless these values are revised by the model user. The trip rates utilized in this analysis were derived from Table 1 in the WPA Traffic Engineering, Inc. traffic study.

The projections of the proposed project's generated mobile source emissions for the year 2015 are presented in column 2 of Table T. The calculations for the projections are contained in the Appendix B of this EIR. In the year 2015, the proposed project generated traffic will add the following mobile source emissions to the air basin on a daily basis: 2,612.4 pounds per day of CO; 421.4 pounds per day of NO_x; 54.9pounds per day of SO_x; 81.2 pounds per day of PM_{10}; and 267.3 pounds per day of HC.

Total Emissions

Long-term total emissions generated from the project are the sum of the stationary source emissions and the mobile source emissions. The total emissions amount is then compared to the impact criteria for long-term emissions established by the SCAQMD for daily threshold emission levels.

It should be noted that the air quality analysis of mobile source emissions is based on standards set forth in the South Coast Air Quality Management District CEQA Handbook for Air Quality Analysis, with environmental significance determined accordingly. This worst-case analysis criteria assumes that the proposed project will generate increased traffic and therefore increased vehicle emissions. While it is obvious that the increased emissions will be generated in the vicinity of the project site, the increase will not necessarily constitute a net increase in emissions generated within the South Coast Air Basin.

The totals for both vehicular and stationary source emissions generated by the proposed project are displayed in column 3 of Table T.

Based on the long-term emissions estimated to be generated by the proposed project, it is anticipated that the proposed project will exceed SCAQMD's daily threshold emission levels for CO, NO_x and HC. Table S provides a comparison of daily total emissions to the SCAQMD's emission thresholds of significance for each pollutant and identifies the percent by which the emission thresholds are exceeded. The daily exceedance of the thresholds for CO, NO_x and HC is a long-term air quality impact. In addition, the addition of emissions to an air basin designated as non-attainment is considered under CEQA to be an significant impact. Mitigation Measure 8 along with the traffic mitigation provided in Section 5.4 of this EIR will reduce this impact to the extent feasible by reducing the proposed project's peak hour trips and resulting mobile source emissions. This impact, after mitigation, remains an unavoidable adverse impact.

CUMULATIVE IMPACTS

The cumulative impact analysis for air quality addresses the regional setting as described in Section 4.0 Regional, Sub-regional, and Local Setting of this EIR.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in a short-term air quality impact due to construction activities. The addition of emissions to an air basin designated as non-attainment is considered under CEQA to be an impact. The project's incremental contribution to this impact will be reduced to the extent feasible by Mitigation Measures 1 through 6. This impact, after mitigation, remains an unavoidable adverse impact. The project will result in the development of industrial uses which have the potential to generate objectionable odors, which could affect nearby sensitive receptors. Mitigation Measure 7 will reduce this impact to a level less than significant.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in significant cumulative long-term impacts to air quality. The addition of emissions to an air basin designated as non-attainment is considered under CEQA to be an impact. Mitigation Measure 8 along with the traffic mitigation provided in Section 5.4 will reduce this impact to the extent feasible by reducing the proposed project's peak hour trips and resulting mobile source emissions. This impact, after mitigation, remains an unavoidable adverse impact.

STANDARD CITY POLICIES AND REQUIREMENTS

A. During construction, the applicant shall use water trucks or sprinkler systems on all areas where vehicles travel to keep damp enough to prevent dust from being raised when leaving the site.

B. During construction, the applicant shall use low sulfur fuel (.05%) by weight for construction equipment.

C. During construction, the applicant shall attempt to phase and schedule construction activities to avoid high ozone days (first stage smog alerts).

D. During construction, the applicant shall discontinue construction during second stage smog alerts.

MITIGATION MEASURES

1. During grading and construction, the applicant shall be responsible for compliance with the following:

A. During clearing, grading, earth moving or excavation, maintain equipment engines in proper tune.

B. After clearing, grading, earth moving or excavation:

1. Wet the area down, sufficient enough to form a crust on the surface with repeated soakings, as necessary, to maintain the crust and prevent dust pick up by the wind.
2. Spread soil binders; and
3. Implement street sweeping as necessary.

C. During construction:

1. Use water trucks or sprinkler systems to keep all areas where vehicles move damp enough to prevent dust raised when leaving the site;
2. Wet down areas in the late morning and after work is completed for the day;
3. Use low sulfur fuel (.05% by weight) for construction equipment.

D. Phase and schedule construction activities to avoid high ozone days.

E. Discontinue construction during second stage smog alerts.

2. During grading and construction, the applicant shall be responsible for compliance with the following:

A. Require a phased schedule for construction activities to minimize daily emissions.

B. Schedule activities to minimize the amount of exposed excavated soil during and after the end of work periods.

C. Treat unattended construction areas with water (disturbed lands which have been, or are expected to be unused for four or more consecutive days).

D. Require the planting of vegetative ground cover as soon as possible on construction sites and super pads if construction is not anticipated within one month.

E. Install vehicle wheel-washers before the roadway entrance at construction sites.

F. Wash off trucks leaving site.

G. Require all trucks hauling dirt, sand, soil or other loose substances and building materials to be covered, or to maintain a minimum freeboard of two feet between the top of the load and the top of the truck bed sides.

H. Use vegetative stabilization, whenever possible, to control soil erosion from storm water especially on super pads.

I. Require enclosures or chemical stabilization of open storage piles of sand, dirt, or other aggregate materials.

J. Control off-road vehicle travel by posting driving speed limits on these roads.

3. During grading and construction, the applicant shall be responsible for assuring that vehicle movement on any unpaved surface other than water trucks shall be terminated if wind speeds exceed 15 mph.

4. During grading and construction, the applicant shall be responsible for the paving of all access aprons to the project site and the maintenance of the paving.

5. Prior to issuance of grading permits within the Specific Plan, the applicant shall be responsible for assuring that construction vehicles be equipped with proper emission control equipment to substantially reduce emissions.

6. Prior to issuance of grading permits within the Specific Plan, the applicant shall be responsible for the incorporation of measures to reduce construction related traffic congestion into the project grading permit. Measures, subject to the approval and verification by the Planning Department, shall include:

   - Provision of rideshare incentives.
   - Provision of transit incentives for construction personnel.
   - Configuration of construction parking to minimize traffic interferences.
   - Measures to minimize obstruction of through traffic lanes.
   - Use of a flagman to guide traffic when deemed necessary.

7. Prior to the issuance of building permits within the Specific Plan, the applicant shall provide proof to the City Community Development Director that the use will not emit objectionable odors or provide an air quality analysis including a quantitative assessment of odors and meteorological conditions consistent with the ASTM, Standard Method D1391 or Standard Method E679-79. Project design measures or additional control technology shall be implemented to ensure that odor emissions comply with SCAQMD standards.

8. Prior to the issuance of certificates of occupancy within the Specific Plan, the applicant shall prepare a Transportation Demand Management Plan (TDM) for review and approval by the SCAQMD and City. At a minimum, the plan shall include the following major elements and shall be implemented in accordance with SCAQMD Rule 1501:

   - Provision of a commuter transportation coordinator, with responsibilities to include coordinating and facilitating formation of carpools and vanpools, serving as a resource person for transit information, coordinating sale of transit passes, monitoring progress towards TDM goals and surveying employees, etc.

- Provision of a commuter center which would include such information as: bus and rail transit schedules/maps; telephone numbers for the designated transportation coordinator; bus route and Metrolink schedules; ridesharing promotional material; bicycle route and facility information; and location of on-site vanpool/carpool spaces.

- Carpool and vanpool program, including participation in a computerized matching system, provision of preferential parking, and provision of travel allowances/financial incentives.

- Encouragement of non-vehicle modes, such as bicycle, walk, or bus transit.

- Transit incentives and improvements, including subsidization of transit passes and dissemination of transit information and schedules.

LEVEL OF SIGNIFICANCE

The proposed project is anticipated to exceed SCAQMD's daily threshold emission during construction activities. In addition, the addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact. Mitigation Measures 1 through 6 will reduce this impact to the extent feasible. This impact, after mitigation, remains an unavoidable adverse impact.

The proposed project is anticipated to exceed SCAQMD's daily threshold emission levels for CO, NO_x and HC. The daily exceedance of the thresholds for CO, NO_x and HC is a long-term air quality impact. In addition, the addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact. Mitigation Measure 7 will reduce this impact to the extent feasible. This impact, after mitigation, remains an unavoidable adverse impact.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in a short-term air quality impact due to construction activities. The addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact. The project's incremental contribution to this impact will be reduced to the extent feasible by Mitigation Measures 1 through 6. This impact, after mitigation, remains an unavoidable adverse impact.

The project will result in the development of industrial uses which has the potential to generate objectionable odors which could affect nearby sensitive receptors. Mitigation Measure 7 will reduce this impact to a less than significant level.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in significant cumulative long-term impacts to air quality. The addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact. Mitigation Measure 8 along with the traffic mitigation provided in Section 5.4 of this EIR will reduce the proposed project's incremental contribution to this impact to the extent feasible. This impact, after mitigation, remains an unavoidable adverse impact.

5.6 NOISE

INTRODUCTION

This section addresses the potential impacts related to noise associated with the proposed McDonnell Centre project. The noise calculations prepared by EDAW, Inc., March 1997 are provided in Technical Appendix E of this EIR. The traffic assumptions used in the noise analysis are from the traffic study prepared by WPA Traffic Engineering, Inc., May, 1997. A copy of the traffic study is provided in Technical Appendix E of this EIR.

EXISTING CONDITIONS

Noise Measurement

Sound is technically described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the Decibel (dB). One decibel is approximately equal to the threshold of a person's hearing, 30 decibels is considered very quiet, 45 decibels is commonly considered the maximum indoor noise level, and 65 decibels is commonly considered the maximum outdoor noise levels. At 100 decibels noise begins to be intolerable and at 180 decibels noise is lethal.

Because the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discrimination against frequencies in a manner approximating the sensitivity of the human ear.

Community noise levels are measured in terms of the "A-weighted decibel." The "equivalent noise level" or L_{eq} is the average noise level on an energy basis for any specified time period. The L_{eq} for one hour is the energy average noise level during the hour, specifically, the average noise based on the energy content (acoustic energy) of the sound. It can be thought of as the level of a continuous noise which has the same energy content as the fluctuating noise level.

Several rating scales have been developed for measurement of community noise. These account for: (1) the parameters of noise that have been shown to contribute to the effects of noise on man; (2) the variety of noises found in the environment; (3) the variations in noise levels that occur as a person moves through the environment; and (4) the variations associated with the time of day.

The predominant rating scale now in use in California for land use compatibility assessment is the Community Noise Equivalent Level (CNEL). The CNEL scale represents a time weighted 24 hour average noise level based on the A-weighted decibel. Time weighted refers to the fact that noise that occurs during certain sensitive time periods is penalized for occurring at these times. The evening time period (7 p.m. to 10 p.m.) penalizes noises by 5 dB, while nighttime (10 p.m. to 7 a.m.) noises are penalized by 10 dB. These time periods and penalties were selected to reflect people's increased sensitivity to noise during these time periods. Table U depicts typical outdoor noise levels in terms of CNEL.

TABLE U

TYPICAL OUTDOOR NOISE LEVELS

LAND USE	CNEL
Apartment next to freeway	88
3/4 Mile from touchdown at major airport	86
Downtown with some construction activity	78
Urban High Density apartment	76
Urban Row Housing on major avenue	68
Old Urban Residential	59
Wooded Residential	51
Agricultural Cropland	44
Rural Residential	39
Wilderness Ambient	35

Source: EDAW, Inc.

CNEL = Community Noise Equivalent Level

Federal Agencies typically use the Day-Night Level (L_{dn}) description. In most applications, the differences between L_{dn} and CNEL metrics are negligible.

Noise Criteria

State of California

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles and motor boats, establish noise impact boundaries around airports, regulate freeway noise affecting classrooms, and set noise insulation standards. The standards which are applicable to the proposed project are the State Noise Insulation Standards found in the California Code of Regulations. This code requires acoustical insulation in areas subjected to 60 CNEL or greater in order to maintain an annual interior level of 45 CNEL in any habitable room of a dwelling unit. This code applies to new projects which include multiple-family residences, hotels, or motels.

The State Guidelines establish noise acceptability ranges for various land uses. These ranges are in terms of the CNEL scale. For residential land uses, an outdoor noise of 65 CNEL and an interior noise of 45 CNEL are considered acceptable. Outdoor use areas are typically defined by Caltrans and the State of California Noise and Land Use Criteria as rear yards, patios and balconies. Open Space park land has an exterior standard of 65 CNEL for active recreation areas. There is no other specific standard for general open space areas, although these noise levels should be as quiet as possible. Commercial, retail, and industrial land uses are not as sensitive to noise as residential land uses. Commercial land uses are less sensitive to exterior noise and more influenced by interior noise levels.

City of Huntington Beach General Plan

The City of Huntington Beach General Plan Noise Element identifies goals, objectives, and policies formulated to provide basic guiding principles for reduction of noise. The sound level limit for all residential areas is 65 CNEL for outdoor and 45 CNEL for indoor areas.

Land uses that are considered "noise sensitive" receptors which require low noise levels typically include churches, public and private schools, libraries, park and recreation facilities, institutions, residential units, and hospitals. Low noise levels are necessary for these uses in order to preserve their intended goals such as education, health promotion, and general state of well-being.

Existing Traffic Noise Levels

The principal source of noise on the project site and in the vicinity of the project site is vehicular traffic. The major source of traffic related noise occurs from the three major arterial streets that run adjacent to the site. These roadways are Bolsa Chica Street on the west, Bolsa Avenue on the south, and Springdale Street on the east. In addition, collector roads provide access to the site: Able Lane, Skylab Road, and Rancho Road. The greatest volume of traffic occurs on Bolsa Chica Street followed by Springdale Street then Bolsa Avenue (refer to the Exhibit 23 in the Transportation/Circulation section of this document).

Some land uses are considered more sensitive to intrusive noise levels than others, due to the amount of noise exposure (in terms of both exposure time and insulation from noise) and the types of activities typically involved. Residences, motels and hotels, schools, libraries, and recreation areas are generally more sensitive to noise than are sports facilities, and commercial and industrial land uses. Residential uses exist north and east of the project site.

The project site is currently designated for commercial/industrial uses and is in Huntington Beach, a highly urbanized location with significant ambient background noise levels. Many land uses in the vicinity of the project site are office or commercial retail uses which are not considered to be sensitive receptors.

The existing noise levels used in the analysis for the proposed project have been estimated in terms of the CNEL index by modeling the roadways for current traffic speed characteristics. No actual noise measurements were made. The roadway noise levels were computed using the Highway Noise Model published in the Federal Highway Administration ("FHWA Highway Traffic Noise Prediction Model," FHWA-RD-77-108, December 1978.).

The FHWA Model uses traffic volume (average number of vehicle trips per day), vehicle mix (percentage of cars, trucks, and heavy trucks), vehicle speed, and roadway geometry to compute the CNEL. Equivalent noise levels are computed for each of the time periods. Weighing these noise levels and adding them, results in the CNEL for the existing traffic estimated. For roadway analysis, worst-case assumptions have been made and are incorporated in the modeling effort. Traffic assumptions used to estimate existing noise levels, including traffic mixes and time distribution, are shown in Technical Appendix E of this EIR.

It is estimated that the existing roadway segments in the vicinity of the project site currently meet the criteria stated above for potential significant noise impacts. Table V details the current noise levels for each road segment.

Increases in project-generated traffic will be the greatest source of noise impacts to sensitive receptors located on roadways surrounding the project site. A low noise level is necessary for sensitive noise receptors in order to preserve their intended goals such as education, health promotion, and general state of mind. The primary sensitive noise receptors in the vicinity are residential units along Springdale Street, Rancho Road, Bolsa Chica Street and Westminster Avenue.

For the purposes of this study, six roadway segments were analyzed which are in close proximity to the proposed project and which are anticipated to experience project-generated increases in traffic. The roadway segments modeled are: 1) Springdale Street between Bolsa Avenue and Westminster Avenue, 2) Bolsa Chica Street between Bolsa Avenue and Rancho Road, 3) Rancho Road between Bolsa Chica Street and Westminster Avenue, 4) Bolsa Chica Street between Rancho Road and Westminster Avenue, 5) Westminster Avenue between Bolsa Chica Street and Rancho Road, and 6) Westminster Avenue between Rancho Road and Springdale Street. These roadway segments have concentrations of residential units which are representative of the surrounding area.

TABLE V

EXISTING CONDITION (1997)
DISTANCES TO CNEL NOISE CONTOURS

ROADWAY SEGMENT	DISTANCE TO CONTOUR[1]			CNEL AT 50 FEET[2]
	70 CNEL	65 CNEL	60 CNEL	
1. Springdale Street (between Bolsa Ave & Westminster Ave)	75	215	673	69.5 dB
2. Bolsa Chica Street (between Bolsa Ave & Rancho Road)	131	391	1,227	71.7 dB
3. Rancho Road (between Bolsa Chica St & Westminster Ave)	0	0	132	63.1 dB
4. Bolsa Chica Street (between Rancho Road & Westminster Ave)	128	381	1,198	71.6 dB
5. Westminster Avenue (between Bolsa Chica St & Rancho Road)	0	152	469	67.9 dB
6. Westminster Avenue (between Rancho Road & Springdale Street)	62	169	524	68.4 dB

Source: EDAW, Inc.

[1] Distance to CNEL contour from centerline of roadway in feet.
[2] CNEL at 50 feet from near travel lane centerline.
Note: CNEL = Community Noise Equivalent Level Margin of error is +/- 1.5 dBA.

Sensitive land uses in the immediate vicinity of the project site are depicted in Table W. Distance to the existing receptors is also provided in Table W.

Table V provides the distances to the existing 60, 65, and 70 CNEL contours for the six roadway segments modeled in the vicinity of the project site. These represent the distance from the centerline of the road to the contour value shown. In addition, Table V provides the CNEL at 50 feet from the nearest travel lane centerline. Varying topography, different distances of noise sensitive receptors from the road segments, different design and location of existing structures as well as variable traffic volumes, speeds, and mixes make it difficult to precisely forecast the existing traffic noise levels at specific locations. The projections depicted in Table V do not take into account the mitigating effects of any intervening structures, such as walls, that may effect ambient noise levels.

Comparing the CNEL contours in Table V to the average setbacks (distance to roadway centerline) detailed in Table W, it is estimated that five of the roadways segments currently expose sensitive receptors to noise levels which exceed the 65 CNEL exposure limit. As stated previously, the noise projections do not take into account the mitigating effects of any intervening structures, such as walls, that may effect ambient noise levels, thus this is considered a worst case analysis. The location of sensitive receptors located in areas which experience noise levels above 65 CNEL is considered a significant impact. This impact is an existing impact and not related to project implementation.

<u>**On-Site Noise Levels**</u>

Due to concerns voiced at previous Scoping Meetings for the EIR 91-2 project, a 24-hour noise measurement was completed near the north side of the proposed project along Rancho Road and the U.S. Navy Railroad. This analysis was prepared by Gordon Bricken and Associates on September 18, 1991 and is also contained in Appendix E. The measurements were taken at the property line between the north side of the existing McDonnell Douglas facility and the Navy railroad line adjacent to residential units (refer to Exhibit 4 in the Project Description section of this EIR). The study was prepared based on actual noise measurements rather than noise modeling.

The measurement reports an existing noise level of 59.5 CNEL at the property line. This is below the City of Huntington Beach General Plan standard of 65 CNEL. Based on the results of this analysis, existing daytime conditions comply with the City's General Plan guidelines for noise levels.

IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant noise effect if it will:

(p) Substantially increase ambient noise levels adjacent to the project.

TABLE W

SENSITIVE RECEPTORS

	ROADWAY SEGMENT	TYPE	DISTANCE TO ROADWAY CENTERLINE
1.	Springdale Street (between Bolsa Ave & Westminster Ave)	Residential	65 feet
3.	Rancho Road (between Bolsa Chica St & Westminster Ave)	Residential	60 feet
4.	Bolsa Chica Street (between Rancho Road & Westminster Ave)	Residential	70 feet
5.	Westminster Avenue (between Bolsa Chica St & Rancho Road)	Residential	60 feet
6.	Westminster Avenue (between Rancho Road & Springdale Street)	Residential	67 feet

Source: EDAW, Inc.

The City of Huntington Beach General Plan Noise Element specifies the sound level limit for all residential areas as 65 CNEL for outdoor and 45 CNEL for indoor areas. Any increase in noise above those limits will have a significant noise impact.

For the purposes of this EIR, significant impacts exist where the community noise standards are violated as a result of the implementation of the proposed project. The impacts related to the above stated criteria are discussed below.

Potential noise impacts are divided into two groups: short-term and long-term. The short-term temporary impacts are usually associated with noise generated by construction activities. Long-term impacts are generated by mobile sources and stationary sources.

In addition to the above criteria, noise impacts must be assessed in terms of perceived change in existing sound levels. Typically for short-term noise sources, an increase of at least 3 dB is usually required before most people perceive a change in noise levels, and an increase of 5 dB is required before the change will be clearly noticeable. Table X is based upon recommendations made by the Federal Interagency Committee on Noise (FICON) to provide guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. Their recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, it has been assumed for this analysis that they are applicable to all sources of noise that are described in terms of cumulative noise exposure metrics such as L_{dn} or CNEL. These metrics are generally applied to transportation noise sources, and define noise exposure in terms of average noise exposure during a 24-hour period with penalties added to noise that occurs during the nighttime or evening. L_{dn} or CNEL are often defined in terms of an average annual day, and are therefore quite different than the short-term noise level descriptors described above.

This EIR will utilize Table X in determining which long-term noise impact have the potential to be noticeable and considered to be a significant noise impact.

Currently, the five roadway segments exceed the impact criteria for noise levels. To determine project related impacts to these roadway segments, the criteria of "perceived change" will be used; if the street segments experience a noise increase over 1.5 dB beyond the estimated future noise conditions due to project related traffic, this will be considered a significant impact.

Short-term Construction Noise

The proposed project has the potential to result in short-term construction noise impacts to onsite and surrounding land uses due to the grading and construction activities. Construction noise represents a short-term impact on ambient noise levels. Although most of the types of exterior construction activities associated with the proposed project will not generate continually high noise levels, occasional single-event disturbances from grading and construction activities are possible. Construction activities will occur during daylight hours. Table Y depicts typical construction equipment noise. Construction equipment noise is controlled by the Environmental Protection Agency's Noise Control Program (Part 204 of Title 40, Code of Federal Regulations).

TABLE X

SIGNIFICANCE OF CHANGES IN CUMULATIVE NOISE EXPOSURE

AMBIENT NOISE LEVEL WITHOUT PROJECT (L_{DN} OR CNEL)	**SIGNIFICANT IMPACT**
>60 dB	+5.0 dB or more
>60 - 65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

Source: Federal Interagency Committee on Noise (FICON)

TABLE Y

CONSTRUCTION EQUIPMENT NOISE

TYPE	MAXIMUM LEVEL, dB AT 50 FEET
Bulldozers	87 dB
Heavy Trucks	88 dB
Backhoe	85 dB
Pneumatic Tools	85 dB

Source: Environmental Noise Pollution, 1977.

During the construction phases of the Specific Plan project, noise from construction activities will add to the noise environment in the immediate area. Activities involved in construction would generate maximum noise levels, as indicated in Table Y, ranging from 85 to 88dB at a distance of 50 feet. Construction activities will be temporary in nature and are expected to occur during normal daytime working hours. Construction noise impacts could result in annoyance or sleep disruption for nearby residences if nighttime operations occurred, or if unusually noisy equipment was used.

Noise would also be generated during the construction phase by increased traffic associated with transport of heavy materials and equipment. The noise would be short in duration and would occur primarily during daytime hours.

The proposed project has the potential to result in significant short-term noise impacts on nearby sensitive noise receptors. Implementation of Mitigation Measures 1 and 2 will reduce short-term construction noise impacts to noise sensitive land uses a level less than significant.

<u>**Long-Term Impacts**</u>

On-Site

The 24-hour measurement taken at the property line between the north side of the existing McDonnell Douglas facility and the Navy Railroad line reports a noise level of 59.5 CNEL. This is below the City's General Plan standard of 65 CNEL. This noise value was measured at the northern property line of the McDonnell Douglas Facility. Existing residential uses are located approximately 50 feet to the north of this measurement location. Noise levels experienced at the existing residential homes in this area are less than the measured value of 59.5 CNEL. This segment of Rancho Road near the Navy Railroad was not modeled in the traffic study prepared for the project. It is unknown what level of traffic increases will occur with project implementation. It is possible that increased traffic due to the project may cause this roadway segment to experience higher CNEL values in the future which have the potential to impact nearby residential units. This is considered a significant impact. Mitigation Measure 3 has been proposed to monitor noise levels on this roadway segment and ensure compliance with City noise standards. With implementation of proposed mitigation, this impact will be reduced to a level less than significant.

Off-Site

A potential acoustic impact of buildout of the project site is noise from project generated traffic along nearby roadways. Noise modeling for long-term impacts is based on year 2015 buildout future traffic conditions as discussed in the Transportation and Circulation section of this EIR. In order to determine project impacts, the base year 2015 traffic conditions (traffic volumes without the project), as well as year 2015 traffic conditions with project buildout were modeled for estimated noise levels. Tables Z and AA depict the year 2015 noise levels with and without the estimated traffic volumes from the proposed project. Table BB shows the project's incremental increase over the base year 2015 estimated noise levels.

TABLE Z

YEAR 2015 BUILDOUT WITHOUT PROJECT DISTANCES TO CNEL NOISE CONTOURS

ROADWAY SEGMENT		DISTANCE TO CONTOUR[1]			CNEL AT 50 FEET[2]
		70 CNEL	65 CNEL	60 CNEL	
1.	Springdale Street (between Bolsa Ave & Westminster Ave)	80	233	731	69.8 dB
2.	Bolsa Chica Street (between Bolsa Ave & Rancho Road)	184	565	1,782	73.3 dB
3.	Rancho Road (between Bolsa Chica St & Westminster Ave)	0	77.5	240	65.7 dB
4.	Bolsa Chica Street (between Rancho Road & Westminster Ave)	172	528	1,665	73.0 dB
5.	Westminster Avenue (between Bolsa Chica St & Rancho Road)	94	279	877	70.6 dB
6.	Westminster Avenue (between Rancho Road & Springdale Street)	98	291	916	70.8 dB

Source: EDAW, Inc.

[1] Distance to CNEL contour from centerline of roadway in feet.
[2] CNEL at 50 feet from near travel lane centerline.

Note: CNEL = Community Noise Equivalent Level Margin of error is +/- 1.5 dBA.

TABLE AA

YEAR 2015 BUILDOUT WITH PROJECT DISTANCES TO CNEL NOISE CONTOURS

ROADWAY SEGMENT	DISTANCE TO CONTOUR[1]			CNEL AT 50 FEET[2]
	70 CNEL	65 CNEL	60 CNEL	
1. Springdale Street (between Bolsa Ave & Westminster Ave)	86	252	789	70.1 dB
2. Bolsa Chica Street (between Bolsa Ave & Rancho Road)	209	648	2,045	73.9 dB
3. Rancho Road (between Bolsa Chica St & Westminster Ave)	0	111	349	67.4 dB
4. Bolsa Chica Street (between Rancho Road & Westminster Ave)	192	593	1,870	73.5 dB
5. Westminster Avenue (between Bolsa Chica St & Rancho Road)	91	270	848	70.4 dB
6. Westminster Avenue (between Rancho Road & Springdale Street)	102	305	960	71.0 dB

Source: EDAW, Inc.

[1] Distance to CNEL contour from centerline of roadway in feet.
[2] CNEL at 50 feet from near travel lane centerline.

Note: CNEL = Community Noise Equivalent Level Margin of error is +/- 1.5 dBA.

TABLE BB

NOISE INCREASE COMPARISONS

ROADWAY SEGMENT	EXISTING	BUILDOUT WITHOUT PROJECT		BUILDOUT WITH PROJECT	
	CNEL	CNEL	Increase Over Existing	CNEL	Increase Over Buildout Without Project
1. Springdale Street (between Bolsa Ave & Westminster Ave)	69.5 dB	69.8 dB	+0.3	70.1 dB	+0.3
2. Bolsa Chica Street (between Bolsa Ave & Rancho Road)	71.7 dB	73.3 dB	+1.6	73.9 dB	+0.6
3. Rancho Road (between Bolsa Chica St & Westminster Ave)	63.1 dB	65.7 dB	+2.6	67.4 dB	+1.7
4. Bolsa Chica Street (between Rancho Road & Westminster Ave)	71.6 dB	73.0 dB	+1.4	73.5 dB	+0.5
5. Westminster Avenue (between Bolsa Chica St & Rancho Road)	67.9 dB	70.6 dB	+2.7	70.4 dB	-0.2
6. Westminster Avenue (between Rancho Road & Springdale Street)	68.4 dB	70.8 dB	+2.4	71.0 dB	+0.2

Source: EDAW, Inc.

CNEL at 50 feet from near travel lane centerline.

YEAR 2015 NOISE LEVELS WITHOUT THE PROJECT

Comparing the CNEL contours in Table Z to the average setbacks detailed in Table W, it is estimated that roadways segments modeled for noise will expose sensitive receptors to noise levels which exceed the 65 CNEL exposure limit. Table BB shows the subsequent increase over existing noise levels As stated previously, the noise projections do not take into account the mitigating effects of any intervening structures, such as walls, that may effect ambient noise levels. The location of sensitive receptors in areas that will experience noise levels above 65 CNEL is considered a significant impact. This impact will occur without the project and is not related to project implementation.

YEAR 2015 NOISE LEVELS WITH THE PROJECT

Table AA depicts the year 2015 noise levels with the project. Table BB shows the subsequent increase over base year 2015 noise levels. With buildout of the project, it is estimated that all the street segments modeled will expose sensitive receptors to noise levels above 65 CNEL. However, this would occur even without project implementation as also shown in Table Z. Thus the project's incremental increase over the base year 2015 noise levels will be used as impact criteria. One roadway segment will result in an increase over 1.5dB, Rancho Road. The Rancho Road segment will increase in CNEL due to project implementation by 1.7dB. This increase is more than the 1.5dB standard for a perceived change for this worst case scenario. This increase in noise levels due to the project of up to 1.7dB over year 2015 noise levels is considered a significant impact. The results of the Year 2015 long-term buildout analysis are subject to change based upon the actual buildout of the Specific Plan project and other projects assumed in the SARA traffic model. Mitigation in Section 5.4 requires that updated TIA be commenced when 90% of the interim trip budget is built or has approved development applications (entitled) and no further development shall be entitled or constructed (beyond that development that generates 100% of trips for the interim trip budget) until the updated TIA and required mitigations are reviewed and approved by the City. This change in traffic analysis would also result in a change in the noise analysis. Mitigation Measure 3 has been proposed to monitor future buildout noise levels on this roadway segment and ensure compliance with City noise standards. With implementation of proposed mitigation, this impact will be reduced to a level less than significant.

CUMULATIVE IMPACTS

The cumulative impact analysis for noise addresses the subregional and local settings as described in Section 4.0 Regional, Subregional, and Local Setting of this EIR.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in a short-term construction noise impact. The projects incremental contribution will be mitigated to a less than significant level by the implementation of Standard City Policies and Requirements and Mitigation Measures 1 and 2.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in an incremental increase in traffic noise levels that exceed 65 CNEL. This is considered an unavoidable adverse impact.

STANDARD CITY POLICIES AND REQUIREMENTS

A. Construction shall be limited to Monday - Saturday 7:00am to 8:00pm. Construction shall be prohibited Sundays and Federal holidays.

MITIGATION MEASURES

1. Prior to issuance of grading permits within the Specific Plan, the applicant shall submit and have approved a noise mitigation plan to the Department of Community Development that will reduce or mitigate short-term noise impacts to nearby noise sensitive receptors. The plan shall comply with the City of Huntington Beach Noise Ordinance and shall include, but not be limited to:

   a. A criteria of acceptable noise levels based on type and length of exposure to construction noise levels;

   b. Physical reduction measures such as temporary noise barriers that provide separation between the source and the receptor; and

   c. Mitigation measures such as restrictions on the time of construction for activities resulting in high noise levels.

2. Prior to issuance of grading permits within the Specific Plan, the applicant shall produce evidence acceptable to the City Engineer that:

   a. All grading and construction vehicles and equipment, fixed or mobile, shall be equipped and maintained with effective muffler systems that use state of the art noise attenuation.

   b. Stockpiling and/or vehicle staging areas shall be located as far as practicable from sensitive noise receptors.

   c. All operations shall comply with the City of Huntington Beach Noise Ordinance.

3. Commensurate with the updated TIA (refer to Mitigation Measure 8 in Section 5.4), an updated acoustical analysis shall be performed on the following two roadway segments: 1) Rancho Road near the Navy Railroad; and 2) Rancho Road between Bolsa Chica Street and Westminster Avenue to determine if potential vehicular noise will impact nearby residential units. The study will be prepared under the supervision of an acoustical engineer and include a discussion of the need for noise attenuation measures and/or noise barriers to ensure compliance with City noise standards. This analysis shall be submitted to and approved by the Community Development Department.

LEVEL OF SIGNIFICANCE

The proposed project has the potential to result in significant short-term noise impacts during construction activities. Implementation of Standard City Policies and Requirements and Mitigation Measures 1 and 2 will reduce short-term construction noise impacts to a level of insignificance.

It is possible that increased traffic due to the project may cause the Rancho Road near the Navy Railroad roadway segment to experience higher CNEL values in the future which have the potential to impact nearby residential units. With implementation of Mitigation Measure 3, this impact will be reduced to a level less than significant.

The proposed project will increase the year 2015 traffic noise levels by up to 1.7dB. The increase in noise levels due to the project along the segment of Rancho Road between Bolsa Chica and Westminster is considered a significant impact. With implementation of Mitigation Measure 3, this impact will be reduced to a level less than significant.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in a short-term construction noise impact. The projects incremental contribution will be mitigated to a less than significant level by the implementation of Standard City Policies and Requirements and Mitigation Measures 1 and 2.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in an incremental increase in traffic noise levels that currently exceed 65 CNEL. This is considered an cumulative unavoidable adverse impact.

5.7 EARTH CONDITIONS

EXISTING CONDITIONS

The following discussion is taken from the past soils/geotechnical analyses that have been prepared for portions of the 307-acre project site. The following is a listing of those past studies:

- Report of Foundation Investigation, 1982 (covers portion of Planning Area 3 north of Skylab Way)
- Phase I Environmental Assessment, 1991 (covers 62-acre lot - Planning Area 2)
- Foundation Investigation for Proposed Building 46 Consolidation (covers portion of Planning Area 1)
- A limited Phase II Investigation, 1993 (covers 11.84-acre parcel located within Planning Area 2)
- Geotechnical Investigation, 1993 (covers 11.84-acre parcel located within Planning Area 2)
- Huntington Beach General Plan Update Technical Background Report, 1992 (covers City of Huntington Beach)

Local Geology

The project area is located near the eastern edge of the lower Santa Ana Hydrologic Unit in the coastal plain of Orange County. From oldest to youngest, the stratigraphic units consist of the following: metamorphic rock of Jurassic geologic age which is overlain by the Wissler formation of Miocene age; the Repetto and Pico formations of the Pliocene age; the San Pedro formation of the Pleistocene age and the unnamed surface fluvial and alluvial deposits of Holocene and late Pleistocene age.

The upper 100 feet of fluvial and alluvial deposits are composed mainly of unconsolidated clays, silts, silty sands and sands, with some gravels found mainly in the lower portion of the formation. The deposits were derived from sediments of the Santa Ana River, the local hills and the underlying marine deposits.

The natural soils beneath the site consist of silt, clay and sand. The soils are soft to moderately firm. In the vicinity of the site and the soil filtration rate is low at less than 10 inches per hour. The material near the site is composed primarily of low permeability, silty to fine sandy clays, and clayey silts and fine sands.

Seismicity

The project site is located in the seismically active southern California area. The site is not located in an Alquist-Priolo Special Studies Zone. In 1972 the California State Legislature enacted the Alquist-Priolo Geology Hazard Zones Act. Pursuant to this act, the state geologist has delineated special studies zones to encompass all potentially and recently active traces of the San Andreas, Calaveras and San Jacinto faults, among others, which may contribute a potential hazard to structures from faulting activity.

The nearest active fault to the project site is the Newport-Inglewood fault located approximately 2 miles to the southeast. This fault has a probable magnitude of 6.7 on the Richter scale. Movement along this fault has been continuing sporadically since approximately the Middle Miocene Age. Net earth movement due to faulting on the Newport-Inglewood Fault System tends to be right-lateral strike-slip in nature. This means that overall movement occurs primarily in a horizontal plane with the northeast sides of the fault moving south and the southwest sides moving north.

Faults within the City of Huntington Beach determined to be geologically active and expected to be associated with the ground rupture at some time in the future are the North Branch, Bolsa-Fairview, and South Branch Faults; all of these are faults within the Newport-Inglewood Fault Zone. The project site lies approximately 2 miles northwest of this fault zone. Surface rupture has apparently not occurred within the past 9,000 years on these faults in the Huntington Beach area.

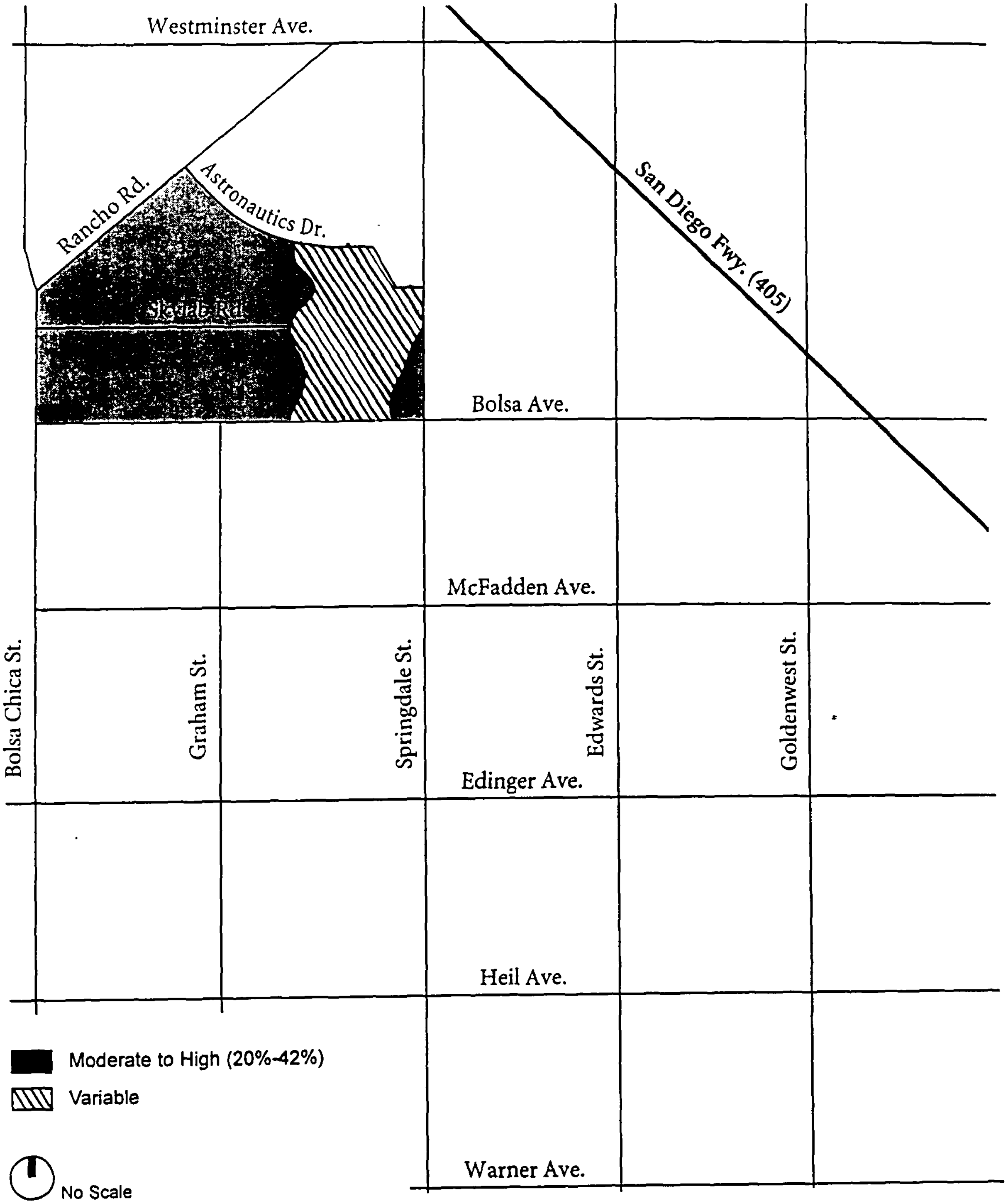
Liquefaction

Liquefaction is defined as the transformation of a granular material from a solid state into a liquefied state as a consequence of increased pore water pressure. Groundshaking resulting from an earthquake is capable of providing the mechanism for liquefaction, usually in saturated, loose, medium to fine-grained sands, silty sands, and certain types of clayey soils. The potential for liquefaction is greatest in areas of shallow ground water or near-saturated soils at generally shallow depths. The porous alluvial soils, when saturated or wet, have a moderate to high potential for liquefaction. The likelihood of liquefaction occurring depends on many factors including differences in the compaction of soil layers, nature of the soil, depth of the deposits, and depth of the water table.

Based upon the existing soil types onsite and the level of filtration to the soils, the potential for liquefaction to occur onsite is high. Liquefaction occurring as a result of a seismic event would result in a localized area of subsidence.

Expansive Soils

Surface and subsurface silt type soils exist onsite. According to the City's Expansive Soil Distribution Map, expansive soils range in percentage of clay content from Variable to Moderate/High 20% - 40% in the project area. The map indicates that the major deposits of clay having a Moderate-to-High Expansion potential are located within the inland areas of the northern half of the City. The soils within this area are primarily clay, clay loams, and clay adobe with percentages of clay size particles ranging from about 20 to 42 percent. Exhibit 38 depicts the expansive soil distribution in the vicinity of the project site.



EDAW, Inc.

Source: City of Huntington Beach General Plan

Exhibit 38

Expansive Soil Locations

Hazardous Materials

A Phase I Environmental Assessment was conducted by Camp Dresser and McKee, Inc. on March 15, 1991 for the portion of the project site east of Able Lane within Planning Area 2.

A follow-up Phase II Soil Investigation was performed in November 1993 also by Camp Dresser and McKee, Inc. This area east of Able Lane has a history of strawberry cultivation. This assessment included a site survey to evaluate contamination potential associated with onsite storage of hazardous materials and use of pesticides.

The report details site conditions at the time the study was prepared. Since the 1991, several parcels detailed in the original Phase I report have been developed. The remaining undeveloped areas east of Able Lane are assumed to still contain potential chemical contamination. Both pesticides and herbicides were applied to the soil to assist in the strawberry cultivation. Table CC lists the chemicals which were used by the farms onsite.

Chemicals applied onsite are used in accordance with the manufacturer's instructions concerning the method and amount of application. Most of the chemicals are rapidly broken down (short-lived) upon application. Methyl bromide is the only product used which is classified as having high potential for environmental persistence. No accidental spills or releases of chemicals have been reported at the project site.

No evidence of extensive site contamination was uncovered. Based on the small quantities of stored materials at the site, the potential for extensive contamination is low.

IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant effect if it will:

(r) Expose people or structures to major geologic hazards.
(v) Create a potential public health hazard to people or animal or plant populations in the area affected.

For the purposes of this EIR, significant geologic hazards are considered geologic conditions that cannot be overcome by design using reasonable construction and/or maintenance practices in future development that will occur with implementation of the proposed project. The impacts related to the above stated criteria are discussed below.

Local Geology

Currently the topography of the project site is flat. Buildout of the Specific Plan will most likely consist of grading and excavating associated with the development of future industrial, office and support retail facilities. It is unknown at this time the extent and depth of grading and excavating necessary for future project implementation.

TABLE CC

CHEMICALS USED ON STRAWBERRY FIELDS

TRADE/COMMON CHEMICAL NAME	APPLICATION METHOD	COMMENTS
Methomyl Liquid	Sprayed	Insecticide
Dibrom	Sprayed	For mites and worms
Benamill	Sprayed	Fungicide
Vinclozolin	Sprayed	Fungicide
Methyl Bromide	Fumigation	Biocide, kills all vegetation
Chloropicrin	Fumigation	Biocide, kills all vegetation
Avid Liquid	Sprayed	Insecticide for mites
Pyellin	Sprayed	Insecticide for worms
Javelin	Sprayed	Insecticide for worms
Carbaryl	Sprayed	Insecticide for worms

Source: Camp Dresser and McKee, Inc. April 1991.

The project lies in an area of varied soils and rock units. The alluvial deposits and scattered fill soils that occur onsite are potentially compressible in their present states under foundation loadings. Development without proper soil compaction could result in structure failure and impacts to humans. Since past soils/geology studies do not cover the entire 307-acre site or 134 acres (to be developed with future uses) , standard City policies and mitigation are proposed. The policies/mitigation requires a site specific geology study to determine competency of soils and to evaluate the extent of compressibility of the soils for structural design purposes. With implementation of standard City policies and requirements and Mitigation Measure 1, potential impacts are reduced to a level less than significant.

Seismicity

The proposed project site lies in a seismically active area. Seismic hazards constitute an existing safety condition experienced by all developments in the southern California region. The principal seismic considerations for development of the subject site are surface rupturing of fault traces and damage caused by ground shaking or seismically induced ground settlement. The potential for any or all of these hazards depends upon the most recent fault activity and proximity of the fault to the project site. The possibility of damage due to ground rupture is considered likely due to proximity of the Newport-Inglewood fault which is approximately 2 miles away. This is considered a significant impact. Mitigation has been proposed to reduce this impact.

The Newport-Inglewood fault is the most likely fault to impact the site with significant ground shaking should an earthquake occur. Ground shaking resulting from earthquakes accounts for the greatest amount of damage and injury. Additional faults in the area which could contribute to ground shaking are summarized in Table DD.

Determining the magnitude of the maximum probable earthquake is subjective and requires risk analysis depending on the type of structure or development involved. The maximum probable earthquake is one that is likely to occur with a fairly high probability.

Since past soils/geology studies do not cover the entire 307-acre site or 134 acres (to be developed with future uses), Mitigation Measures 2 and 3 have been proposed. With the implementation of these mitigation measures, potential impacts anticipated related to seismicity are reduced to a level less than significant.

Liquefaction

Seismic-induced liquefaction can cause ground failure resulting in severe damage to buildings, flatwork, pavement and underground utilities. Liquefaction of soil may cause severe damage to structures supported on shallow foundations. The project site lies in an area containing porous alluvial soils which when saturated or wet, have a moderate to high potential for liquefaction. It is emphasized that liquefaction potential depends on may factors. These factors include groundwater level, soil type, relative density and the intensity and duration of ground shaking. The potential for liquefaction can vary over short lateral distances, and the liquefaction potential on the project site may vary from one building site to the next.

TABLE DD

FAULTS IN THE VICINITY OF THE PROJECT

Fault Zone	Distance to Huntington Beach	Maximum Probable Magnitude (Richter)	Estimated Maximum Bedrock Acceleration (g)
Newport-Inglewood	0-3 miles	6.7	0.65+
Palos Verdes	10±	6.5	0.31
Whittier	21±	6.8	0.21
Elsinore	25±	7.2	0.20
San Jacinto	50±	7.5	0.10
San Andreas	53±	7.7	0.10

Source: EDAW, Inc.

(g) = Force of gravity per unit mass at a given point

Since past soils/geology studies do not cover the entire 307-acre site or 134 acres (to be developed with future uses), mitigation is proposed to reduce impacts associated with liquefaction. With implementation of Mitigation Measure 4, potential impacts will be reduced to a level of less than significant.

Expansive Soils

Expansive soils not detected prior to construction may severely damage structural foundations, slabs, pavements and exterior flatwork. This is considered a significant impact. Because geologic conditions vary widely, it is difficult to generalize about expansive soil potential. Expansive soils may occur in areas thought to be free of this condition.

Grading operations required to bring construction sites to design grade can result in the presence of both expansive and nonexpansive soils on a single lot unless selective grading procedures (use of a single soil type or a well mixed blend of two or more soil types near finished pad elevation) are utilized.

Recompaction of soils with expansive potential can increase the possible adverse affects to structures, to fill slopes, and flatwork. Expansive soils compacted to a higher degree of compaction than natural uncompacted conditions will have a tendency to expand with the addition of irrigation or runoff water. If compacted expansive soils are allowed to dry out, shrinkage would occur which could also affect structures and flatwork. Repetitive wetting and drying of expansive soils on a compacted slope would tend to cause surficial instability of the slopeface through repetitive expansion and contraction with subsequent reduction of in-place density.

The use of expansive soils in fill embankments increases the potential for surficial instability with increasing slope height. Expansive soils can inhibit achievement of proper compaction during fill placement because of the difficulties in achieving optimum moisture conditions in silt or clay-type soils. Proper compaction is considered to be at least 90 percent of the maximum density for a specific soil type. Compaction is a function of the amount of moisture in the soil and the maximum density with a narrow range.

Without thorough grading and recompaction of the expansive soils known to exist onsite, structural damage may occur with project implementation. This is considered a significant impact. Since past soils/geology studies do not cover the entire 307-acre site or 134 acres (to be developed with future uses), mitigation measures are proposed to reduce potential impacts associated with expansive soils. With implementation of Mitigation Measures 5 and 6, impacts will be reduced to a level less than significant.

Hazardous Materials

Implementation of the project will result in an increased number of persons working on the project site, portions of which have been exposed to chemicals. Chemicals have been applied to portions of the project site east of Able Lane. Because these chemicals were reported to be applied in the correct manner and no past accidental spill or releases of chemicals have been reported onsite, the potential for human exposure related impacts is low. No significant impacts are anticipated.

CUMULATIVE IMPACTS

Based on the information obtained regarding local geology, seismicity, liquefaction, expansive soils, and hazardous materials, buildout of the proposed conceptual plan will not result in the creation of any adverse cumulative impacts. No cumulative impacts have been identified.

STANDARD CITY POLICIES AND REQUIREMENTS

A. Prior to submittal for building permits, a detailed soils analysis shall be prepared by a registered Soils Engineer. This analysis shall include onsite soil sampling and laboratory testing of materials to provide detailed recommendations regarding grading, chemical and fill properties, foundations, retaining walls, streets and utilities.

B. Prior to issuance of building permits, a grading plan shall be submitted to the Department of Public Works for review and approval (by issuance of a grading permit). A plan for silt control for all water runoff from the property during construction and initial operation of the project may be required if deemed necessary by the Director of Public Works.

MITIGATION MEASURES

Local Geology

1. Prior to issuance of grading permits within the Specific Plan, additional studies as deemed necessary by the Director of Public Works, shall be performed to determine native elevations and evaluate the extent of compressibility of the soils for structural design purposes. These studies shall be reviewed and approved by all appropriate departments at the City of Huntington Beach.

Seismicity

2. Prior to issuance of grading permits within the Specific Plan, it shall be proven to the Department of Public Works that all structures are designed in accordance with the seismic design provisions of the Uniform Building Codes or Structural Engineers Association of California to promote safety in the event of an earthquake.

3. An engineering geologist shall be engaged to submit a report indicating the ground surface acceleration from earth movement for development parcels. All structures shall be constructed in compliance with the g-factors as indicated by the geologist's report. Calculations for footings and structural members to withstand anticipated g-factors shall be submitted to the City for review prior to the issuance of grading permits.

Liquefaction

4. Prior to issuance of grading permits within the Specific Plan, grading plans shall demonstrate that alluvial soils shall be removed in the areas that will receive fill or foundation loading down to competent materials and recompacted. Additional studies may be deemed necessary by the Director of Public Works, to evaluate the extent of liquefaction of the soils for structural design purposes.

Expansive Soils

5. Prior to approval of grading permits within the Specific Plan, the applicant shall prepare a report for approval by the Director of Public Works which assesses and provides recommendations for the following:

    a. Specific measures for adequate foundation, paving and flatwork design in areas of any remaining expansive soils.

    b. Identify the Expansive Index onsite and specify where necessary recommendations included, but not limited to: 1) presaturation of soils prior to concrete placement; 2) raised floors; 3) post-tensioned slabs; 4) thicker slabs; 5) deeper footings; 6) the addition of soil amendments to facilitate wetting during compaction.

6. The applicant(s) shall be responsible for remedial removal of expansive soils onsite during grading and prior to construction. Should any construction occur on expansive soils, the applicant(s) shall adhere to the recommendations identified above in Mitigation Measure 5.

LEVEL OF SIGNIFICANCE

With implementation of standard City policies and requirements and Mitigation Measure 1, potential impacts related to local geology are reduced to a level less than significant.

With implementation of Mitigation Measures 2 and 3, impacts related to seismicity will be reduced to a level less than significant.

With implementation of Mitigation Measure 4, impacts related to liquefaction will be reduced to a level less than significant.

With implementation of Mitigation Measures 5 and 6, impacts related to Expansive Soils will be reduced to a level less than significant.

No significant impacts are anticipated related to Hazardous Materials.

Based on the information obtained regarding local geology, seismicity, liquefaction, expansive soils, and hazardous materials, buildout of the proposed conceptual plan will not result in the creation of any adverse cumulative impacts. No cumulative impacts have been identified.

5.8 DRAINAGE/HYDROLOGY

EXISTING CONDITIONS

The information contained in this section is summarized from the March, 1997 Infrastructure Master Plan. The study is provided as Technical Appendix F of the EIR.

On-Site Drainage

The project site is located in a low land area of Huntington Beach. The elevation at the site is approximately 20 feet above sea level in an area of gradual elevation change. The natural slope of the site is presently to the southwest. The Santa Ana River is located approximately 5 miles to the southeast.

For the purpose of the drainage analysis, a total of 329.61 acres was included. The extra acreage includes the property to the centerline of Bolsa Avenue and Bolsa Chica Street. The commercial property on the south side of Bolsa Avenue is also included since it drains towards Bolsa into the catch basins and storm drain, which ultimately ties into the 307-acre project site drainage system. Storm water runoff currently flows from the project area by way of existing storm drains. The residential drainage areas northerly of the project area have their own area drainage facilities and do not affect the proposed property. Regional flood control channels exist along Bolsa Chica Street and Springdale Street. The existing drainage area boundaries and node numbers which relate to the calculations in the drainage analysis are shown on Exhibit SD-1, which is contained in Appendix F of the EIR. There are three existing storm drain systems surrounding the project area: the area to the east drains southerly into the Orange County Flood Control District (OCFCD) C-4 Westminster Channel; the area to the south drains westerly into the OCFCD C-2 Bolsa Chica Channel; the areas on the west and to the north drain to the OCFCD C-2 Bolsa Chica Channel and to the C-3 Anaheim Barber City Channel, respectively. The Bolsa Chica Channel, an open channel, is located adjacent to the western boundary of the site adjacent to Bolsa Chica Street. The Bolsa Chica Channel is designated as area "C" on Exhibit SD-1 in Appendix F. The existing condition runoff volumes for a 100-year storm event (Q100) for the existing 329.61-acre drainage area is shown in Table EE. Advanced Engineering Software (AES) was utilized for estimation of the flows for 100-year return frequency. The results of these calculations are included in Appendix F under sections "100-year Hydrology" for existing and ultimate conditions. Water Surface Hydraulic Gradient "WSPG" was utilized for hydraulic calculations and the results and an explanation of methodology is included in Appendix F under title "Hydraulic Calculations".

The existing drainage system for the project area is depicted on Exhibit 39. A majority of the site is in a developed condition with buildings and paved parking areas. Some areas primarily to the east and west of Able Lane are still undeveloped and/or unpaved, as they were previously utilized by agriculture. The existing storm drain system, which lies within private streets or easements, provides drainage for the site, draining the majority of the site to the west, towards Bolsa Chica Channel. A small eastern portion of the site drains to the channel adjacent to the eastern boundary of Springdale Street (Orange County Flood Control District (OCFCD) C-4 Westminster Channel).

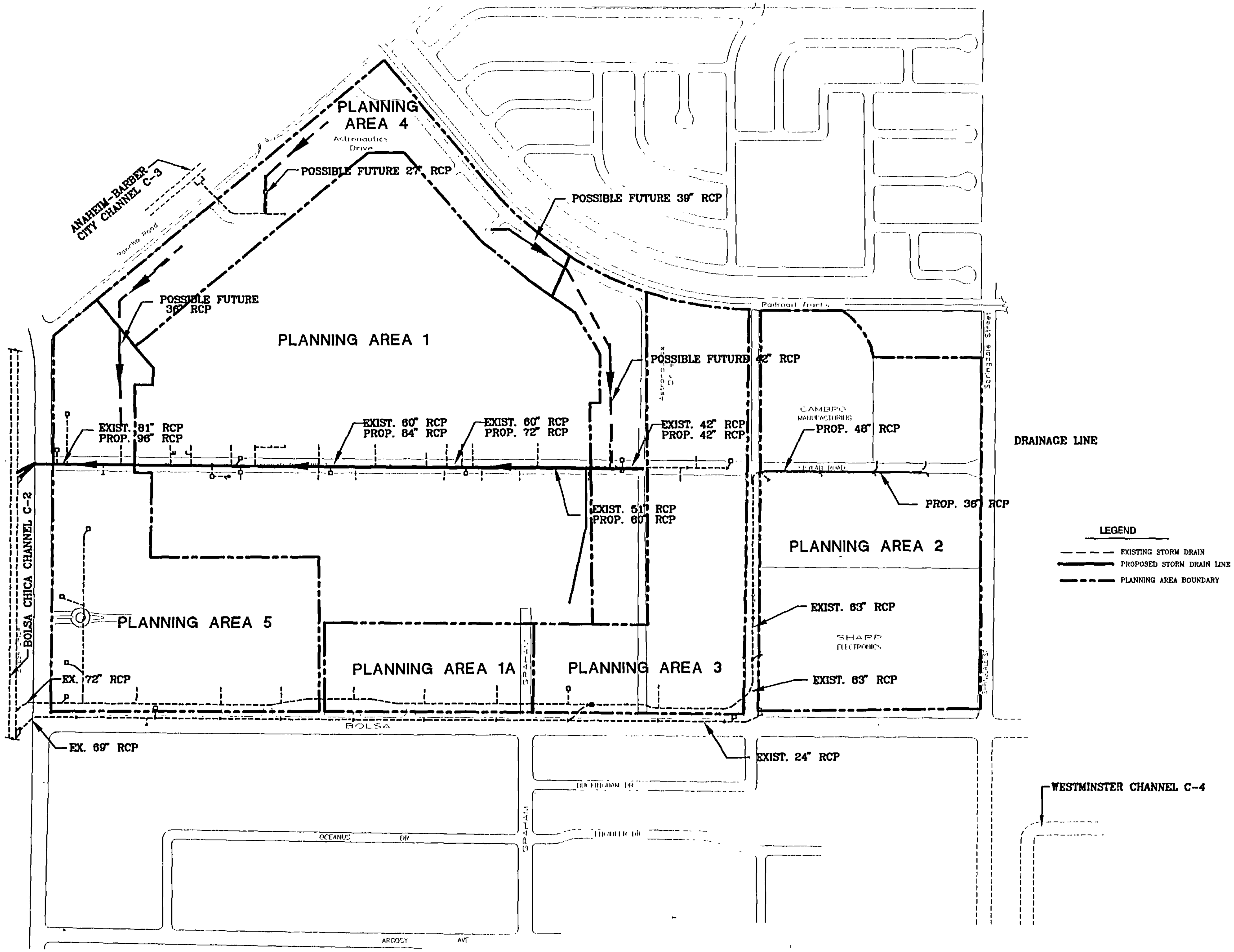
TABLE EE

EXISTING AND PROPOSED RUNOFF VOLUMES FOR A 100-YEAR STORM EVENT

SUBAREA	ACRES	EXISTING Q100(cfs)	PROPOSED Q100(cfs)	FLOW INCREASE (cfs)
A-1 to A-14	65.74	139.7	187.4	47.7
B	70.14	169.0	159.1	***
A-16.1 to A-31	41.03	70.1	70.1	0.0
C	140.50	360.1	371.6	11.5
D	12.20	27.7	36.9	9.2
TOTAL	**329.61**	**766.6**	**825.1**	**58.5**

Source: Adams Streeter

Note: Sub-areas are shown on Exhibit SD-1 and SD-2 with an Appendix F.
-A (1) represents areas A-1 to A-4
-A (2) represents areas A16.1-A31



No Scale

EDAW, Inc.

Source: Adams-Streeter

Exhibit 39

Existing/Proposed Storm Drainage System

The project's most easterly and southerly areas are currently tabled to drain into the newly constructed storm drain system adjacent to Bolsa Avenue. This system was approved by the OCFCD and the City of Huntington Beach Master Plan and constructed in fall of 1995. This system is designed for ultimate conditions as per approved *"Hydrology Study and Hydraulic Analysis for Proposed Storm Drain System North of Bolsa Avenue"*, dated August 1, 1995. Through the approximate center of the property, drainage is piped westerly to the OCFCD C-2 Bolsa Chica Channel.

The piped system currently serving the existing McDonnell Douglas Aerospace facilities is at its maximum capacity.

Flooding

Flood Insurance Rate Maps are prepared by the Federal Emergency Management Agency (FEMA), and show flood hazard boundaries. According to the FEMA map, the project site is located in Zone X. Zone X designates areas of 500-year flood; which contain areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and which are protected by levees from 100-year flood. Zone X is not considered a flood hazard area and is not subject to Federal Flood development requirements.

Historically, the Bolsa Chica Channel has reached near capacity during larger rain storms in the area. The following information was obtained from MDA personnel regarding the January 4, 1995 storm: No storm waters within Bolsa Chica Channel flowed onto Bolsa Chica Street within the reach of Bolsa Avenue to Rancho Road; no storm waters collected within Bolsa Chica Street overflowed the easterly curb onto the parkway or into the MDA facilities nor at the intersection of Bolsa Avenue and Bolsa Chica Street; the high-rise office building's basement did not become flooded at any time during the storm. It should be noted that there was a very low tide at the time of this flood and both the County of Orange Environmental Management Agency (EMA) and City of Huntington Beach believe that the Channel would have over-topped had the tide been in. The EMA has suggested that "the Bolsa Chica Channel may not provide flood protection in accordance with the goals of the National Flood Insurance Program." The City of Huntington Beach has also indicated that Navy-owned bridges at Bolsa Avenue and Saybrook, which include the bridge piers, act as an obstruction in the channel and reduce channel capacity.

Water Quality

Water quality in California is regulated by the US Environmental Protection Agency's National Pollution Discharge Elimination System (NPDES), which controls the discharge of pollutants to water bodies from point and non-point sources. NPDES permits are required for any commercial and/or industrial construction sites. As stated above, the existing site is currently developed with existing MDA facilities, including athletic fields utilized by MDA. The site also contains open fields, which at one time were in agricultural production. It is anticipated that the existing runoff from the site contains concentrations of fertilizers and pesticides associated with the fields ands other compounds typical of urban runoff. These include particulate solids (total suspended solids), nutrients (total nitrogen compounds and phosphates) and oxygen demanding substances (BOD).

IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant effect if it will:

(f) Substantially degrade water quality
(q) Cause substantial flooding, erosion or siltation.

For the purposes of this EIR, a significant impact would occur if implementation of the proposed project would cause or expose people and property to substantial flooding or make worse existing drainage deficiency problems. The impacts related to the above stated criteria are discussed below. Additionally, a significant impact would occur if implementation of the project would cause a substantial degradation of water quality.

On-Site Drainage

Buildout of the property under the proposed Specific Plan will incrementally alter the amount of impervious surface (concrete, asphalt, etc.). The amount of storm water runoff is anticipated to increase due to additional developed areas onsite. The proposed Q100 figures for the drainage area of the project site are presented in Table EE. The hydraulic calculation results and methodology are included in Appendix F under the title "Hydraulic Calculations". Under a 100-year storm event, the proposed Specific Plan project will result in a total flow increase of 58.5 cfs.

Changes to the existing MDA facility (i.e. new building) would not impact the drainage system, since the replacement would already be on currently developed property. In the event that the MDA facility would no longer remain, and this 100-acre area became available for new development, the Master Plan Drainage Study proposes to provide a new piped drainage facility paralleling the existing (or replacing the existing entirely), draining to the C-2 Bolsa Chica Channel.

Preliminary pipe sizes required to convey calculated 100-year flows are shown in Exhibits 39 of this EIR and SD-2, which is contained in Appendix F of the EIR. The areas proposed at the project's northerly boundary will drain westerly and northerly into the OCFCD C-3 Anaheim Barber City channel. The existing mainline storm drain (48") shall provide enough capacity for ultimate conditions. However, some improvements will be required for future developments upstream of the existing 48" storm drain as shown on Exhibit SD-2 for area "D" (see Appendix F). As stated previously, the project's most easterly and southerly areas are currently tabled to drain into the newly constructed storm drain system adjacent to Bolsa Avenue. This system was approved by the OCFCD and the City of Huntington Beach Master Plan and constructed in fall of 1995. This system is designed for ultimate conditions as per approved *"Hydrology Study and Hydraulic Analysis for Proposed Storm Drain System North of Bolsa Avenue"*, dated August 1, 1995.

The proposed storm drain systems as shown on Exhibit 39 and Exhibit SD-2 are considered to be Reinforced Concrete Pipe (RCP) with the minimum pipe size of 18 inches. The proposed pipe sizes are estimated for planning purposes only and are subject to refinement in the final design of the project. The proposed storm drain system has also been incorporated as part of the Specific Development Concept (refer to Section 4.3 Public Facilities Plan). The future storm drain requirements were anticipated as part of the Specific Plan process in an effort to ensure the infrastructure would adequately support future land uses that could result from the Specific Plan implementation. Since the Specific Plan buildout will occur over a period of several years, the proposed storm drain system improvements will be phased consistent with the level of future development. A proposed phasing plan is included in the Specific Plan and discussed in Section 3.0 Project Description of this EIR. A potential project-specific drainage impact would occur if the future storm drain system components are not brought on line when future demands identify the need. Mitigation Measure 1 will reduce this potential impact to a level less than significant.

Construction related activities that require grading and vegetation removal will increase runoff, causing greater erosion and downstream siltation. Runoff volume from a single storm will be increased from the present volume, depending on the existing and future soil characteristics, the storm intensity and duration, and storm drain improvements associated with buildout of the Specific Plan project. This is considered a significant impact. Mitigation measure will reduce this impact to a level less than significant.

Flooding

Buildout of the proposed project is not anticipated to expose people and property to flood hazards. The project is located within a 500-year flood zone (Zone X), which is not subject to Federal Flood Development requirements. Due to concerns regarding drainage into Bolsa Chica Channel, meetings between the project applicant, the City of Huntington Beach, and the County of Orange Flood Program Division have occurred (refer to correspondence within Appendix F). The potential for off-site flooding which may be increased due to project implementation is a significant impact. To ensure that no significant impacts will occur with the implementation of the project, Mitigation Measures 1 and 3 have been proposed. These mitigation measures will reduce this impact to a level less than significant.

Water Quality

The proposed project has the potential to result in a long-term impact on water quality due to the addition of pollutants typical of urban runoff. Volatile solids in urban runoff can originate: from accidental spills or deliberate dumping of lubricating oils or fuel oils; from emissions of engines during normal operations such as vehicle exhaust particulates or drippings of crankcase oil; from dustfall or rainout of atmospheric particulates; from spilling of crude or refined petroleum products; from leached or eroded pavement; from natural seepage on land; or from natural biogenic sources. The proposed project has the potential to result in an impact on water quality due to the addition of volatile solids to the runoff.

Stormwater flows from the future buildout of the Specific Plan will be subject to the NPDES permit process. Through the NPDES Permit process, the City currently requires contributors to non-point runoff pollution to establish Best Management Practices (BMPs) to minimize the potential for pollution. Under this program, the developer is responsible for identification and implementation of a program of BMPs which can include special scheduling of project activities, prohibitions of certain practices, establishment of certain maintenance procedures, and other management practices to prevent or reduce the pollution of downstream waters. Typical elements of such a BMP program would include addressing the use of oil and grease traps, detention basins, vegetated filter strips, and other common techniques in order to preclude discharge of pollutants to local storm drains and channels. Mitigation Measures 4 and 5 will reduce potential water quality impacts to a less than significant level.

CUMULATIVE IMPACTS

Buildout of the proposed Specific Plan in conjunction with future related projects will incrementally contribute to a cumulative increase in the total amount of surface runoff erosion and water quality impacts. Construction related activities that require grading and vegetation removal will increase runoff, causing greater erosion and downstream siltation. Implementation of proposed mitigation and standard City policies and requirements will reduce the project's incremental contribution to cumulative impacts to a level less than significant.

STANDARD CITY POLICIES AND REQUIREMENTS

A. Prior to issuance of building permits, drainage and hydraulic studies shall be submitted for Public Works approval.

MITIGATION MEASURES

1. Prior to the issuance of building permits within the Specific Plan, the project applicant shall implement conditions of the Public Works Department regarding storm drainage improvements which shall include, but not be limited to:

    - Construct the necessary storm drainage improvements (identified on Exhibit 39 within the EIR) to handle increased flows.
    - Ensure that future building pads are placed at elevations suitable to withstand 100-year flood for sites adjacent to Bolsa Chica Street between Bolsa Avenue and Rancho Road.
    - Confine street flows within the street right-of-way.

2. Prior to the issuance of grading permits within the Specific Plan, the project applicant shall submit and obtain approval of final drainage and erosion control plans for each project component. These final drainage plans shall demonstrate that future post-development stormwater discharge levels from the project will remain at or below existing stormwater discharge levels. The mitigation measures contained in the plan shall be approved by the Regional Water Quality Control Board and the City of Huntington Beach prior to any construction activities. The plans shall include measures such as the following:

- Diversion of offsite runoff away from the construction site;
- Prompt revegetation of proposed landscaped areas;
- Perimeter sandbagging or temporary basins to trap sediment; and
- Regular sprinkling of exposed soils during construction phases

3. Prior to the issuance of building permits within the Specific Plan, the project applicant shall develop a plan to implement any recommendations from the County of Orange Flood Control Division and City Public Works Departments which will reduce impacts to the Bolsa Chica Channel floodplain resulting from onsite development. For example, one such recommendation would be the removal of the wooden bridge at a future time when it is no longer utilized by the County operations and maintenance staff to access the westerly bank of the Channel. This plan shall be submitted to the City Department of Public Works for review and approval.

4. Prior to issuance of any grading permits within the Specific Plan, the applicant shall submit a "Notice of Intent" (NOI), along with the required fee to the State Water Resources Control Board to be covered under the State NPDES General Construction permit and provide the City with a copy of the written reply containing the discharger's identification number.

5. Prior to the issuance of the grading permits within the Specific Plan, the applicant shall provide a Water Quality Management Plan showing conformance to the Orange County Drainage Area Management Plan and all NPDES requirements (enacted by the EPA) for review and approval by the City Engineer. The plan shall reduce the discharge of pollutants to the maximum extent practical using management practices, control techniques and systems, design and engineering methods, and such other provisions which are appropriate.

LEVEL OF SIGNIFICANCE

With implementation of standard City policies and requirements and proposed Mitigation Measures 1 and 2, the potential impacts to drainage will be reduced to a level less than significant.

With implementation of standard City policies and requirements and proposed Mitigation Measures 1 and 3, the potential impacts associated with flooding will be reduced to a level less than significant.

With implementation of standard City policies and requirements and proposed Mitigation Measures 4 and 5, the potential impacts to water quality will be reduced to a level less than significant.

Implementation of proposed Mitigation Measures 1 through 5 and standard City policies and requirements will reduce the project's contribution to potential cumulative drainage, flooding, and water quality impacts to a level less than significant.

5.9 NATURAL RESOURCES/ENERGY

EXISTING CONDITIONS

Non-renewable natural resources are resources which, once depleted, cannot be renewed. Examples include fossil fuels, gravel, sand, as well as other resources. Lumber, depending on the ratio of replacement to removal, can be considered a non-renewable resource.

Prime farmland can also be considered a non-renewable natural resource because the prime soils are lost once development occurs. Impacts to prime farmland are discussed in the Agriculture Section of this document.

Although consumption of fossil fuels in California is relatively high, when looked at on a per capita basis, California is the seventh most energy efficient state in the nation.

The market for sand and gravel in southern California is primarily in residential, commercial, and industrial construction. Statewide statistics for construction-related minerals indicate a gradual increase in production and consumption in California. Between 1985 and 1990, production of sand and gravel increased from 112,000 to 127,200 thousand short tons, a nine percent increase. Mining of crushed stone also increased seven percent between 1985 and 1990 from 41,199 to 44,000 thousand short tons. Unlike timber, sand, gravel and crushed stone are wholly non-renewable. Currently, reserves for each of these minerals are not considered to be low. A factor in the substantial increase of sand, gravel and crushed stone production is that production was driven by an extremely healthy mineral economy in 1987 relative to 1985. Among all non-fossil fuel minerals, value in 1988 increased nearly 13 percent above that of 1986, stimulating production in the market. The increase of all non-fossil fuel minerals increased only one percent from 1988 to 1990.

IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant natural resources effect if it will:

(n) Encourage activities which result in the use of large amounts of fuel, water, or energy

(o) Use fuel, water, or energy in a wasteful manner

A significant impact would occur if implementation of the proposed project would encourage activities which would result in the use of a large amount of fuel, water, or energy or the use of fuel, water, or energy in a wasteful manner.

Development of the site will contribute to the consumption of non-renewable natural resources. The conversion from current underdeveloped uses to industrial, office, and commercial uses will result in long-term increased consumption of natural resources. A project-specific calculation of consumption cannot be made, since specific development plans have not been prepared. It is anticipated that the project will contribute to the trend towards increased resource consumption presently occurring in the state.

At project buildout, the site is anticipated to generate 56,445 million annual vehicle miles daily from future industrial, office, and commercial land uses. This will result in the consumption of 17,000 million gallons of gasoline daily, based upon an average vehicle fuel efficiency of 20 miles per gallon. The proposed Specific Plan project is consistent with the City's recently adopted General Plan (refer Section 5.1 Land Use of this EIR).

In addition, the project will indirectly contribute to the consumption of fossil fuels through the consumption of electricity. For a discussion of impacts associated with the project's electricity usage, please refer Section 5.11 Public Services and Utilities for a discussion of increases in electricity consumption.

Based upon factors provided by Adams-Streeter, the proposed project will also result in the consumption of approximately 57,720 gallons of water hourly. This estimate is based upon the City of Huntington Beach 1988 Water Master Plan. This will result in a net increase from the current hourly consumption. For a more detailed discussion of water usage, please refer to Section 5.11 Public Services and Utilities section.

As a whole, the consumption of natural resources as a result of the use of construction-related materials, gasoline, and water is considered significant. Implementation of Mitigation Measures 1 and 2 will reduce impacts to a level less than significant.

CUMULATIVE IMPACTS

The proposed project in conjunction with other past, present, and reasonably foreseeable future developments, will contribute to an incremental cumulative natural resources/ energy impact. The project's incremental contribution to this cumulative impact will be reduced to a level less than significant upon implementation of Mitigation Measures 1 and 2.

STANDARD CITY POLICIES AND REQUIREMENTS

The intent of this section is to state standard City conditions and requirements which reduce impacts identified previously in this section. No standard City conditions or requirements are applicable to identified project impacts.

MITIGATION MEASURES

1. Building design and construction shall comply with the Energy Conservation Standards set forth in Title 24 of the California Administrative Code. Prior to approval of building permits for the Specific Plan, architectural and engineering plans shall be subject to the review and approval of the Director of Public Works to ensure conformance with these standards. Energy conservation features should include:

- Installation of thermal insulation in walls and ceilings which meet or exceed State of California, Title 24 requirements.
- Insulation of hot water pipes and duct systems.
- Use of natural ventilation where possible.
- Use of natural gas for space heating and cooking.
- Installation of ventilation devices.
- Orientation to sunlight and use of overhangs.
- Landscaping with deciduous trees, to provide shade in the summer months and allow sunlight through in the winter months.

2. Prior to approval of building permits within the Specific Plan, it is recommended that the applicant consult with both the Southern California Gas Company and Southern California Edison during the building design phase for further energy conservation measures.

LEVEL OF SIGNIFICANCE

Development of this property will result in an increase in the use of fuel, water and energy for the life of the project. Mitigation is proposed to reduce this increase to a level less than significant; however, this increase is considered significant on a project-specific basis. The project in conjunction with other past, present and reasonably foreseeable future projects will result in natural resources impacts. The incremental impacts on natural resource/energy depletion have been reduced to a level less than significant.

5.10 PUBLIC SERVICES AND UTILITIES

EXISTING CONDITIONS

Information used in the preparation of this analysis was obtained through letters and phone conversations with public services and utilities in July 1996. Utility service questionnaires are contained in Appendix B.

Fire

The following information is based on correspondence from the City of Huntington Beach Fire Department dated June 28, 1996. Fire protection for the proposed project will be provided by the Huntington Beach Fire Department. The site will be served by three stations. The first is the Heil Station located at 5891 Heil Street, two miles from the project site. The second station serving the site is Murdy Station at 16221 Gothard Street, approximately three miles from the project site. The third station serving the site is Warner Station at 3831 Warner Avenue, approximately four and one-half miles from the project site.

Heil Station is equipped with a four-person paramedic engine company. Response time from the Heil Station is estimated to be five minutes and 10 seconds. Murdy Station is equipped with a four-person paramedic engine company, a four-person truck/ladder company and a two-person ambulance company. Response time from the Murdy Station is estimated to be seven minutes and 20 seconds. Warner Station is equipped with a four-person paramedic engine. Response time from the Warner Station is estimated to be nine minutes and 40 seconds. These stations provide fire suppression, medical emergency response, hazardous material spill response and mitigation, fire prevention inspections and hazardous material inspections.

The existing fire station at 5801 Heil Avenue is planned to be relocated to Graham and Production Lane by the year 2000. This would be the closest fire station to the subject area. At this time, staffing for this station is uncertain. Distance to the project site will be 1.4 miles and the response time will be three minutes and 40 seconds.

Currently, fire department response time to the project area does not meet the criteria established by the Cities Growth Management Committee. This policy requires a fire department response time under five minutes 80% of the time.

Police

The following information is based on correspondence from the City of Huntington Beach Police Department dated July 3, 1996. Police service is provided to the project area by the Huntington Beach Police Department. The McDonnell Douglas project site encompasses Reporting Districts #126 and #127.The department is responsible for crime prevention, investigation and enforcement of the law, providing police support to the area with patrol responses, reporting and investigative support.

The Police Department is located approximately 5.5 miles from the project site, located at 2000 Main Street at Yorktown Avenue in Huntington Beach. The averages for response times (including dispatch time) are:

Priority 1 = 7.9 minutes
Priority 2 = 14.65 minutes
Priority 3 = 19.05 minutes

One patrol unit is out at a time with one police officer.

At the present time, the Police Department has 224 sworn officers and 131.5 civilian personnel.

Schools

The following information is based on correspondence from the Westminster School District and the Huntington Beach Union High School District dated July 1, 1996 and June 26, 1996 respectively. The proposed project site lies within the Westminster School District for elementary (grades K-6) and intermediate (grades 7-8) schools and the Huntington Beach Union High School District for high schools (grades 9-12). The uses onsite currently do not place a demand on this service.

Community Services

The following information is based on correspondence from the City of Huntington Beach Community Services Department dated July 6, 1996. The Community Services Department is responsible for recreation, park development, arts and cultural services, human services, beach maintenance, parking and marine safety. The uses onsite currently do not place a demand on this service. Facilities operated by the Community Services Department which service the surrounding vicinity including the following:

Marina Community Park - This park is closest to the project site, and is over a mile from the project site. The park, located on the corner of Edinger Avenue and Graham Street, is 11.5 acres in size and provides lighted tennis courts, handball courts, basketball courts and a Little League baseball field. There is also a picnic shelter and a children's tot-lot.

Murdy Community Center and Park - This Community Center and park is located on the corner of Norma Avenue and Golden West Street, approximately 3.5 miles from the project site. The community center is 15 acres in size and provides tennis courts, basketball courts, a softball field, a picnic shelter and a children's tot-lot.

Community Art Center - This art center is located at 536 Main Street, approximately seven miles from the project site. The art center offers performances, classes, children's art camps, rental facilities, and three art galleries.

Seniors Recreation Center - The recreation center for seniors is located at 1706 Orange Avenue, approximately seven miles from the project site.

Seniors Outreach Center - The recreation center for seniors is located at 1708 Orange Avenue, approximately seven miles from the project site.

No neighborhood parks are located in the immediate area of the site (within a half-mile radius). Additionally, two baseball fields are currently located within Planning Area 3 of the Specific Plan, along Bolsa Avenue. These fields are currently utilized by McDonnell Douglas employees for informal games. According to McDonnell Douglas Realty Company, these fields are neither City-owned nor operated, utilized strictly by McDonnell Douglas employees.

<u>Library</u>

The following information is based on correspondence from the Huntington Central Library dated July 3, 1996. The Huntington Beach Public Library System offers a wide array of services from basic book circulating, reference research with print and electronic databases, extensive children's programming, specialized genealogy collection, media and technology center, gift shop, meeting rooms and a 320 fixed seat theater. Complete library services are provided to all residents within Huntington Beach, including the project area. Nonresidents are charged a nonresident library card fee.

The Graham Branch Library is located approximately 1 mile from the project site at 15882 Graham Street, Huntington Beach. This facility houses 17,000 volumes and has 2,000 square feet of floor space. This library has 1 full time staff member with assistance of 11 volunteer workers.

The recently expanded Huntington Central Library and Cultural Center is located in Huntington Central Park at 7111 Talbert Avenue, approximately 4.5 miles from the project site. The 125,000 square foot library provides a full spectrum of public services including circulating books, magazines, compact disc, audio/video cassettes, pamphlets and equipment. This facility houses approximately 956,000 volumes and has 46 full time staff members and 14 volunteers.

Oak View Branch is located at 17241 Oak Lane, 6.5 miles from the project site. This facility has 1,200 square feet of floor space and houses approximately 10,500 volumes. This library dose not have any full time staff member, but does have eight volunteer workers.

The Main Street Branch is located at 525 Main Street, 7.5 miles from the project site. This facility houses 30,000 volumes and has 5,000 square feet of floor space. This library has 1 full time staff member and 12 volunteer workers.

Banning Branch is located at 9281 Banning Avenue. As of February 1997 this facility has been closed for remodeling.

Water

The following information is based on correspondence from the City of Huntington Beach Water Department dated July 16, 1996. The terrain of Huntington Beach is generally flat, lying on a gradual slope from northeast to southwest. The project site is located south and adjacent to Peck Reservoir at the corner of Springdale Street and Glenwood Drive.

The Water Division of the City of Huntington Beach provides water to the project site, as well as to all customers within the City of Huntington Beach. The City of Huntington Beach water supply is derived from two primary sources: imported water from the Metropolitan Water District of Southern California and groundwater from the Orange County Groundwater Basin. On an annual average, the Water Division obtains approximately 70 percent of its water from the nine city wells and imports 30 percent of its water via the Metropolitan Water District (MWD) system. The Water Division maintains emergency connections with the Cities of Fountain Valley, Westminster and Seal Beach. According to the City of Huntington Beach 1988 Water System Master Plan, additional imported supplies of water are not probable in the near future.

The existing water supply systems are shown on Exhibit 40.

Solid Waste Disposal

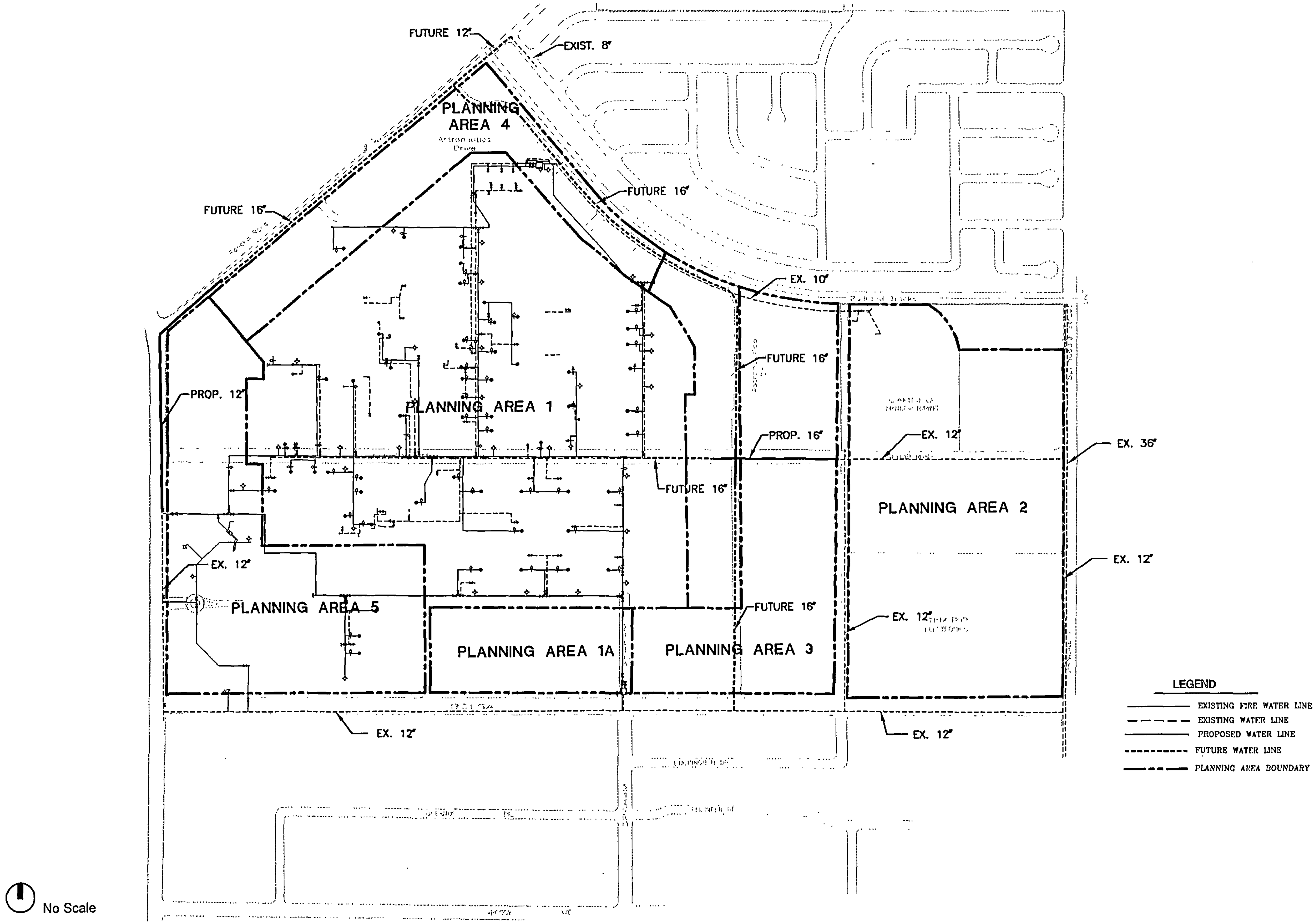
The following information is based on correspondence from the Rainbow Disposal Company dated July 15, 1996. Solid waste generated in the City is collected by Rainbow Disposal Inc., a private collection company under contract with the City. Rainbow Disposal provides the following services: solid waste removal and recycling, construction debris removal, commercial pick-up service, three cubic yard bin, roll-off container and compactor service. Commercial and industrial units contract with Rainbow Disposal on an individual basis.

Solid waste is processed through the Rainbow Transfer/Recycling Facility. Recyclables are removed and the residual is transported to the County Bauerman Landfill. The capacity of the Rainbow Transfer/Recycling Facility is 2800 tons per day and is presently at 1,500 tons per day.

Public Transportation

The following information is based on correspondence from the Orange County Transportation Authority dated July 3, 1996. Public transportation service to the project vicinity is provided by the Orange County Transit Authority (OCTA). OCTA presently provides local bus service to the McDonnell Douglas facility. The service is currently offered during peak hours only.

OCTA bus route 64, which operates from Santa Ana to the project site primarily via Bolsa Avenue, provides service on weekdays during peak hours. Service consists of 26 daily trips operating about every 30 minutes. Currently, there are six bus stops in the project area; four are located on Bolsa Avenue, one is located on Springdale Street just south of Bolsa Avenue and one is located on the McDonnell Douglas property. Combined, these bus stops account for about 66 daily passenger boardings and alightings. Currently the service is significantly underutilized.



EDAW, Inc.

Source: Adams-Streeter

Exhibit 40

Existing/Proposed Water System

Sewer

The following information is based on correspondence from the City of Huntington Beach Public Works Department and the County Sanitation Districts of Orange County dated July 8, 1996, and from the Sewer Master Plan report.

The existing sewer facilities for the project area are served by two agencies: 1) the City of Huntington Beach, Public Works Department, Sewage Division, for collection of wastewater; and 2) the County Sanitation Districts (OCSD) of Orange County District 11, for the treatment of wastewater. Wastewater generated within the District's service area is processed at treatment plants; OCSD #5 is located at 10844 Ellis Avenue in Fountain Valley and Plant #2 is easterly of the City of Huntington Beach, approximately 12 miles from this property (see Exhibit 41). The District operates under a National Pollutant Discharge Elimination System (NPDES) permit issued by the California Regional Water Quality Control Board (CRWQCB). This permit has a set discharge limit for biochemical oxygen demand (BOD) and suspended solids (SS). The project area is within OCSD Number 11, and for sewage flow purposes it is tributary to the OCSD Number 11 Slater Avenue Pump Station which is currently deficient.

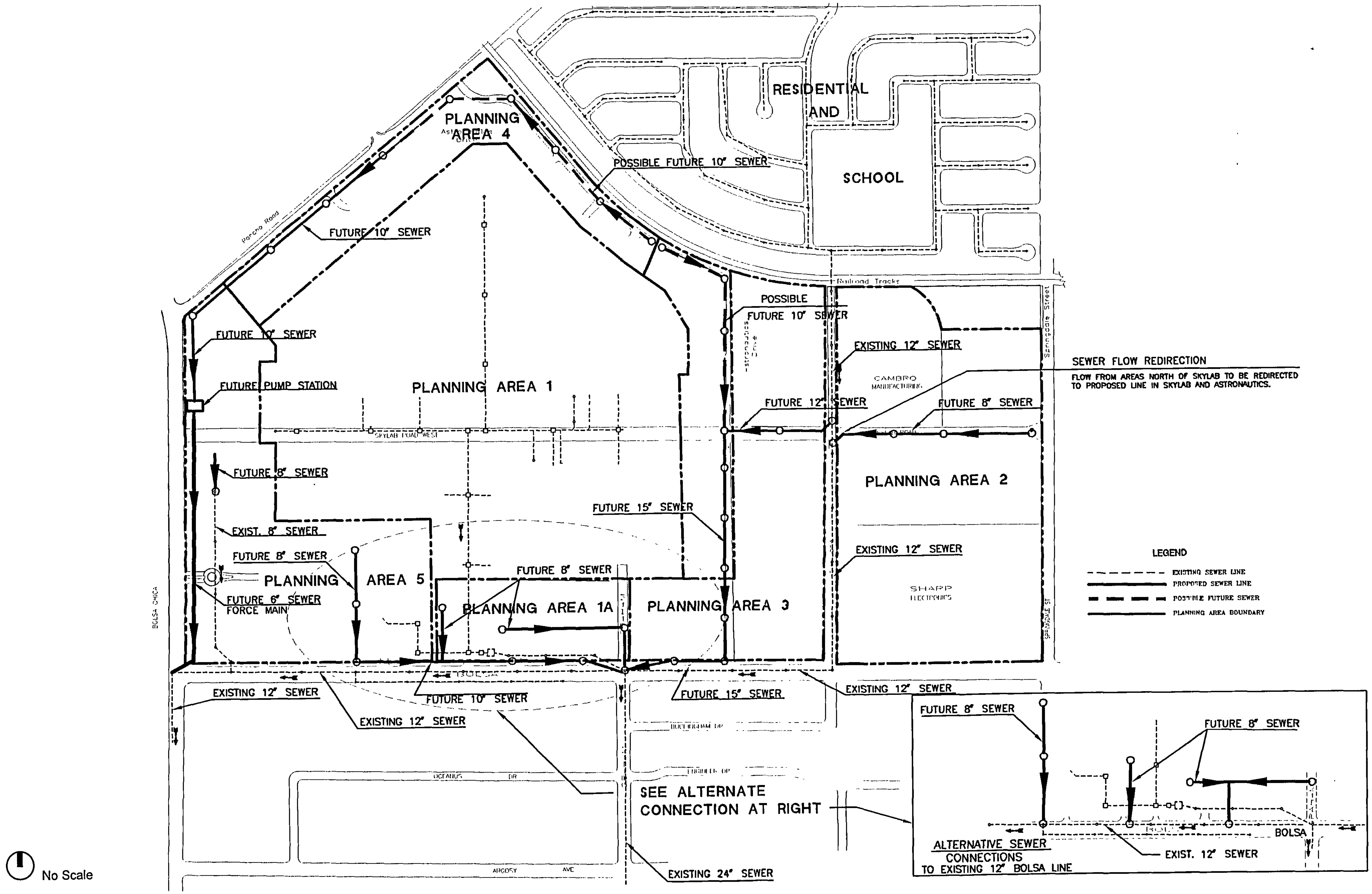
Sewerage from project site is collected at two points. One is at the intersection of Bolsa Avenue and Graham Road, then via a 24-inch line southerly to the Sanitation District trunk line in Edinger Avenue, and then continuing to the District Plant #2. This system also collects the sewerage flows from the residential area northerly of the project site. The second collection point is at the intersection of Bolsa Avenue and Bolsa Chica Road, then via a 12-inch line southerly to the Sanitation District's trunk line located in Edinger Avenue.

Total sewer flows from the project site currently come from three sub-areas. The first sub-area is located on the southwest corner of the project site and includes the existing high-rise office building. This sub-area drains through an eight-inch sewer line and a double six-inch siphon, southerly of a 12-inch line in Bolsa Avenue. From there it flows westerly, to a 12-inch OCFCD sewer line in Bolsa Chica Street, which drains southerly to the Sanitation District's trunk line in Edinger Avenue.

The second sub-area consists of the McDonnell Douglas aerospace (MDA) plant area. Sewer flows from this area are collected through a system of pipes as shown on Exhibit 41 and directed to a pump station located north of Bolsa Avenue and east of Graham Street. The flows are then pumped through an 18-inch pipe to the existing 24-inch sewer pipe where it joins with sewer from the third sub-area.

The third sub-area includes the residential area north of the railroad tracks, Cambro Manufacturing located at the northwest corner of Skylab and Able Lane, and Sharp Electronics, at the northwest corner of Bolsa Avenue and Springdale Street. A 12-inch sewer line flowing southerly in Able Lane and westerly in Bolsa Avenue, conveys these flows to a 24" sewer line located in Graham Street.

The existing MDA sewer system has sufficient capacity as a stand alone system.



EDAW, Inc.

Source: Adams-Streeter

Exhibit 41

Existing/Proposed Sewer System

Storm Drainage

Please refer to Section 5.8 of this EIR for a discussion of Drainage and Hydrology.

Natural Gas

The following information is based on correspondence from the Southern California Gas Company dated July 5, 1996. Natural gas service is provided by The Gas Company. Existing facilities in the area include an existing main located in Able Lane and in Springdale Street adjacent to the project site. The uses onsite currently do not place a significant demand on this service.

Electricity

Electrical service is provided in the area by Southern California Edison Company (SCE). The project site is adjacent to standard 12kV electrical facilities located on Bolsa Avenue and Springdale Streets. An underground primarily electrical line runs along the full length of the south side of Bolsa Avenue. There are existing lateral lines along the east side of Springdale street which connect with the Bolsa Avenue facility. All new lines installed in the City are required to be underground, and the City is working with SCE to achieve the undergrounding of existing lines. The uses onsite currently do not place a significant demand on this service.

Telephone

The following information is based on correspondence from the General Telephone Company dated July 3, 1996. General Telephone Company (GTE) provides telecommunication services to the City of Huntington Beach. The service facility closest to the project area is located at the existing McDonnell Douglas facility on the site. Currently, a cable exists along Bolsa Avenue and along Springdale Street. The City of Huntington Beach requires that all new transmission lines be installed underground.

Hospital

The following information is based on correspondence from Vencor Hospital, Orange County and Columbia Huntington Beach Hospital and Medical Center dated June 26, 1996 and July 15, 1996 respectively. The project area is serviced by these two facilities. The closest hospital to the site is the Vencor Hospital, located 2.3 miles from the site at 200 Hospital Circle in the City of Westminster. The hospital provides general medical and surgical acute care. There are 99 licensed beds, with an occupancy rate of 48%. The hospital does not maintain emergency services; there is no emergency room.

Columbia Huntington Beach Hospital and Medical Center of Huntington Beach is located at 17772 Beach Boulevard, between Slater and Talbert, approximately five miles from the project site. The hospital provides general acute care, intensive and coronary care, maternity services with labor, delivery and recovery suites, emergency room, outpatient surgical services, inpatient and outpatient psychiatric services, rehabilitation services, cardiopulmonary services, diagnostic imaging and occupational medicine program for work injuries and illnesses. The hospital is equipped with 135 beds. Current operation is at 45% occupancy rate. The hospital has recently constructed a 4,075 square foot emergency department.

IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant public services and utilities effect if it will:

(e) Breach published national, state, or local standards relating to solid waste or litter control;
(n) Encourage activities which result in the use of large amounts of fuel, water, or energy;
(o) Use fuel, water or energy in a wasteful manner;
(z) Interfere with emergency response plans or emergency evacuation plans.

Additionally, for the purposes of this EIR, expansion of existing services due to project demand constitutes a significant impact if the provider anticipates substantial difficulty in providing increased service. All public services and utilities have been analyzed to assess capacity impacts associated with the proposed project.

__**Fire**__

Future development of the project site under the proposed Specific Plan may create a need for additional fire protection services. The increase in the number of buildings and the number of employees brought into the area will directly affect the fire department's responses.

Currently, fire department response time from the Heil Station to the project area does not meet the criteria established by the Cities Growth Management Committee, which requires a fire department response time under five minutes 80% of the time. As indicated previously, the Heil Station at 5801 Heil Avenue is planned to be relocated to Graham and Production Lane by the year 2000. This would be the closest fire station to the subject area, being located 1.4 miles from the project site. Response time will then be three minutes and 40 seconds. No impacts to response times are anticipated with relocation of the fire station.

Potentially, one additional fire company will be required at the new facility at Graham and Production Lane. Capital revenue for this new facility is currently under negotiations with the development of the Bolsa Chica Wetlands. The most likely source for revenue will come from the City's General Fund. Implementation of Mitigation Measures 1 through 3 will reduce impacts related to the need for adequate response times and additional fire protection services to a level less than significant.

Police

Development within the project area will adversely impact the level of police services presently provided. Unless additional personnel are provided for the proposed area, the level of service needed will decrease in both response time and quality of service. According to the proposed plan, approximately one (1) additional police officer would be needed to serve the project area. This is based on the Police Department's equation of: project square footage/2.986 calls per square foot/356 calls per officer = # of police officers. 1,068,422 sq.ft./2,986 calls per sq.ft./356 calls per officer = 1 officer. The Police Department is currently on a hiring freeze for police officers. Consequently, the project would increase the calls for service, therefore, increasing the workload. Implementation of Mitigation Measures 4 through 8 will reduce this project-specific impact to a level less than significant.

Schools

The project does not contain a residential component, which would generate additional students. The School Districts utilize the City of Huntington Beach General Plan to anticipate potential students resulting from ultimate buildout of the General Plan land uses. The Specific Plan is consistent with the City General Plan; therefore, buildout of the Specific Plan would have been accounted for within School District student projections. The applicant is subject to the current developer fee, which is $.30 per sq.ft. of non-residential. Implementation of Mitigation Measure 9 will reduce project-specific impacts to a level less than significant.

Community Services

The proposed project will result in the loss of the two non-City owned ball fields located in Planning Area 3 of the project site. According to the Specific Plan, this Planning Area is intended to accommodate research and design facilities along with light industrial, manufacturing and distribution uses. Office use and limited commercial retail activities may occur along the Bolsa Avenue. Implementation of Mitigation Measure 10 will reduce potential impacts related to the loss of the two fields to a level less than significant.

Library

The project site is closest to the Graham Branch Library, approximately one mile away. The expansion of this branch has been listed in the City's capital improvement program for several years; however, a lack of funding has prohibited the expansion. With the development of the surrounding area, the service demand on this facility will increase. On account of the project not containing a residential component the increased demand on this facility by the employees of the project will not place a significant impact on this nor other libraries in the City, including the Huntington Central Library and Cultural Center, Oak View Branch Library, Main Street Branch Library, and the Banning Branch Library. The applicant is subject to the developer fee for non-residential development in place at the time of request for building permits. Implementation of Mitigation Measure 11 will reduce project specific impacts to a level less than significant.

Water

The proposed project may result in impacts to water supply. According to the City of Huntington Beach Water Division, the estimated water consumption rate for the proposed Specific Plan is approximately 962 gallons per minute. The MDA site has always been a part of the City's Master Plan for service. Implementation of Mitigation Measures 12 through 18 will reduce impacts to water supply to a level less than significant.

The proposed project will result in impacts to the existing water service provided to the project site. According to correspondence received from the Huntington Beach Water Division, the proposed project would have an adverse impact on the level of service presently provided, until the Water Master Plan (WMP) improvements (identified in the 1995 WMP) and project related infrastructure are built. The Water Division requested that the specific impact of the proposed project be determined by performing a (hydraulic) network analysis modeling of the area, with the proposed development.

As a result of this request, a water system analysis for the ultimate system required by the proposed project was conducted by Sidawi and Associates (included as Appendix C of this EIR).

According to the analysis, with the ultimate development onsite, water lines will be able to connect to the external system at more than one location to provide a second point of service (or loop) to each part of the system (see Exhibit 40). All onsite lines will be sized to deliver fire flow at adequate quantities and pressures and are 8 to 12 inches in diameter. Additionally, all water improvements will be designed to the City of Huntington Beach water standards for future City acceptance and maintenance.

The proposed water system has been incorporated as part of the Specific Development Concept (refer to Section 4.3 Public Facilities Plan). The future water requirements were anticipated as part of the Specific Plan process in an effort to ensure the infrastructure would adequately support future land uses that could result from the Specific Plan implementation. Since the Specific Plan buildout will occur over a period of several years, the proposed water system improvements will be phased consistent with the level of future development. A proposed phasing plan is included in the Specific Plan and discussed in Section 3.0 Project Description of this EIR. A potential project-specific water impact would occur if the future water system components are not brought on line when future demands identify the need. Mitigation Measure 19 will reduce this potential impact to a level less than significant.

Please refer to Section 5.8 for a discussion of impacts to water quality.

Solid Waste Disposal

Rainbow Disposal anticipates no adverse impacts in serving the proposed development. No adverse impacts are anticipated on Rainbow Disposal's operations, its transfer station, or the County Bauerman Landfill. In addition, the California Integrated Waste Management Act of 1989, AB939, mandates that each City must prepare, adopt or submit to the County a Source Reduction and Recycling Element for inclusion in a County Integrated Waste Management Plan.

AB939 establishes a statewide goal of diverting through source reduction, recycling, and composting 25% of solid waste from landfill or incinerator by 1995, and 50% or the maximum amount feasible by 2000. These reductions required by AB939 will assist in reducing solid waste generation impacts associated with the proposed project.

These facilities are presently adequate to serve the proposed project. No significant impacts are anticipated. Although no significant impacts have been identified, Mitigation Measures 20 and 21 are proposed to ensure that no impacts will occur.

Public Transportation

The increase in employees due to the proposed project will generate increased demand for transit service to the area. According to the Orange County Transportation Authority (OCTA), the existing park and ride and bus stops should be retained, and if necessary, they could be modified to conform with the design of the new project. Furthermore, a project of such large scope may require expansion of service. Due to the proposed mixed use of the project, there may be the demand to provide bus service during the middle of the day.

OCTA recommends incorporating transit amenities such as bus stops, bus turnouts, bus stop shelters, and maintaining the existing park and ride. Implementation of Mitigation Measures 22 through 24 will reduce impacts to a level less than significant.

Sewer

Implementation of the proposed project will result in additional demand on the existing sewer system from increased sewage flows. In response to a questionnaire submitted to the Huntington Beach Public Works Department, the Public Works Department requested that a detailed engineering sewer study be performed to determine the capacity of the existing facilities and the need for expansions of new facilities. As a result of this request, a Sewer Master Plan was prepared for the proposed Specific Plan. Buildout of the Specific Plan will result in additional sub-areas generating sewer flows (see Exhibit 41). Sewer flows for area L-1 and L-2 which drain through the existing eight-inch sewer line would include the future motel, restaurant, and a second office building, as well as the existing office high rise. This line has the capacity to carry the proposed calculated flows.

Proposed planning areas on the westerly and northerly periphery of the project site are proposed to drain through a system of pipes to a future pump station in the northwest corner of Skylab and Bolsa Chica Street. A forced main will convey this flow southerly to the existing 12-inch main in Bolsa Chica Street. This line has the capacity to carry the proposed calculated flows.

The MDA plant area sewer will remain isolated and will continue to drain via the existing pump station. New sewer lines are proposed for the planning areas located north of Bolsa Avenue to drain separately to the existing 24-inch Graham sewer line.

A new line is proposed in Skylab West and Astronautics Drive to convey the sewer flows from the existing residential area (not a part of the Specific Plan site) and the areas north of Skylab Road and areas adjacent to and west of Able Lane, with the exception of the Cambro facility. Cambro Manufacturing will drain to the existing 12-inch sewer in Able Lane and Bolsa Avenue, and will then drain to the Graham 24-inch sewer.

The proposed sewer system has been incorporated as part of the Specific Development Concept (refer to Section 4.3 Public Facilities Plan). The future sewer requirements were anticipated as part of the Specific Plan process in an effort to ensure the infrastructure would adequately support future land uses that could result from the Specific Plan implementation. Since the Specific Plan buildout will occur over a period of several years, the proposed sewer system improvements will be phased consistent with the level of future development. A proposed phasing plan is included in the Specific Plan and discussed in Section 3.0 Project Description of this EIR. A potential project-specific water impact would occur if the future sewer system components are not brought on line when future demands identify the need. Mitigation Measure 25 will reduce this potential impact to a level less than significant.

Storm Drainage

Please refer to Section 5.8 Drainage and Hydrology of this EIR for a discussion of impacts related to storm drainage.

Natural Gas

The Gas Company indicates that gas service could be provided by the existing main along Able Lane and Springdale Street. The availability of natural gas service is based upon present conditions of gas supply and regulatory policies. The Gas Company anticipates that project consumption can be accommodated by existing facilities without any significant impacts. Mitigation Measure 2 in Section 5.9 Natural Resources/Energy of this EIR is proposed to ensure energy conservation standards are met. No impacts are anticipated with implementation of proposed mitigation.

Electricity

Adequate electric power supply can be provided from 12 kV distribution lines located along Bolsa Avenue and on Springdale Street. SCE does not anticipate any significant impacts given the fact that the electric loads of the project area are within the parameters of Southern California Edison's project load growth. The project site is surrounded by facilities adequate to serve it; some facilities may require relocation or removal depending on street alignments. Mitigation Measure 2 in Section 5.9 Natural Resources/Energy of this EIR is proposed to ensure energy conservation standards are met. No impacts are anticipated with implementation of proposed mitigation.

Telephone

Service for the project area will be from underground lines. The proposed project will create a need for an extension of facilities toward the west along Bolsa Avenue. Mitigation Measure 26 is proposed to ensure necessary improvements are made to provide adequate service to the project site. No impacts are anticipated with implementation of the proposed mitigation.

Hospital

Columbia Huntington Beach Medical Center and Vencor Hospital Orange County of Westminster foresee no impact on hospital service with buildout of the proposed project. The present facilities are sufficiently capable to provide service to the project site.

CUMULATIVE IMPACTS

Fire

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will have an incremental cumulative impact on fire services.

Police

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will have an incremental cumulative impact on police services.

Schools

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will have an incremental cumulative impact on schools.

Community Services

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will have an incremental cumulative impact on community services.

Library

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will have an incremental cumulative impact on library services and facilities.

Water

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will have an incremental cumulative impact on water supplies.

Solid Waste Disposal

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will incrementally contribute to the cumulative impact on solid waste disposal sites.

Public Transportation

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will incrementally contribute to the cumulative impact on public transportation services in the area.

Sewer

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will have an incremental cumulative impact on sewage facilities.

Storm Drains

Refer to Section 5.8 Drainage and Hydrology for a discussion of cumulative impacts related to storm drains.

Natural Gas

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will have an incremental cumulative impact on natural gas.

Electricity

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will have an incremental cumulative impact on electricity.

Telephone

The proposed project in conjunction with other past, present and reasonably foreseeable future developments will have an incremental cumulative impact on telephone services.

Hospital

No project-specific impacts were identified, therefore no cumulative impacts have been identified.

STANDARD CITY POLICIES AND REQUIREMENTS

A. All applicable Public Works fees shall be paid. The developer will be responsible for the payment of any additional fees adopted in the "upcoming" Water Division Financial Master Plan.

MITIGATION MEASURES

Fire

1. Prior to approval of building permits within the Specific Plan, complete building plans shall be submitted to and approved by the Fire Department. If during the Fire

Department's plan check it becomes evident that fireground operations will become impeded, the department will impose standard fire code requirements such as automatic sprinkler systems, alarm systems, access roads, etc.

2. Prior to issuance of building permits within the Specific Plan, the applicant shall contribute funding on a "fair-share" basis towards the relocation/enlargement of the Heil station, subject to the approval of the Community Development Department.

3. Prior to issuance of building permits within the Specific Plan, the applicant shall be subject to a fire facility needs assessment/review by the Fire Department to determine the actual necessity of the new fire station and whether applications should be halted until the fire facility at Graham and Production Lane is in service.

Police

4. Prior to issuance of building permits within the Specific Plan, the need for additional police officers must be fully evaluated by the City of Huntington Beach and the applicant. If it is found that additional officers are needed to serve the area, funds must be procured on a "fair-share" basis to fill this position.

5. The Police Department shall be consulted during preliminary stages of the project design prior to approval of building permits within the Specific Plan to review the safety features, determine their adequacy, and suggest improvements.

6. During construction and at complete buildout, the project shall provide easy access into and within the project site for emergency vehicles and addresses shall be well marked to facilitate response by officers. Project site plans depicting these requirements shall be reviewed and approved by the Police Department.

7. Prior to issuance of building permits within the Specific Plan, the project shall be designed such that all areas of the project will be well lit, including alcoves, walkways, doorsteps, and parking facilities. Project site plans depicting these requirements shall be reviewed and approved by the Police Department.

8. Prior to issuance of building permits within the Specific Plan, an internal security system (e.g. security guards, alarms, access limits after hours) shall be incorporated, to be reviewed by the Police Department and the City Planning Department.

Schools

9. Prior to issuance of building permits within the Specific Plan, the applicant shall provide school fees to mitigate conditions of overcrowding as part of building permit application. These fees shall be based on the State fee schedule in effect at the time of future building permit applications.

Community Services

10. Prior to issuance of grading permits for Planning Area 3 in the Specific Plan resulting in removal of the existing fields, the applicant shall determine if recreation facilities are needed by existing and future employees. If deemed necessary, the applicant must enter into a lease-type agreement or provision of recreation facilities for employees to replace those lost, subject to the approval of the City of Huntington Beach Community Services Department.

Library

11. The applicant shall provide development fees to mitigate conditions of increased demand as part of building permit application. These fees shall be based on the City fee schedule in effect at the time of future building permit applications.

Water

12. Prior to issuance of Certificates of Occupancy, the following water conservation measures shall be implemented as required by state law:

    a. Ultra-low-flush toilets
    b. Ultra-low-flow showers and faucets
    c. Insulation of hot water lines in water recirculating systems
    d. Compliance with water conservation provisions of the appropriate plumbing code

13. Prior to issuance of building permits, irrigation systems which minimize water waste shall be used to the greatest extent possible. Such measures should involve such features as the following:

    a. Raised planters and berming in conjunction with closely spaced low volume, low angle (22 ½ degree) sprinkler heads.
    b. Drip irrigation
    c. Irrigation systems controlled automatically to ensure watering during early morning or evening hours to reduce evaporation losses.
    d. The use of reclaimed water for irrigated areas and grass lands. The project applicants shall connect to the Orange County Water District's "Green Acres" system of reclaimed water should this supply of water be available. Separate irrigation services shall be installed to ease this transition.

14. Prior to issuance of Certificates of Occupancy, water pressure regulators to limit downstream pressure to a maximum of 60 psi shall be installed.

15. Prior to issuance of building permits within the Specific Plan, the use of pervious paving material shall be encouraged to reduce surface water runoff and aid in groundwater recharge and slopes and grades shall be controlled to discourage water waste through runoff.

16. Prior to issuance of grading permits, the City shall provide information to prospective occupants regarding benefits of low water use landscaping and sources of additional assistance in selecting irrigation and landscaping.

17. Prior to issuance of building permits, complete landscape and irrigation plans which minimize use of lawns and utilize warm season, drought tolerant species shall be submitted to and approved by the Water Division. Mulch shall be used extensively in all landscaped areas. Mulch applied on top of soil will improve the water-holding capacity of the soil by reducing evaporation and soil compaction. Irrigation system shall be designed to use reclaimed water when available.

18. Prior to issuance of building permits within the Specific Plan, the Water Division of the City's Public Works Department shall be consulted during design and construction for further water conservation measures to review irrigation designs and drought tolerant plant use, as well as measures that may be incorporated into the project to reduce peak hour water demand.

19. Prior to the issuance of building permits within the Specific Plan, the project applicant shall implement conditions of the Public Works Department regarding water infrastructure improvements (identified on Exhibit 40 within the EIR) to handle increased water flow demands.

<u>Solid Waste Disposal</u>

20. To reduce the proposed project's impacts on waste disposal facilities, project designs shall develop a means of reducing the amount of waste generated both during construction and when the project is in use. The waste reduction program shall be approved by the Community Development Director prior to issuance of building permits within the Specific Plan. Potential ways of reducing project waste loads include implementation of recycling programs, and use of low maintenance landscaping when possible (i.e., native vegetation instead of turf).

21. Rainbow Disposal shall be contacted during the design stage of project components to ensure the most efficient and economical means for rubbish removal. The designs shall include rubbish enclosures, projected travel areas, and turnabouts where necessary.

<u>Public Transportation</u>

22. Prior to issuance of building permits within the Specific Plan, a bus turnout, if determined by the City Traffic Engineer to be necessary based on roadway cross sections, travel volumes or speeds, shall be provided at each bus stop located in the project area.

23. Prior to approval of a tentative map within the Specific Plan, the area adjacent to this turnout shall include a paved passenger waiting area complete with a bus shelter and bench.

24. Prior to approval of a tentative map within the Specific Plan, a concrete bus pad sufficient to support the weight of a bus (see OCTD's Design Guidelines for Bus Facilities) may have to be provided at the transit stop. This would be necessary assuming the material used to construct Bolsa Avenue would be insufficient to support continued transit use of the bus stop.

<u>Sewer</u>

25. Prior to the issuance of Certificates of Occupancy within the Specific Plan, the project applicant shall implement conditions of the Public Works Department regarding sewer infrastructure improvements (identified on Exhibit 41 within the EIR) to handle increased sewer flow demands.

<u>Storm Drains</u>

Please refer to Section 5.8 Drainage and Hydrology of this EIR.

<u>Natural Gas</u>

Please refer to Mitigation Measure 2 in Section 5.9 Natural Resources/Energy of this EIR.

<u>Electricity</u>

Please refer to Mitigation Measure 2 in Section 5.9 Natural Resources/Energy of this EIR.

<u>Telephone</u>

26. Prior to issuance of building permits within the Specific Plan, building plans shall be submitted to GTE enabling GTE to assess the improvements necessary to provide adequate service to the project site.

LEVEL OF SIGNIFICANCE

Implementation of the Specific Plan project will not result in significant impacts to hospital facilities.

Implementation of the above measures will mitigate all project-specific impacts to public services and utilities to a level less than significant.

The proposed project will create increased demand for public services and utilities on a local and regional basis. Additionally, the project in conjunction with other past, present and reasonably foreseeable future projects, will create an increased demand for police, community services, water, solid waste disposal, public transportation, and sewage. Implementation of mitigation measures will reduce each incremental cumulative impact on the associated public services and/or utilities to a level less than significant.

5.11 AGRICULTURE

EXISTING CONDITIONS

The site is owned by the McDonnell Douglas Realty Company. According to MDRC, the site has not been leased for irrigated agricultural purposes for the past two seasons (since 1994).

A portion of the site is classified as prime farmland according to the State Department of Conservation, which ranks farmlands according to soils maps produced by the U.S. Department of Agriculture, Soil Conservation Service. Exhibit 42 illustrates important farmlands within the City of Huntington Beach. Prime farmland is defined by the Department of Conservation as "land with the best combination of physical and chemical features for the production of agricultural crops."

The site is not classified as agricultural preserve under the State's Williamson Act of 1965. Exhibit 43 depicts the location of Agricultural Preserves within the County of Orange. In order to be considered an agricultural preserve under the Williamson Act, the land must have a minimum size of 100 acres. Agricultural preserves under the Williamson Act provide for reduced property taxes to farm land in return for restricting its development.

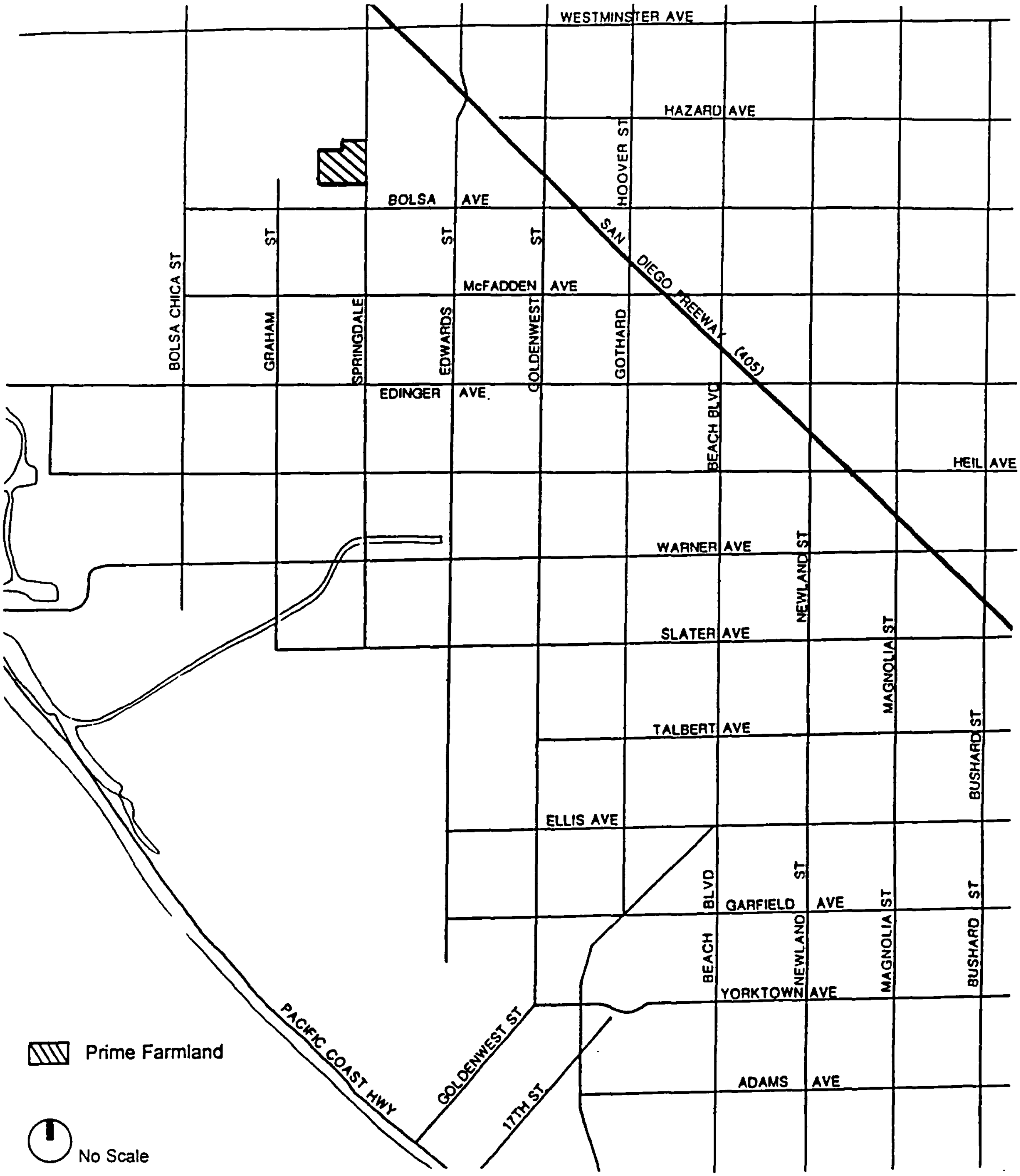
IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant agriculture effect if it will:

(y) Convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime agricultural land.

According to the State Department of Conservation, a project will have a significant effect on the environment if it will convert at least 80 acres of prime agricultural land to non-agricultural uses or impair the agricultural productivity of prime agricultural land. The Farmland Mapping and Monitoring Program of the Department of Conservation's Office of Land Conservation is responsible for monitoring the conversion of all farmland within the state. Projects containing less than 80 acres of prime farmland are not subject to review by the Department.

The proposed project will convert approximately 30 acres of important farmland (not currently in agricultural production) to urbanized uses. Therefore the project is under the threshold defined by the Office of Land Conservation, and will not result in a significant impact to the conversion of agricultural resources. The site has not been in agricultural use since 1994 and future agricultural uses are not anticipated during the implementation of the proposed Specific Plan.

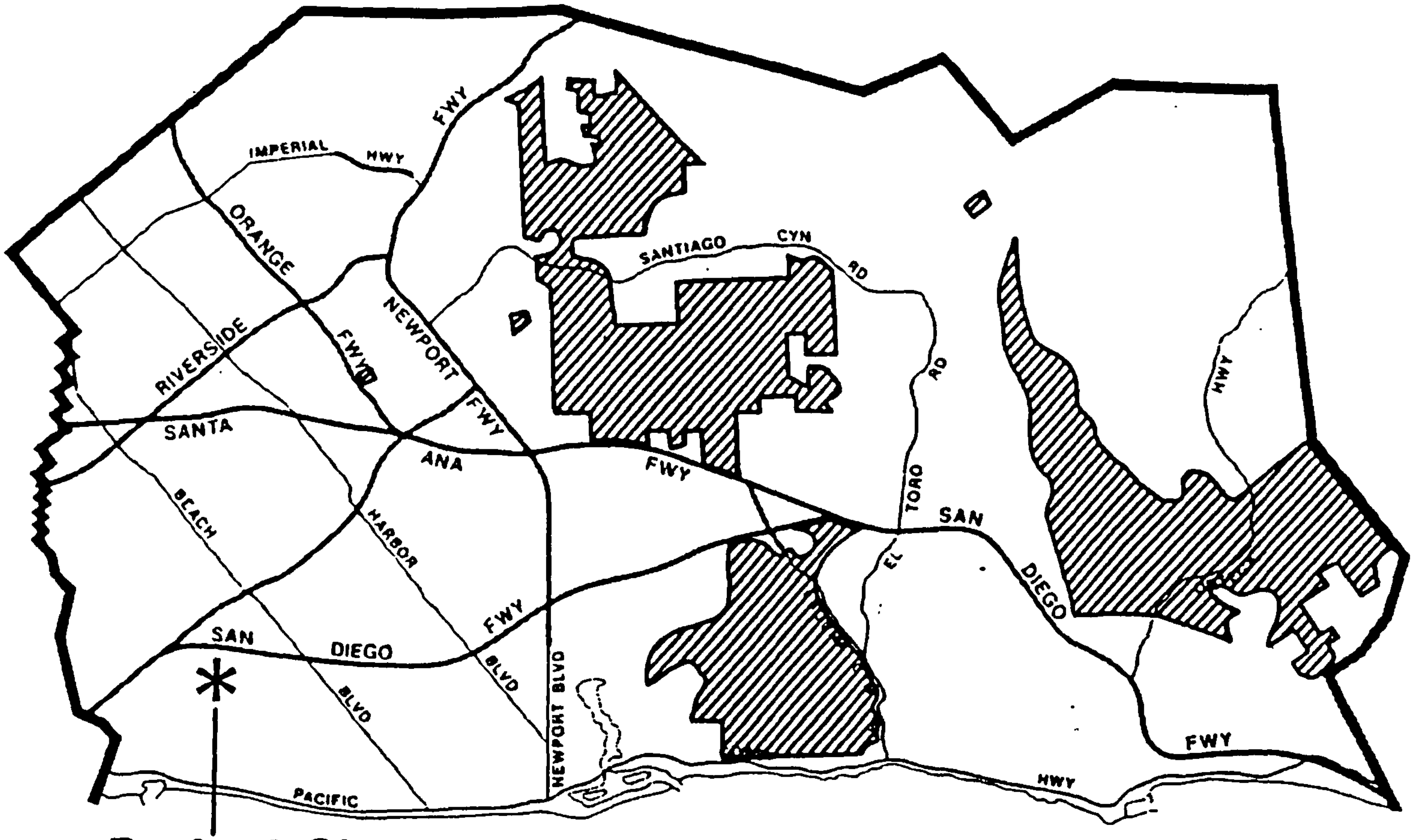


EDAW, Inc.

Source: California State Department of Conservation

Exhibit 42

Important Farmlands



Agricultural Preserves

No Scale

EDAW, Inc.

Source: County of Orange EMA

Exhibit 43

Orange County Agricultural Preserve

CUMULATIVE IMPACTS

Of the cumulative projects list located in Section 4.0, none are located on important farmlands as defined by the State Department of Conservation. In addition, none of the cumulative projects are located on agriculture preserves as defined by the Williamson Act of 1965. As indicated in Exhibit 43, most of the agriculture preserves in the County are located south and east of State Highway 55, in the southern half of the County.

On a Citywide basis, one other parcel of agriculture land has been identified as important farmland by the State Department of Conservation. Please refer to Exhibit 42. An approximate 10 acre parcel of land located beneath the Edison power lines south of Heil Avenue, north of Warner Avenue, east of Lucia Lane and west of Ross Lane, is designated as unique farmland. Unique farmland is defined by the Department of Conservation as "land of lesser quality soils used for the production of the State's leading agriculture cash crops." This parcel of land is not planned for development in the near future. In addition, it is less than 80 acres in size, and therefore any disruption of agriculture activities would not be subject to review by the State Department of Conservation guidelines. Furthermore, this parcel is not identified as an agriculture preserves.

Aside from the proposed project, no conversion of agriculture land is anticipated on a Citywide basis. Nonetheless, the proposed project will contribute to the ongoing trend of converting prime agriculture farmlands within the local area to urban development. This is considered a significant cumulative impact which cannot be mitigated to a level of insignificance.

STANDARD CITY POLICIES AND REQUIREMENTS

The intent of this section is to state standard City conditions and requirements which reduce impacts identified previously in this section. No standard City conditions or requirements are applicable to identified project impacts.

MITIGATION MEASURES

Mitigation measures are not necessary since the proposed project will convert less than 80 acres of important farmland to urbanized use.

LEVEL OF SIGNIFICANCE

The proposed project is located on an area of prime farmland as identified by the State Department of Conservation. The project will result in the loss of less than 80 acres of farmland and will not result in a significant impact to conversion of agricultural resources according to the criteria set by the Department of Conservation Office of Land Conservation.

The proposed project in conjunction with past, present, and reasonably foreseeable future projects will contribute to the ongoing cumulative impacts to agricultural resources in the region.

5.12 SOCIOECONOMIC

EXISTING CONDITIONS

The following discussion is based on information contained in the Technical Background Report for the Huntington Beach General Plan and information provided by the Department of Finance, Demographic Research Unit.

Within Huntington Beach's private and public sectors, the City currently provides employment for approximately 60,800 people. These estimates are based on California State Employment Development Department (EDD) and US Census data on employment at the city level for all cities within the Anaheim-Santa Ana Standard Metropolitan Statistical Area. Key retail, service, manufacturing and wholesaling jobs account for over 45 percent of all local employment. Many of these areas of employment have been growing recently in either the number of new establishments opening for business in the City or in expansions of existing businesses.

Aerospace and its related manufacturing suppliers, job shops, fabricators and testing houses play an important role in the City's economy. The McDonnell Douglas Aerospace facility, is the City's single largest aerospace employer. Although employment levels are known to fluctuate substantially at large aerospace companies, it is estimated that McDonnell Douglas employed approximately 8,500 persons at the Huntington Beach facility in 1991. Approximately 17 other local businesses are involved wholly or in part with the aerospace industry. It is estimated that these "aerospace-support" companies employ just under 1300 people. Many of these firms are tied to McDonnell Douglas's vertically-disintegrated production network in the area. The success of these firms can be attributed to the continued business at the McDonnell Douglas Aerospace Facility.

Based on the historical growth rate, employment in the City of Huntington Beach is projected to increase to 70,006 in 2000 and 86,914 in the year 2010. The employment to population ratio was estimated in 1989 to be .288. This .288 figure means that there are roughly 28 jobs available for every 100 residents within the City. This is expected to increase to .320 by 2000 and .375 by the year 2010.

The 1990 Census population figure for Huntington Beach was 181,519. This represents a total increase of 6.4% from the 1980 population figure of 170,505. Huntington Beach ranks as the third most populated City in Orange County, following Anaheim and Santa Ana.

The composition of housing stock (multi-family versus single family) in Huntington Beach remained basically the same between 1980 and 1990. The predominant housing type is the single family home. In 1990, a total of 72,736 housing units were counted in the City of Huntington Beach.

IMPACTS

Appendix G of the CEQA Guidelines serves as a guideline/general example of consequences that are deemed to have a significant effect on the environment. A project may be deemed to have a significant socioeconomic effect if it will:

- (a) Conflict with adopted environmental plans and goals of the community where it is located;
- (k) Induce substantial growth or concentration of population;
- (m) Displace a large number of people.

Additionally, a significant change in the City's employment base is considered a significant employment impact; any change in population density, distribution, or growth rate significantly above what is forecasted in adopted City plans and policies is considered a significant impact. In addition, any inconsistency with the General Plan Housing Element is considered a significant impact.

Implementation of the proposed Specific Plan will stimulate business opportunities within the City by allowing for and encouraging development. The proposed Specific Plan provides for a range of employment opportunities in the professional, retail, service and industrial fields; thus stimulating business opportunities and widening the employee base of the community.

The project will not result in change in the City's employment base that is considered significant. The Specific Plan is consistent with the City's General Plan. Buildout of the project site with industrial-type uses has been addressed within the City's General Plan. Additionally, the Specific Plan area is anticipated to incrementally developed in phases over an extended period of time, as outlined in Section 4.5 of the Specific Plan. The project site has been divided into a number of planning areas, creating distinct subareas and allowing for private development to occur in a timely manner within an overall Master Plan concept. This approach is to ensure that future economic development opportunities will be implemented dependent upon market conditions. No significant impacts are anticipated.

STANDARD CITY POLICIES AND REQUIREMENTS

The intent of this section is to state standard City conditions and requirements which reduce impacts identified previously in this section. No standard City conditions or requirements are applicable to identified project impacts.

MITIGATION MEASURES

No mitigation measures are necessary; therefore, none are provided.

LEVEL OF SIGNIFICANCE

The proposed project in and of itself, and in conjunction with other past, present and reasonably foreseeable future projects, will not result in socioeconomic impacts.

6.0 ALTERNATIVES TO THE PROPOSED PROJECT

6.1 INTRODUCTION

The State CEQA Guidelines Section 15126 (d) requires that an EIR, "Describe a range of reasonable alternatives to the project, or to the location of the project, which could reasonably attain the basic objectives of the project and evaluate the comparative merits of the alternatives". Section 15126 (d)(1) states, "The discussion of alternatives shall focus on alternatives capable of eliminating any significant adverse environmental effects or reducing them to a level of insignificance, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly." As stated in Section 15126 (d) (4), "The range of alternatives required in an EIR is governed by the `rule of reason' that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The key issue is whether the selection and discussion of alternatives fosters informed decision making and informed public participation."

Pursuant to the guidelines, a range of alternatives are considered and evaluated in this EIR. These alternatives were developed in the course of project planning and environmental review. The discussion in this section provides:

1. A description of alternatives considered;

2. An analysis of whether the alternatives are feasible (as defined by the CEQA Guidelines in Section 15364), meet the objectives of the project (described in Section 3.0 of this EIR), and remain under consideration (summarized in Table FF);

3. An analysis of the alternatives under consideration and the proposed project. The analysis is primarily summarized in Table GG. The focus of this analysis is to determine if feasible alternatives are capable of eliminating or reducing the significant environmental effects of the project to a level of insignificance.

4. A description of the impacts of the alternative that are not project related impacts (summarized in Table HH).

5. Statement indicating why the alternative has been rejected from consideration, if appropriate.

The following alternatives are discussed in this section:

1. Alternative 1 - No Project/No Development
2. Alternative 2 - Development Under Existing General Plan/Zoning
3. Alternative 3 - Alternative Location - Holly Seacliff
4. Alternative 4 - Reduced Intensity (60% Specific Plan Buildout)

A detailed discussion of each alternative is included on the following pages.

TABLE FF

SUMMARY OF ALTERNATIVES

Alternative	Technically Feasible	Meets Project Applicant's Objectives	Environmentally Superior	Under Further Consideration
1. No Project/No Development	Yes	No	Yes	Yes
2. Development under Existing General Plan/Zoning Standards	Yes	No	No	Yes
3. Alternative Location	No	No	No	No
4. Reduced Intensity - 60% SP Buildout	Yes	No	Yes	Yes

Source: EDAW, Inc.

TABLE GG

ALTERNATIVE SUMMARY MATRIX [1]

CATEGORY OF IMPACT	DESCRIPTION OF IMPACT	ALTERNATIVE 1 NO PROJECT/NO DEVELOPMENT	ALTERNATIVE 2 DEVELOPMENT UNDER EXISTING GENERAL PLAN/ZONING	ALTERNATIVE 4 REDUCED INTENSITY - 60% SP BUILDOUT
LAND USE COMPATIBILITY	The proposed project may result in impacts to on-site land uses.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will result in similar impact
	The proposed project may result in impacts to adjacent land uses.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will result in similar impact
	The proposed Specific Plan may result in impacts to the Land Use, Urban Design, Housing, Economic Development, Growth Management, Circulation, Public Facilities and Public Services, Recreation and Community Services, Utilities, Environmental Resources/ Conservation, Coastal, Environmental Hazards, Noise, Housing, and Hazardous Materials Elements.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will result in similar impact
	The proposed Specific Plan will result in inconsistencies with the Air Quality Element due to the increase in local and regional emissions.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
	The proposed Specific Plan in conjunction with other past, present, and reasonably foreseeable future projects will not result in impacts to the Land Use, Urban Design, Housing, Economic Development, Growth Management, Circulation, Public Facilities and Public Services, Recreation and Community Services, Utilities, Environmental Resources/ Conservation, Coastal, Environmental Hazards, Noise, and Hazardous Materials.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will result in similar impact
AESTHETICS/URBAN DESIGN	The proposed project may result in impacts between on-site uses and development of the Specific Plan.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will result in similar impact
	Off-site adjacent residential land uses located north and east of the project site will experience an aesthetic change associated with ultimate development of the McDonnell Centre Business Park.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will result in similar impact
	The proposed project, in conjunction with other past, present, and reasonably foreseeable future developments will incrementally contribute to changes to the perceived aesthetic quality of the local and regional area.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
LIGHT AND GLARE	The project will affect on-site and nearby residents' nighttime perception of light and glare.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will result in similar impact
	The project will allow for the potential development of commercial recreation and entertainment-type uses in Planning Area 5. The development of such uses, which could include movie theaters, shops, etc., may result in an increase in night-time activity related light, unlike that of the typical industrial uses.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will result in similar impact

[1] Note: Alternative 3 - Alternative Location has been eliminated from further consideration and is not included within this Matrix.

TABLE GG

ALTERNATIVE SUMMARY MATRIX (Continued)

CATEGORY OF IMPACT	DESCRIPTION OF IMPACT	ALTERNATIVE 1 NO PROJECT/NO DEVELOPMENT	ALTERNATIVE 2 DEVELOPMENT UNDER EXISTING GENERAL PLAN/ZONING	ALTERNATIVE 4 REDUCED INTENSITY - 60% SP BUILDOUT
	The project in conjunction with other past, present and reasonably foreseeable future projects will incrementally increase the amount of light and glare in the area. Over time, the project will contribute to a cumulative increase in the amount of light and glare in the vicinity.	Alternative will increase this impact	Alternative will increase this impact	Alternative will result in similar impact
TRANSPORTATION/CIRCULATION	The proposed project may result in impacts related to traffic signalization on the surrounding street system.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
	The proposed project may result in impacts related to parking.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
	Construction related traffic will result from the future buildout of the Specific Plan.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
	Increased activity on-site and in the vicinity of the project could expose pedestrians and bicycles to traffic hazards.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
	Under the Level 3 Condition, the proposed interim project traffic is contributing to the need for intersection improvements.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
	Under the Level 3 condition, the proposed interim project traffic is contributing to the need for improvements at the roadway segments.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
	Under the Level 5 condition, the proposed buildout project traffic is contributing to the need for the identified improvements at Westminster/Bolsa Chica, Westminster/Rancho-Hammon, Bolsa/Springdale, and Bolsa/Golden West.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
	Under the Level 5 condition, the proposed buildout project traffic is contributing to the need for improvements at Edinger to Heil along Bolsa Chica Street and Rancho to Bolsa along Bolsa Chica Street.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact

Note: Level 2 and Level 4 traffic conditions do not assume project traffic and therefore are not summarized in this table.

TABLE GG

ALTERNATIVE SUMMARY MATRIX (Continued)

CATEGORY OF IMPACT	DESCRIPTION OF IMPACT	ALTERNATIVE 1 NO PROJECT/NO DEVELOPMENT	ALTERNATIVE 2 DEVELOPMENT UNDER EXISTING GENERAL PLAN/ZONING	ALTERNATIVE 4 REDUCED INTENSITY - 60% SP BUILDOUT
AIR QUALITY	The proposed project is anticipated to exceed SCAQMD's daily threshold emission during construction activities. In addition, the addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
	The proposed project is anticipated to exceed SCAQMD's daily threshold emission levels for CO, NO_x and HC. The daily exceedance of the thresholds for CO, NO_x and HC is a long-term air quality impact. In addition, the addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
	The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in a short-term air quality impact due to construction activities. The addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
	The project will result in the development of industrial uses which has the potential to generate objectionable odors which could affect nearby sensitive receptors.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
	The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in significant cumulative long-term impacts to air quality. The addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
NOISE	The proposed project has the potential to result in significant short-term noise impacts during construction activities.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
	It is possible that increased traffic due to the project may cause the Rancho Road near the Navy Railroad roadway segment to experience higher CNEL values in the future which have the potential to impact nearby residential units.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will reduce this impact
	The proposed project will increase the year 2015 traffic noise levels by up to 1.7dB. The increase in noise levels due to the project along the segment of Rancho Road between Bolsa Chica and Westminster is considered a significant impact.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will reduce this impact
	The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in a short-term construction noise impact.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
	The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in an incremental increase in traffic noise levels that currently exceed 65 CNEL.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will reduce this impact
EARTH CONDITIONS	The proposed project may result in impacts related to local geology.	Alternative will reduce this impact.	Alternative will result in similar impact.	Alternative will result in similar impact.
	The proposed project may result in impacts related to seismicity.	Alternative will reduce this impact.	Alternative will result in similar impact.	Alternative will result in similar impact.
	The proposed project may result in impacts related to liquefaction.	Alternative will reduce this impact.	Alternative will result in similar impact.	Alternative will result in similar impact.

TABLE GG

ALTERNATIVE SUMMARY MATRIX (Continued)

CATEGORY OF IMPACT	DESCRIPTION OF IMPACT	ALTERNATIVE 1 NO PROJECT/NO DEVELOPMENT	ALTERNATIVE 2 DEVELOPMENT UNDER EXISTING GENERAL PLAN/ZONING	ALTERNATIVE 4 REDUCED INTENSITY - 60% SP BUILDOUT
	The proposed project may result in impacts related to expansive soils.	Alternative will reduce this impact.	Alternative will result in similar impact.	Alternative will result in similar impact.
	The proposed project may result in impacts related to hazardous materials.	Alternative will reduce this impact.	Alternative will result in similar impact.	Alternative will result in similar impact.
	The proposed project may result in cumulative impacts related to local geology, seismicity, liquefaction, expansive soils, and hazardous materials.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
DRAINAGE AND HYDROLOGY	The proposed project may result in impacts related to drainage.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
	The proposed project may result in impacts related to flooding.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
	The proposed project may result in impacts related to water quality.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
	The proposed project may result in cumulative impacts related to drainage, flooding, and water quality.	Alternative will reduce this impact	Alternative will increase this impact	Alternative will reduce this impact
NATURAL RESOURCES/ENERGY	Development of this property will result in an increase in the use of fuel, water and energy for the life of the project; this increase is considered significant on a project-specific basis. The project in conjunction with other past, present and reasonably foreseeable future projects will result in natural resources impacts.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
PUBLIC SERVICES AND UTILITIES	The proposed project may result in significant impacts to hospital facilities.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will reduce this impact
	The proposed project may result in impacts to public services and utilities.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will reduce this impact
	The proposed project will create increased demand for public services and utilities on a local and regional basis. Additionally, the project in conjunction with other past, present and reasonably foreseeable future projects, will create an increased demand for police, community services, water, solid waste disposal, public transportation, and sewage.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will reduce this impact
AGRICULTURE	The proposed project is located on an area of prime farmland as identified by the State Department of Conservation. The project will result in the loss of less than 80 acres of farmland.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
	The proposed project in conjunction with past, present, and reasonably foreseeable future projects will contribute to the ongoing cumulative impacts to agricultural resources in the region.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact
SOCIOECONOMIC	The proposed project in and of itself, and in conjunction with other past, present and reasonably foreseeable future projects, may result in socioeconomic impacts.	Alternative will reduce this impact	Alternative will result in similar impact	Alternative will result in similar impact

TABLE HH
IMPACTS OF THE ALTERNATIVES WHICH WOULD NOT RESULT FROM THE PROJECT

ALTERNATIVE	IMPACT
1. No Project/No Development	
2. Development under Existing General Plan/Zoning	Alternative would result in an increase in land use impacts, both onsite and offsite. Alternative would result in greater aesthetics/urban design impacts. Alternative would result in greater light and glare impacts. Alternative could potentially result in an increase in water runoff that greater than that of the proposed project.
3. Alternative Location	
4. Reduced Intensity - 60% SP Buildout	

Source: EDAW, Inc.

A description of each alternative is provided and the alternative is discussed below. This section evaluates alternatives which may be capable of eliminating, or reducing to a level of insignificance, adverse impacts associated with the project. Additionally, the alternatives considered environmentally superior to the proposed project are identified.

6.2 ALTERNATIVE 1 - NO PROJECT/NO DEVELOPMENT

Description of Alternative

An evaluation of a "No Project" Alternative is required by CEQA Guidelines Section 15126(d)(2). Under this alternative, the proposed project would not be implemented and the site would remain in its current undeveloped state.

The No Project/No Development alternative would restrict development of the project site by not allowing the construction of the uses proposed as a result of the Specific Plan. Land uses within the project area would remain as they are currently and no development would occur.

Environmental Assessment

LAND USE COMPATIBILITY

This alternative would avoid all land use impacts associated with the proposed project. This alternative will not result in inconsistencies with the Air Quality Element. Impacts associated with land uses would be less than the proposed project.

AESTHETICS/URBAN DESIGN

This alternative would avoid all aesthetics/urban design impacts associated with the proposed development of the Specific Plan. The positive aesthetic/urban design impact of implementing the design guidelines and landscape concept policies would not be realized with the no project alternative. Impacts associated with aesthetics/urban design would be less than the proposed project.

LIGHT AND GLARE

This alternative would avoid all light and glare impacts associated with the proposed development of the Specific Plan project. The present appearance of the site would not change. Additional facilities would not be constructed. No impacts to on-site as well as off-site adjacent land uses due to the development of the Specific Plan would occur. Impacts associated with light and glare would be less than the proposed project.

TRANSPORTATION/CIRCULATION

This alternative would avoid all impacts to transportation/circulation. This alternative would not contribute to short-term construction related impacts due to the addition of truck and construction vehicle traffic. This alternative also would not result in vehicular increases on the surrounding street system. Traffic improvements proposed for the Specific Plan area, as identified in the Circulation Plan section of the Specific Plan, would not be implemented with the no project alternative.

AIR QUALITY

This alternative would avoid all air quality impacts associated with the proposed project. No short-term or long-term increases in air emissions would result, as the project site would remain in its existing state.

NOISE

This alternative would avoid all noise impacts associated with the proposed project. As the project site would remain in its current state, short-term construction noise to adjacent sensitive receptors would not occur. Because this alternative would not generate additional vehicular traffic, no long-term traffic related noise impacts would result to on-site and off-site land uses.

EARTH CONDITIONS

This alternative would avoid all impacts associated with compressible and expansive soils, and seismic ground subsidence.

DRAINAGE AND HYDROLOGY

This alternative would avoid all impacts related to increased surface water runoff. This alternative will not result in the covering of surface soils with impermeable structures and surfaces. This alternative also will not result in the addition of pollutants typical of urban runoff.

NATURAL RESOURCES/ENERGY

This alternative would not result in impacts related to natural resources/energy.

AGRICULTURE

This alternative would not result in impacts related to agriculture.

PUBLIC SERVICES AND UTILITIES

This alternative would not result in impacts to public services and utilities as identified due to implementation of the Specific Plan. The no project alternative would not place demands on existing public service facilities and services that currently accommodate the site.

SOCIOECONOMIC

This alternative would not result in impacts related to socioeconomic; however, it would not meet the City General Plan goals of developing additional Industrial uses on the Specific Plan site.

Status of Alternative

This alternative is technically feasible. It does not meet the project applicant's objectives. It is environmentally superior to the proposed project and remains under consideration.

6.3 ALTERNATIVE 2 - DEVELOPMENT UNDER EXISTING GENERAL PLAN/ZONING

Description of Alternative

Under this alternative, the proposed Specific Plan project would not be implemented; however, the project site could be developed under the existing General Plan land use designation and existing zoning. The site could be developed under the existing General Plan designation for the project site, which is Industrial, with a floor area ratio of 0.75. Development allowed under the existing General Plan designations of the project site includes manufacturing, research and development, professional office and supporting commercial-type uses. The existing zoning of the site is Limited Industrial (IL) and Limited Industrial with a high rise overlay (IL-H). This zoning allows for industrial/manufacturing-type uses. It is anticipated that development of this alternative would occur in a piece-meal manner and would not have the benefit of a "Master Development Concept," including Circulation, Public Facilities, Landscape, and Phasing. It is also anticipated that this alternative would not have the opportunity of buildout under a comprehensive set of Design Guidelines.

Environmental Assessment

LAND USE COMPATIBILITY

This alternative would result in an increase in land use impacts, compared to that associated with the proposed project. Land use compatibility impacts, both on-site and off-site would be greater with development of uses. The proposed Specific Plan identifies several policies related to landscaping and buffers, which would not be implemented with this alternative. Impacts to the Air Quality Element would be similar to the proposed project. Impacts associated with land use are anticipated to be greater than the proposed project.

AESTHETICS/URBAN DESIGN

This alternative would result in greater aesthetics/urban design impacts compared to those associated with the proposed project. The proposed Specific Plan identifies several policies related to landscaping and buffers and includes a comprehensive Design Guidelines section, which would not be implemented with this alternative. The proposed Specific Plan provides a landscape concept and design guideline policies to establish the design character and visual qualities of the interior and perimeter of the project area that would not be implemented with development under the current General Plan. Overall impacts associated with aesthetics/urban design would be greater than the proposed project.

LIGHT AND GLARE

This alternative would result in greater light and glare impacts compared to those associated with the proposed project. The proposed Specific Plan identifies several policies to ensure that proposed lighting within the Specific Plan area does not result in significant impacts. These policies would not be implemented under this alternative. Overall impacts associated with light and glare would be greater than the proposed project.

TRANSPORTATION/CIRCULATION

This alternative would generate similar project traffic volumes to the proposed project; however the alternative would not include implementation of the Circulation Plan that is proposed as part of the Specific Plan. The Circulation Plan identifies the transportation improvements necessary to adequately accommodate buildout of the proposed project. Impacts associated with transportation/circulation would be more than the proposed project.

AIR QUALITY

This alternative would result in short-term air quality impacts similar to the proposed project. Impacts would result from short-term construction due to the addition of truck and construction vehicle traffic. This alternative would result in long-term mobile source emissions similar to the proposed project.

NOISE

This alternative would result in similar short-term impacts as the proposed project during construction activities. Noise impacts due to the increase in traffic would also be similar to the proposed project.

EARTH CONDITIONS

This alternative would result in similar impacts associated with expansive soils, similar to the proposed project. This alternative would also result in impacts associated with ground shaking, and other geotechnical constraints similar to that of the proposed project.

DRAINAGE AND HYDROLOGY

This alternative would result in increased surface water runoff due to the covering of surface soils with impermeable structures and surfaces, similar to that of the proposed project. This alternative would result in potential impacts related to flooding, similar to that of the proposed project. This alternative could potentially result in an increase in water runoff that is greater than that of the proposed project. Development under this alternative would not include the master plan of storm drainage improvements as identified in the Utilities Master Plan, prepared along with the Specific Plan.

NATURAL RESOURCES/ENERGY

This alternative would result in similar impacts to natural resources/energy.

AGRICULTURE

This alternative would not result in impacts to agriculture, similar to that of the proposed Specific Plan project.

PUBLIC SERVICES AND UTILITIES

This alternative would result in impacts to public services and utilities similar to that of the proposed Specific Plan project, with the exception of water and sewer, which are anticipated to be greater with this alternative. Development under this alternative would not include the Master Plan of water/sewer improvements as identified in the Utilities Master Plan, prepared along with the Specific Plan.

SOCIOECONOMIC

This alternative would not result in socioeconomic impacts, similar to that of the proposed Specific Plan project.

Status of Alternative

This alternative is technically feasible. It does not meet the project applicant's objectives. This alternative does not reduce impacts of the proposed project. Furthermore, it creates potentially new impacts not caused by the proposed project. Therefore, it is environmentally inferior to the proposed project. It remains under consideration.

6.4 ALTERNATIVE LOCATION

This alternative considers locating the proposed project at a different site. This alternative is required by CEQA and is intended to evaluate the option of the development of the proposed project at another site. Pursuant to CEQA Guidelines, any alternative site evaluated herein must have similar characteristics as the project site including size, landform, and amenity opportunities. Development would include the same type of use, density, and intensity as the proposed project site. Upon a preliminary analysis of the potential sites of 307 acres within the City of Huntington Beach, the Holly-Seacliff development site was selected for consideration as an alternative site. This site was however rejected from further review due to various constraints encountered. The following discussion briefly describes why the Holly-Seacliff alternative site was dismissed.

As previously outlined in Section 3.0 Project Description of this EIR, the following objectives were identified by the project applicant:

Applicant

- Provide opportunity for a variety of high quality industrial, office, residential and commercial uses consistent with the City's General Plan.

- Provide a range of employment opportunities including professional, retail and service, and industrial, thereby widening the employee base of the City.

- Result in a positive revenue flow to the City.

- Ensure that the development is perceived as a single, cohesive business park complex; design measures encompassing landscaping, signage, setbacks, and streetscapes will combine to establish the unique character of the development.

- Establish flexible development guidelines which will accommodate future market trends and tenant needs, without sacrificing the intended high-quality character of the project.

- Provide adequate infrastructure to support the specific plan land uses.

- Ensure that future development proposals consistent with the Specific Plan obtain City approval in an expeditious manner.

City of Huntington Beach

- Create a development compatible with and sensitive to the existing land uses in the project area.

- Promote the development of commercial, industrial, and public buildings and sites that convey a high quality visual image and character.

- Provide for necessary transportation improvements and strategies to accommodate the demands of new and existing development.

- Balance projected costs and revenues.

- Balance the City's long-term needs for industrial and commercial property.
- Ensure adequate utility infrastructure and public services for new development, and that timing and funding of improvements is closely correlated with development phasing.
- Enhance the community image of Huntington Beach, through the design and construction of a high-quality, state-of-the-art planned development.
- Allow projects that conform with the standards of the Specific Plan without the need for additional entitlements.

The Holly-Seacliff Specific Plan site is approximately 570 acres generally bounded by Ellis Avenue to the north, Huntington and Main Streets to the east, Yorktown Avenue and Summit Drive to the south, and the Edwards Street bluffs to the west. Currently approved uses for the site include Low Density Residential, Medium Density Residential, Medium High Density Residential, Mixed Development, Commercial, Industrial and Open Space. Ultimately, up to 3,895 residential units may be constructed in the area over the next ten to fifteen years.

Two (2) areas within the Holly-Seacliff Specific Plan area are currently zoned for Industrial development. Two (2) areas within the Holly-Seacliff Specific Plan are currently zoned for Commercial development. These sites, however, are unable to accommodate the project as proposed due to size limitations.

Additionally, the location of Holly-Seacliff site does not meet the objective of creating a development compatible with and sensitive to the existing land uses in the project area, nor would it meet the goals of the City General Plan by providing Industrial uses at the McDonnell Douglas site.

Lastly, yet of most importance; this alternative site (and most likely any alternative site) does not reduce and/or eliminate the significant unavoidable impacts associated with the proposed project (i.e. air quality and cumulative 2015 traffic and noise-related impacts). Since the significant unavoidable impacts are not associated with a site-specific issue but rather cumulative/regional issues; these impacts would most likely occur at any alternative site selected. Based on the preceding analysis, the alternative site evaluation has been eliminated.

6.5 ALTERNATIVE 4 - REDUCED INTENSITY - 60% SP BUILDOUT

Description of Alternative

Under this alternative, the proposed 307-acre Specific Plan project would be built out to 60% of the Specific Plan Buildout, as identified within the traffic section of this EIR. The site would be developed under the proposed Specific Plan with the expeditious approvals that would occur through the site plan review process. The types of uses currently allowed under the McDonnell

Centre Business Park Specific Plan would be developed at a reduced intensity. The Specific Plan standards and requirements would apply to future development under this reduced intensity alternative.

Environmental Assessment

LAND USE COMPATIBILITY

This alternative would result in similar land use impacts, compared to that associated with the proposed project. Land use compatibility impacts, both on-site and off-site would be similar with development of uses. The proposed Specific Plan identifies several policies related to landscaping and buffers, which would be implemented with this alternative. Impacts to the Air Quality Element would be similar to the proposed project. Impacts associated with land use would be similar to the proposed project.

AESTHETICS/URBAN DESIGN

This alternative would result in similar aesthetics/urban design impacts compared to those associated with the proposed project. The proposed Specific Plan identifies several policies related to landscaping and buffers and includes a comprehensive Design Guidelines section, which would still be implemented with this alternative. The proposed Specific Plan provides a landscape concept and design guideline policies to establish the design character and visual qualities of the interior and perimeter of the project area that would also be implemented with development under the current General Plan. Overall impacts associated with aesthetics/urban design would be similar than the proposed project.

LIGHT AND GLARE

This alternative would result in similar light and glare impacts compared to those associated with the proposed project. The proposed Specific Plan identifies several policies to ensure that proposed lighting within the Specific Plan area does not result in significant impacts. These policies would still be implemented under this alternative. Overall impacts associated with light and glare would be similar to the proposed project.

TRANSPORTATION/CIRCULATION

This alternative would generate similar project traffic volumes to the proposed project. This alternative would include implementation of the Circulation Plan that is proposed as part of the Specific Plan. The Circulation Plan identifies the transportation improvements necessary to adequately accommodate 60 percent buildout of the proposed project. Impacts associated with transportation/circulation would be less than the proposed project.

AIR QUALITY

This alternative would result in short-term air quality impacts similar to the proposed project. Impacts would result from short-term construction due to the addition of truck and construction vehicle traffic. This alternative would result in long-term mobile source emissions similar to the proposed project. Although the emissions would be less, the proposed alternative would still result in significant unavoidable air quality impacts.

NOISE

This alternative would result in similar short-term impacts as the proposed project during construction activities. Noise impacts due to the increase in traffic would be less than the proposed project.

EARTH CONDITIONS

This alternative would result in similar impacts associated with expansive soils, similar to the proposed project. This alternative would also result in impacts associated with ground shaking and other geotechnical constraints, similar to that of the proposed project.

DRAINAGE AND HYDROLOGY

This alternative would result in surface water runoff due to the covering of surface soils with impermeable structures and surfaces; however it would be less than that of the proposed project. This alternative would result in potential impacts related to flooding, less than that of the proposed project. This alternative will result in an increase in water runoff that is less than that of the proposed project. Development under this alternative would still include storm drainage improvements as identified in the Utilities Master Plan, prepared along with the Specific Plan.

NATURAL RESOURCES/ENERGY

This alternative would result in similar impacts to natural resources/energy.

AGRICULTURE

This alternative would result in impacts to agriculture, similar to that of the proposed Specific Plan project.

PUBLIC SERVICES AND UTILITIES

This alternative would result in impacts to public services and utilities, reduced to that of the proposed Specific Plan project.

SOCIOECONOMIC

This alternative would not result in socioeconomic impacts, similar to that of the proposed Specific Plan project.

Status of Alternative

This alternative is technically feasible. It does not meet the project applicant's objectives. This alternative does reduce impacts of the proposed project and does not create new impacts not caused by the proposed project. Therefore, it is environmentally superior to the proposed project. It remains under consideration.

7.0 LONG-TERM IMPLICATIONS OF THE PROPOSED PROJECT

7.1 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The site is presently zoned as Limited Industrial, with a high rise overlay on a portion of the site. The Specific Plan is in compliance with the City's General Plan therefore, not requiring amendment to the General Plan. The project site is surrounded by low density residential, commercial, office, and manufacturing uses. To the west of the site is the Orange County Flood Control Channel which is owned by the U.S. Navy and used as a part of the Seal Beach Naval Weapons Station. The site itself serves host for many activities which primarily includes McDonnell Douglas Aerospace Facility. Other businesses have developed on the site such as Cambro Manufacturing and Sharp Electronics. The remaining area of the site is vacant with the exception of parking facilities and roadways.

The project site is characterized by industrial uses and open space. Implementation of the proposed project represents a long term commitment of the land to the uses permitted within the Specific Plan (refer to Section 5.1 for a detailed description of these uses). This project will not, however, be developed at one time. The project provides the framework and guidelines needed to create a business park complex over an extended period of time. The project will provide a 307 acre Master Planned Industrial Business Park that will promote business activity and land use. The anticipated 50 to 75 year life span of structures represents a short-term use of the environment. Nevertheless, implementation of the project would represent a relatively long-term commitment to industrialization and urbanization. It is logical to assume that the proposed uses will, in turn, be replaced by another productive activity as the development and redevelopment of the land progresses through time in response to human needs.

Development of the site will contribute to cumulative impacts related to urbanization, traffic, traffic related noise levels, runoff volumes, air pollution, and public services and utilities over a long period of time. Development of the site would result in a cumulative reduction in open space in the City.

Development of the project represents a continuation of urban growth and development that is occurring in the City of Huntington Beach and Orange County.

Long-tern benefits include growing employment opportunities and revenue back into the community. Short-term impacts of the development due to construction activities include increased noise, dust and vehicular emissions associated with construction vehicles. However, as mentioned above, the development would occur over intervals of time, not all at one time. For a more detailed discussion of the level of significance of environmental impacts, please refer to the appropriate section (i.e. air, noise, etc.) within this EIR. A major_long-term impact resulting from the proposed project will include: greater economic productivity from the creation of new sources of revenues for the City of Huntington Beach. The only immediate short-term benefit of the project would be construction related employment.

7.2 GROWTH INDUCING IMPACTS

According to the CEQA Guidelines, this section is concerned with "...the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." It should not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

The proposed Specific Plan provides for the expansion of industrial and office/business park land uses. The project site is situated in an area which has been experiencing a rapid rate of regional and local growth and development. Population growth in the City of Huntington Beach is expected to continue through the year 2015.

Implementation of the Specific Plan project would be growth-inducing in terms of a localized employment increase. The increase in employment will in turn cause an increase in demand for utilities, community services, fire protection facilities and personnel, and increased police personnel. Since the project restricts urban development to industrial, business park/office, and commercial uses, it is likely that other uses will be attracted to the area to absorb new residential demand generated by the proposed residential uses. These uses will include, but will not be limited to, additional support commercial services, employment-based uses, and housing for employees generate by the Specific Plan. No major extension of overall infrastructure (i.e. roads, sewer mains, utility lines, etc.) outside the Specific Plan boundaries would occur that would induce additional growth.

The Specific Plan project site represents an area containing undeveloped land, surrounded by development. As such, it can be viewed as an infill site and a logical extension of the development of land uses that currently exist on the site. It can also be viewed as an opportunity to provide a complementary, cohesive land use to surrounding urban areas. The proposed project represents land uses for the site which are in compliance with the City of Huntington Beach General Plan. The project site is surrounded by development to the north, south and east.

The City has recognized in the General Plan the development potential of the site and has included development of the site in its planning projections. Consequently, most major urban systems have been, or will be, sized in anticipation of site development.

8.0 ENVIRONMENTAL SUMMARIES

The following summarizes the proposed project's relationship to impacts found not to be significant, impacts mitigated to a level less than significant, unavoidable adverse impacts, mitigation measures, and applicable standard City policies and requirements.

8.1 IMPACTS FOUND NOT TO BE SIGNIFICANT

Initial Study

An Initial study was prepared to identify the potential significance of the effects due to the proposed project. Biological Resources and Cultural Resources were determined not to be significant. Explanations for why these impacts were found not to be significant are contained in Appendix A.

Draft EIR

Impacts which were determined by this Draft EIR not to be significant are listed below. Explanations for why these impacts were found not to be significant are contained within this Draft EIR in the appropriate environmental section.

Land Use Compatibility

No impacts related to on-site land use compatibility have been identified.

No significant impacts to the adjacent land uses are anticipated.

The proposed Specific Plan will not result in inconsistencies with the Land Use, Urban Design, Housing, Economic Development, Growth Management, Circulation, Public Facilities and Public Services, Recreation and Community Services, Utilities, Environmental Resources/ Conservation, Coastal, Environmental Hazards, Noise, Housing, and Hazardous Materials Elements.

The proposed Specific Plan in conjunction with other past, present, and reasonably foreseeable future projects will not result in inconsistencies with the Land Use, Urban Design, Housing, Economic Development, Growth Management, Circulation, Public Facilities and Public Services, Recreation and Community Services, Utilities, Environmental Resources/Conservation, Coastal, Environmental Hazards, Noise, and Hazardous Materials. No significant cumulative land use consistency impacts to the above stated elements are anticipated.

Aesthetics/Urban Design

No aesthetic impacts between on-site uses are anticipated with development of the proposed Specific Plan.

Transportation/Circulation

No significant project-specific impacts have been identified related to traffic signal warrants on the surrounding street system.

Impacts associated with on-site circulation and pedestrian/bicycle safety are project specific issues and are therefore not impacted further by cumulative buildout.

No significant cumulative 2015 buildout impacts have been identified related to traffic signal warrants.

Cumulative impacts associated with on-site parking are project-specific and are therefore not impacted by further cumulative buildout.

Earth Conditions

No significant impacts are anticipated related to Hazardous Materials.

Based on the information obtained regarding local geology, seismicity, liquefaction, expansive soils, and hazardous materials, buildout of the proposed conceptual plan will not result in the creation of any adverse cumulative impacts. No cumulative impacts have been identified.

Public Services and Utilities

Implementation of the Specific Plan project will not result in significant impacts to hospital facilities.

Agriculture

The proposed project is located on an area of prime farmland as identified by the State Department of Conservation. The project will result in the loss of less than 80 acres of farmland and will not result in a significant impact related to conversion of agricultural resources.

Socioeconomic

The proposed project in and of itself, and in conjunction with other past, present and reasonably foreseeable future projects, will not result in socioeconomic impacts.

8.2 IMPACTS MITIGATED TO A LEVEL LESS THAN SIGNIFICANT

Impacts associated with the following environmental issues will be mitigated to a level less than significant upon implementation of applicable standard City policies and requirements and recommended mitigation measures.

Aesthetics/Urban Design

Off-site adjacent residential land uses located north and east of the project site will experience an aesthetic change associated with ultimate development of the McDonnell Centre Business Park.

Light and Glare

The project will affect on-site and nearby residents' nighttime perception of light and glare.

The project will allow for the potential development of commercial recreation and entertainment-type uses in Planning Area 5. The development of such uses, which could include movie theaters, shops, etc., may result in an increase in night-time activity related light, unlike that of the typical industrial uses.

The project in conjunction with other past, present and reasonably foreseeable future projects will incrementally increase the amount of light and glare in the area. Over time, the project will contribute to a cumulative increase in the amount of light and glare in the vicinity.

Transportation and Circulation

Construction related traffic will result from the future buildout of the Specific Plan.

Increased activity on-site and in the vicinity of the project could expose pedestrians and bicycles to traffic hazards.

Implementation of the proposed Specific Plan project may result in significant parking impacts.

Under the Level 3 Condition, the proposed interim project traffic is contributing to the need for intersection improvements at Bolsa Avenue/Springdale Street and Bolsa Avenue/Golden West.

Under the Level 3 Condition, the proposed interim project traffic is contributing to the need for improvements at the Westminster/Rancho-Hammon intersection.

Under the Level 3 Condition, the proposed interim project traffic is contributing to the need for improvements at Bolsa Chica Street: McFadden to Edinger and Rancho Road: Bolsa Chica to Westminster.

Under the Level 5 condition, the proposed buildout project traffic is contributing to the need for the identified improvements at Westminster/Ranch-Hammon, and Bolsa/Springdale.

Under the Level 5 condition, the proposed buildout project traffic is contributing to the need for improvements at Bolsa Chica Street: Edinger Avenue to Heil Avenue.

Under the Level 5 condition, the proposed buildout project traffic is contributing to the need for improvements at Bolsa Chica Street: Edinger Avenue to Heil Avenue.

Air Quality

The project will result in the development of industrial uses which has the potential to generate objectionable odors which could affect nearby sensitive receptors.

Noise

The proposed project has the potential to result in significant short-term noise impacts during construction activities.

It is possible that increased traffic due to the project may cause the Rancho Road near the Navy Railroad roadway segment to experience higher CNEL values in the future which have the potential to impact nearby residential units.

The proposed project will increase the year 2015 traffic noise levels by up to 1.7dB. The increase in noise levels due to the project along the segment of Rancho Road between Bolsa Chica and Westminster is considered a significant impact.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in a short-term construction noise impact.

Earth Conditions

The proposed project may result in impacts related to local geology.

The proposed project may result in impacts related to liquefaction.

The proposed project may result in impacts related to seismicity.

The proposed project may result in impacts related to expansive soils.

Drainage/Hydrology

The proposed project may result in potential impacts related to drainage.

The proposed project may result in potential impacts associated with flooding.

The proposed project may result in impacts to water quality.

The project will contribute to potential cumulative drainage, flooding, and water quality impacts.

Natural Resources

Development of this property will result in an increase in the use of fuel, water and energy for the life of the project.

The project in conjunction with other past, present and reasonably foreseeable future projects will result in natural resources impacts.

Public Services and Utilities

The proposed project will create increased demand for public services and utilities on a local and regional basis. Additionally, the project in conjunction with other past, present and reasonably foreseeable future projects, will create an increased demand for police, community services, water, solid waste disposal, public transportation, and sewage.

8.3 UNAVOIDABLE ADVERSE IMPACTS

Impacts associated with the following environmental issues will be mitigated to the extent feasible by the implementation of the applicable standard City policies and requirements and recommended mitigation measures. The following issues cannot be mitigated to a level less than significant.

Land Use

The proposed Specific Plan will result in inconsistencies with the Air Quality Element due to the increase in local and regional emissions. The impact remains significant and unavoidable.

Transportation/Circulation

Under the Level 5 condition, the proposed interim project traffic contributes to impacts to Westminster/Bolsa Chica and Bolsa/Golden West intersections.

Under the Level 5 condition, the proposed interim project traffic contributes to the need for improvements at Bolsa Chica Street: Rancho to Bolsa.

Air Quality

The proposed project is anticipated to exceed SCAQMD's daily threshold emission during construction activities. In addition, the addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.

The proposed project is anticipated to exceed SCAQMD's daily threshold emission levels for CO, NO_x and HC. The daily exceedance of the thresholds for CO, NO_x and HC is a long-term air quality impact. In addition, the addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in a short-term air quality impact due to construction activities. The addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in significant cumulative long-term impacts to air quality. The addition of emissions to an air basin designated as non-attainment is considered under CEQA to be a significant impact.

Noise

The proposed project in conjunction with other past, present, and reasonably foreseeable future projects will result in an incremental increase in traffic noise levels that currently exceed 65 CNEL.

Agriculture

The proposed project in conjunction with past, present, and reasonably foreseeable future projects will contribute to the ongoing cumulative impacts to agricultural resources in the region.

8.4 MITIGATION MEASURES

Aesthetics/Urban Design

1. Prior to issuance of grading permits within the Specific Plan, the project proponent for subsequent projects located within the Specific Plan area shall submit for review and approval, an Arborist report to the Director of Public Works. This report shall detail the location and quantity of mature trees which currently exist on the specific parcel. The final landscape plan shall illustrate which trees will be removed along with the quantity and location of replacement trees.

2. Prior to issuance of building permits within the Specific Plan, the applicant shall submit a landscape construction set for review and approval to the Public Works Department. The landscape plans shall be prepared by a registered landscape architect and shall incorporate the McDonnell Centre Business Park Specific Plan requirements. Plants that are attractive to rodents should be avoided. The landscape plan shall be approved by both Public Works and Community Development Departments.

Light and Glare

1. Prior to the approval of building permits within the Specific Plan, all exterior lighting shall be consistent with the standards established by the Zoning Ordinance (unless otherwise addressed within the Specific Plan) to minimize on and off-site light and glare impacts. The lighting shall be approved by the Community Development and Public Works Departments.

2. Prior to approval of building permits for buildings constructed within Planning Area 5, proposed lighting shall be approved by the Community Development and Public Works Departments.

3. Buildings shall emphasize the minimization of glare by incorporating non-reflective building materials. Individual building site plans shall be reviewed and approved by the City Community Development Department to assure this measure is met prior to issuance of building permits within the Specific Plan.

Transportation/Circulation

1. Prior to the issuance of building permits within the Specific Plan, each applicant shall coordinate with the City of Huntington Beach in developing a truck and construction vehicle routing plan. This plan shall specify the hours in which transport activities can occur and methods to minimize construction related impacts to adjacent residences. The final plan shall be approved by the City Engineer and Community Development Director.

2. Prior to the issuance of building permits within the Specific Plan, each applicant shall coordinate with the City of Huntington Beach Public Works Department to ensure the following is accomplished:

   a. necessary review of signal warrants
   b. review/approval of turn ingress/egress
   c. review/approval of any added driveways
   d. parking analysis demonstrating parking supplies meet or exceed the demands

   The purpose of the above review is to: 1) ensure site specific impacts from individual projects are reduced to a level less than significant and 2) identify the timing of future signal installations/improvements.

3. Prior to the issuance of building permits within the Specific Plan, the applicant shall demonstrate to the satisfaction of the City Traffic Engineer that truck access points depicted on their "Final" site plan(s), meet the City's minimum truck turning radius standards.

4. Prior to the issuance of building permits within the Specific Plan, the applicant shall demonstrate to the satisfaction of the City Traffic Engineer that standards (including ADA) regarding pedestrian/bicycle safety along the perimeter sidewalks have been met.

5. The City of Huntington Beach shall collect its traffic impact fee as "interim" levels of development occurs prior to the issuance of building permits. These fees will relieve the developer of traffic mitigation obligations (as detailed for Levels 1, 2, and 3 as shown in Tables M and N of the Traffic Impact Assessment) resulting from the interim levels of development. The specific Level 1-3 improvements detailed in Tables M and N shall be added to the City's CIP and implemented in a reasonable time frame.

6. Prior to the issuance of the first building permit within the Specific Plan, the applicant (MDRC) shall complete the intersection improvements for Westminster and Rancho identified in Table M under the Level 2 - Year 2000 (Interim without Project) condition.

7. Prior to the issuance of the first building permit within the McDonnell Centre Specific Plan, the applicant (MDRC) shall post a bond with the City of Westminster for the Specific Plan's fair-share contribution to complete the intersection improvements for Westminster and Rancho identified in Table M under the Levels 1 and 3 and Level 5 - Year 2015 (Buildout with Project) conditions. The bond shall not exceed $30,000 based on today's dollars and would be adjusted based upon the Engineering News Record Construction Cost Index. It would be activated at the time when the City of Westminster completes the identified intersection improvements. This mitigation would be unnecessary if the Cities of Westminster or Huntington Beach acquire intersection improvement funding through other efforts.

8. An updated Traffic Impact Assessment (TIA) shall be prepared at the expense of McDonnell Douglas or successor in interest as the interim trip budget is reached. This updated TIA shall be commenced when 90% of the interim trip budget is built or has approved development applications (entitled) and no further development shall be entitled or constructed (beyond that development that generates 100% of trips for the interim trip budget) until the updated TIA and required mitigations are reviewed and approved by the City. The purpose of the updated TIA is to determine whether the trips projected for the interim condition are consistent with the actual trips and the required traffic mitigation measures for the remaining buildout of the McDonnell Center Specific Plan Area (currently estimated in Levels 4 & 5 as shown in Table 4 of the TIA). This revised TIA shall not relieve the developer of any obligation to pay any traffic impact fees (should the present or any other traffic impact fee program be in place) or provide for mitigation measures for development at the time of developments.

9. Throughout the Specific Plan project's implementation, the City shall maintain and update an annual trip budget monitoring report to determine the status of the constructed and approved development applications (entitled) development and resulting expected trips within the McDonnell Center Specific Plan area. This annual trip budget monitoring report shall be based upon building permits issued and (entitled) development within the McDonnell Center. The trip budget monitoring report shall include gross and usable square footages of the constructed and/or entitled usages, a description of the land usage, and the trip generation rates used for the land usage proposed. The trip rates used in the monitoring report shall be those rates contained in the latest <u>Trip Generation</u> manual published by the Institute of Transportation Engineers (currently the 5th edition and 5th edition update) or another reliable source (i.e., another traffic study) as approved by the City Traffic Engineer.

Air Quality

1. During grading and construction, the applicant shall be responsible for compliance with the following:

   A. During clearing, grading, earth moving or excavation, maintain equipment engines in proper tune.

   B. After clearing, grading, earth moving or excavation:

      1. Wet the area down, sufficient enough to form a crust on the surface with repeated soakings, as necessary, to maintain the crust and prevent dust pick up by the wind.
      2. Spread soil binders; and
      3. Implement street sweeping as necessary.

   C. During construction:

      1. Use water trucks or sprinkler systems to keep all areas where vehicles move damp enough to prevent dust raised when leaving the site;
      2. Wet down areas in the late morning and after work is completed for the day;
      3. Use low sulfur fuel (.05% by weight) for construction equipment.

   D. Phase and schedule construction activities to avoid high ozone days.

   E. Discontinue construction during second stage smog alerts.

2. During grading and construction, the applicant shall be responsible for compliance with the following:

   A. Require a phased schedule for construction activities to minimize daily emissions.

   B. Schedule activities to minimize the amount of exposed excavated soil during and after the end of work periods.

   C. Treat unattended construction areas with water (disturbed lands which have been, or are expected to be unused for four or more consecutive days).

   D. Require the planting of vegetative ground cover as soon as possible on construction sites and super pads if construction is not anticipated within one month.

   E. Install vehicle wheel-washers before the roadway entrance at construction sites.

   F. Wash off trucks leaving site.

G. Require all trucks hauling dirt, sand, soil or other loose substances and building materials to be covered, or to maintain a minimum freeboard of two feet between the top of the load and the top of the truck bed sides.

H. Use vegetative stabilization, whenever possible, to control soil erosion from storm water especially on super pads.

I. Require enclosures or chemical stabilization of open storage piles of sand, dirt, or other aggregate materials.

J. Control off-road vehicle travel by posting driving speed limits on these roads.

3. During grading and construction, the applicant shall be responsible for assuring that vehicle movement on any unpaved surface other than water trucks shall be terminated if wind speeds exceed 15 mph.

4. During grading and construction, the applicant shall be responsible for the paving of all access aprons to the project site and the maintenance of the paving.

5. Prior to issuance of grading permits within the Specific Plan, the applicant shall be responsible for assuring that construction vehicles be equipped with proper emission control equipment to substantially reduce emissions.

6. Prior to issuance of grading permits within the Specific Plan, the applicant shall be responsible for the incorporation of measures to reduce construction related traffic congestion into the project grading permit. Measures, subject to the approval and verification by the Planning Department, shall include:

- Provision of rideshare incentives.
- Provision of transit incentives for construction personnel.
- Configuration of construction parking to minimize traffic interferences.
- Measures to minimize obstruction of through traffic lanes.
- Use of a flagman to guide traffic when deemed necessary.

7. Prior to the issuance of building permits within the Specific Plan, the applicant shall provide proof to the City Community Development Director that the use will not emit objectionable odors or provide an air quality analysis including a quantitative assessment of odors and meteorological conditions consistent with the ASTM, Standard Method D1391 or Standard Method E679-79. Project design measures or additional control technology shall be implemented to ensure that odor emissions comply with SCAQMD standards.

8. Prior to the issuance of certificates of occupancy within the Specific Plan, the applicant shall prepare a Transportation Demand Management Plan (TDM) for review and approval by the SCAQMD and City. At a minimum, the plan shall include the following major elements and shall be implemented in accordance with SCAQMD Rule 1501:

- Provision of a commuter transportation coordinator, with responsibilities to include coordinating and facilitating formation of carpools and vanpools, serving as a resource person for transit information, coordinating sale of transit passes, monitoring progress towards TDM goals and surveying employees, etc.

- Provision of a commuter center which would include such information as: bus and rail transit schedules/maps; telephone numbers for the designated transportation coordinator; bus route and Metrolink schedules; ridesharing promotional material; bicycle route and facility information; and location of on-site vanpool/carpool spaces.

- Carpool and vanpool program, including participation in a computerized matching system, provision of preferential parking, and provision of travel allowances/financial incentives.

- Encouragement of non-vehicle modes, such as bicycle, walk, or bus transit.

- Transit incentives and improvements, including subsidization of transit passes and dissemination of transit information and schedules.

<u>Noise</u>

1. Prior to issuance of grading permits within the Specific Plan, the applicant shall submit and have approved a noise mitigation plan to the Department of Community Development that will reduce or mitigate short-term noise impacts to nearby noise sensitive receptors. The plan shall comply with the City of Huntington Beach Noise Ordinance and shall include, but not be limited to:

    a. A criteria of acceptable noise levels based on type and length of exposure to construction noise levels;

    b. Physical reduction measures such as temporary noise barriers that provide separation between the source and the receptor; and

    c. Mitigation measures such as restrictions on the time of construction for activities resulting in high noise levels.

2. Prior to issuance of grading permits within the Specific Plan, the applicant shall produce evidence acceptable to the City Engineer that:

    a. All grading and construction vehicles and equipment, fixed or mobile, shall be equipped and maintained with effective muffler systems that use state of the art noise attenuation.

b. Stockpiling and/or vehicle staging areas shall be located as far as practicable from sensitive noise receptors.

c. All operations shall comply with the City of Huntington Beach Noise Ordinance.

3. Commensurate with the updated TIA (refer to Mitigation Measure 8 in Section 5.4), an updated acoustical analysis shall be performed on the following two roadway segments: 1) Rancho Road near the Navy Railroad; and 2) Rancho Road between Bolsa Chica Street and Westminster Avenue to determine if potential vehicular noise will impact nearby residential units. The study will be prepared under the supervision of an acoustical engineer and include a discussion of the need for noise attenuation measures and/or noise barriers to ensure compliance with City noise standards. This analysis shall be submitted to and approved by the Community Development Department.

Earth Conditions

Local Geology

1. Prior to issuance of grading permits within the Specific Plan, additional studies as deemed necessary by the Director of Public Works, shall be performed to determine native elevations and evaluate the extent of compressibility of the soils for structural design purposes. These studies shall be reviewed and approved by all appropriate departments at the City of Huntington Beach.

Seismicity

2. Prior to issuance of grading permits within the Specific Plan, it shall be proven to the Department of Public Works that all structures are designed in accordance with the seismic design provisions of the Uniform Building Codes or Structural Engineers Association of California to promote safety in the event of an earthquake.

3. An engineering geologist shall be engaged to submit a report indicating the ground surface acceleration from earth movement for development parcels. All structures shall be constructed in compliance with the g-factors as indicated by the geologist's report. Calculations for footings and structural members to withstand anticipated g-factors shall be submitted to the City for review prior to the issuance of grading permits.

Liquefaction

4. Prior to issuance of grading permits within the Specific Plan, grading plans shall demonstrate that alluvial soils shall be removed in the areas that will receive fill or foundation loading down to competent materials and recompacted. Additional studies may be deemed necessary by the Director of Public Works, to evaluate the extent of liquefaction of the soils for structural design purposes.

Expansive Soils

5. Prior to approval of grading permits within the Specific Plan, the applicant shall prepare a report for approval by the Director of Public Works which assesses and provides recommendations for the following:

   a. Specific measures for adequate foundation, paving and flatwork design in areas of any remaining expansive soils.

   b. Identify the Expansive Index onsite and specify where necessary recommendations included, but not limited to: 1) presaturation of soils prior to concrete placement; 2) raised floors; 3) post-tensioned slabs; 4) thicker slabs; 5) deeper footings; 6) the addition of soil amendments to facilitate wetting during compaction.

6. The applicant(s) shall be responsible for remedial removal of expansive soils onsite during grading and prior to construction. Should any construction occur on expansive soils, the applicant(s) shall adhere to the recommendations identified above in Mitigation Measure 5.

Drainage/Hydrology

1. Prior to the issuance of building permits within the Specific Plan, the project applicant shall implement conditions of the Public Works Department regarding storm drainage improvements which shall include, but not be limited to:

   - Construct the necessary storm drainage improvements (identified on Exhibit 39 within the EIR) to handle increased flows.

   - Ensure that building pads are placed at elevations suitable to withstand 100-year flood for sites adjacent to Bolsa Chica Street between Bolsa Avenue and Rancho Road.

   - Confine street flows within the street right-of-way.

2. Prior to the issuance of grading permits within the Specific Plan, the project applicant shall submit and obtain approval of final drainage and erosion control plans for each project component. These final drainage plans shall demonstrate that post-development stormwater discharge levels from the project will remain at or below existing stormwater discharge levels. The mitigation measures contained in the plan shall be approved by the Regional Water Quality Control Board and the City of Huntington Beach prior to any construction activities. The plans shall include measures such as the following:

   - Diversion of offsite runoff away from the construction site;
   - Prompt revegetation of proposed landscaped areas;
   - Perimeter sandbagging or temporary basins to trap sediment; and
   - Regular sprinkling of exposed soils during construction phases.

3. Prior to the issuance of building permits within the Specific Plan, the project applicant shall develop a plan to implement any recommendations from the County of Orange Flood Control Division and City Public Works Departments which will reduce impacts to the Bolsa Chica Channel floodplain resulting from onsite development. For example, one such recommendation would be the removal of the wooden bridge at a future time when it is no longer utilized by the County operations and maintenance staff to access the westerly bank of the Channel. This plan shall be submitted to the City Department of Public Works for review and approval.

4. Prior to issuance of any grading permits within the Specific Plan, the applicant shall submit a "Notice of Intent" (NOI), along with the required fee to the State Water Resources Control Board to be covered under the State NPDES General Construction permit and provide the City with a copy of the written reply containing the discharger's identification number.

5. Prior to the issuance of the grading permits within the Specific Plan, the applicant shall provide a Water Quality Management Plan showing conformance to the Orange County Drainage Area Management Plan and all NPDES requirements (enacted by the EPA) for review and approval by the City Engineer. The plan shall reduce the discharge of pollutants to the maximum extent practical using management practices, control techniques and systems, design and engineering methods, and such other provisions which are appropriate.

Natural Resources/Energy

1. Building design and construction shall comply with the Energy Conservation Standards set forth in Title 24 of the California Administrative Code. Prior to approval of building permits for the Specific Plan, architectural and engineering plans shall be subject to the review and approval of the Director of Public Works to ensure conformance with these standards. Energy conservation features should include:

   - Installation of thermal insulation in walls and ceilings which meet or exceed State of California, Title 24 requirements.
   - Insulation of hot water pipes and duct systems.
   - Use of natural ventilation where possible.
   - Use of natural gas for space heating and cooking.
   - Installation of ventilation devices.
   - Orientation to sunlight and use of overhangs.
   - Landscaping with deciduous trees, to provide shade in the summer months and allow sunlight through in the winter months.

2. Prior to approval of building permits within the Specific Plan, it is recommended that the applicant consult with both the Southern California Gas Company and Southern California Edison during the building design phase for further energy conservation measures.

Public Services and Utilities

Fire

1. Prior to approval of building permits within the Specific Plan, complete building plans shall be submitted to and approved by the Fire Department. If during the Fire Department's plan check it becomes evident that fireground operations will become impeded, the department will impose standard fire code requirements such as automatic sprinkler systems, alarm systems, access roads, etc.

2. Prior to issuance of building permits within the Specific Plan, the applicant shall contribute funding on a "fair-share" basis towards the relocation/enlargement of the Heil station, subject to the approval of the Community Development Department.

3. Prior to issuance of building permits within the Specific Plan, the applicant shall be subject to a fire facility needs assessment/review by the Fire Department to determine the actual necessity of the new fire station and whether applications should be halted until the fire facility at Graham and Production Lane is in service.

Police

4. Prior to issuance of building permits within the Specific Plan, the need for additional police officers must be fully evaluated by the City of Huntington Beach and the applicant. If it is found that additional officers are needed to serve the area, funds must be procured to fill this position.

5. The Police Department shall be consulted during preliminary stages of the project design prior to approval of building permits within the Specific Plan to review the safety features, determine their adequacy, and suggest improvements.

6. During construction and at complete buildout, the project shall provide easy access into and within the project site for emergency vehicles and addresses shall be well marked to facilitate response by officers. Project site plans depicting these requirements shall be reviewed and approved by the Police Department.

7. Prior to issuance of building permits within the Specific Plan, the project shall be designed such that all areas of the project will be well lit, including alcoves, walkways, doorsteps, and parking facilities. Project site plans depicting these requirements shall be reviewed and approved by the Police Department.

8. Prior to issuance of building permits within the Specific Plan, an internal security system (e.g. security guards, alarms, access limits after hours) shall be incorporated, to be reviewed by the Police Department and the City Planning Department.

Schools

9. Prior to issuance of building permits within the Specific Plan, the applicant shall provide school fees to mitigate conditions of overcrowding as part of building permit application. These fees shall be based on the state fee schedule in effect at the time of building permit applications.

Community Services

10. Prior to issuance of grading permits for Planning Area 3 in the Specific Plan resulting in removal of the existing fields, the applicant shall determine if recreation facilities are needed by existing and future employees. If deemed necessary, the applicant must enter into a lease-type agreement or provision of recreation facilities for employees to replace those lost, subject to the approval of the City of Huntington Beach Community Services Department.

Library

11. The applicant shall provide development fees to mitigate conditions of increased demand as part of building permit application. These fees shall be based on the City fee schedule in effect at the time of building permit applications.

Water

12. Prior to issuance of Certificates of Occupancy, the following water conservation measures shall be implemented as required by state law:

    a. Ultra-low-flush toilets
    b. Ultra-low-flow showers and faucets
    c. Insulation of hot water lines in water recirculating systems
    d. Compliance with water conservation provisions of the appropriate plumbing code

13. Prior to issuance of building permits, irrigation systems which minimize water waste shall be used to the greatest extent possible. Such measures should involve such features as the following:

    a. Raised planters and berming in conjunction with closely spaced low volume, low angle (22 ½ degree) sprinkler heads.
    b. Drip irrigation.
    c. Irrigation systems controlled automatically to ensure watering during early morning or evening hours to reduce evaporation losses.
    d. The use of reclaimed water for irrigated areas and grass lands. The project applicants shall connect to the Orange County Water District's "Green Acres" system of reclaimed water should this supply of water be available. Separate irrigation services shall be installed to ease this transition.

14. Prior to issuance of Certificates of Occupancy, water pressure regulators to limit downstream pressure to a maximum of 60 psi shall be installed.

15. Prior to issuance of building permits within the Specific Plan, the use of pervious paving material shall be encouraged to reduce surface water runoff and aid in groundwater recharge and slopes and grades shall be controlled to discourage water waste through runoff.

16. Prior to issuance of grading permits, the City shall provide information to prospective occupants regarding benefits of low water use landscaping and sources of additional assistance in selecting irrigation and landscaping.

17. Prior to issuance of building permits, complete landscape and irrigation plans which minimize use of lawns and utilize warm season, drought tolerant species shall be submitted to and approved by the Water Division. Mulch shall be used extensively in all landscaped areas. Mulch applied on top of soil will improve the water-holding capacity of the soil by reducing evaporation and soil compaction. Irrigation system shall be designed to use reclaimed water when available.

18. Prior to issuance of building permits within the Specific Plan, the Water Division of the City's Public Works Department shall be consulted during design and construction for further water conservation measures to review irrigation designs and drought tolerant plant use, as well as measures that may be incorporated into the project to reduce peak hour water demand.

19. Prior to the issuance of building permits within the Specific Plan, the project applicant shall implement conditions of the Public Works Department regarding water infrastructure improvements (identified on Exhibit 40 within the EIR) to handle increased water flow demands.

Solid Waste Disposal

20. To reduce the proposed project's impacts on waste disposal facilities, project designs shall develop a means of reducing the amount of waste generated both during construction and when the project is in use. The waste reduction program shall be approved by the Community Development Director prior to issuance of building permits within the Specific Plan. Potential ways of reducing project waste loads include implementation of recycling programs, and use of low maintenance landscaping when possible (i.e., native vegetation instead of turf).

21. Rainbow Disposal shall be contacted during the design stage of project components to ensure the most efficient and economical means for rubbish removal. The designs shall include rubbish enclosures, projected travel areas, and turnabouts where necessary.

Public Transportation

22. Prior to issuance of building permits within the Specific Plan, a bus turnout, if determined by the City Traffic Engineer to be necessary based on roadway cross sections, travel volumes or speeds, shall be provided at each bus stop located in the project area.

23. Prior to approval of a tentative map within the Specific Plan, the area adjacent to this turnout shall include a paved passenger waiting area complete with a bus shelter and bench.

24. Prior to approval of a tentative map within the Specific Plan, a concrete bus pad sufficient to support the weight of a bus (see OCTD's Design Guidelines for Bus Facilities) may have to be provided at the transit stop. This would be necessary assuming the material used to construct Bolsa Avenue would be insufficient to support continued transit use of the bus stop.

Sewer

25. Prior to the issuance of Certificates of Occupancy within the Specific Plan, the project applicant shall implement conditions of the Public Works Department regarding sewer infrastructure improvements (identified on Exhibit 41 within the EIR) to handle increased sewer flow demands.

Storm Drains

Please refer to Section 5.8 Drainage and Hydrology of this EIR.

Natural Gas

Please refer to Mitigation Measure 2 in Section 5.9 Natural Resources/Energy of this EIR.

Electricity

Please refer to Mitigation Measure 2 in Section 5.9 Natural Resources/Energy of this EIR.

Telephone

26. Prior to issuance of building permits within the Specific Plan, building plans shall be submitted to GTE enabling GTE to assess the improvements necessary to provide adequate service to the project site.

8.5 APPLICABLE STANDARD CITY POLICIES AND REQUIREMENTS

Land Use

A. Prior to submittal for building permits, the applicant/owner shall submit three copies of the site plan to the Planning Division for addressing purposes. If street names are necessary, submit proposal to Fire Department for review and approval.

B. Prior to submittal for building permits, the applicant/owner shall depict all utility apparatus, such as but not limited to backflow devices and Edison transformers, on the site plan. They shall be prohibited in the front and exterior yard setbacks unless properly screened by landscaping or other method as approved by the Community Development Director.

C. Prior to submittal for building permits, the applicant/owner shall depict colors and building materials as proposed.

D. Prior to the issuance of building permits, the applicant/owner shall submit a Landscape Construction Set to the Departments of Community Development and Public Works which must be approved. The Landscape Construction Set shall include a landscape plan prepared and signed by a State Licensed Landscape Architect and include all proposed/existing plan materials (location, type, size, quantity), and irrigation plan, a grading plan, an approved site plan, and a copy of the entitlement conditions of approval. The landscape plans shall be in conformance with Chapter 232 Landscape Improvements of the Huntington Beach Zoning and Subdivision Ordinance. The set must be approved by both departments prior to issuance of building permits. Any existing mature trees that must be removed shall be replaced at a 2 to 1 ratio with minimum 86-inch box trees, which shall be incorporated into the project's landscape plan.

E. The applicant/owner shall comply with all applicable provisions of the Ordinance Code, Building Division, and Fire Department.

F. The required landscaping and irrigation systems shall be completed and installed by the applicant/owner prior to final inspection/within 12 months.

G. All improvements (including landscaping) to the property shall be completed in accordance with the approved plans and conditions of approval specified herein.

H. All building spoils, such as unusable lumber, wire, pipe, and other surplus or unusable material, shall be disposed of at an off-site facility equipped to handle them.

Aesthetics/Urban Design

A. All rooftop mechanical equipment shall be screened from any view. Said screening shall be architecturally compatible with the building in terms of materials and colors. If screening is not designed specifically into the building, a rooftop mechanical equipment plan must be submitted showing screening and must be approved.

B. Prior to the issuance of building permits, the applicant/owner shall submit a Landscape Construction Set to the Departments of Community Development and Public Works which must be approved. The Landscape Construction Set shall include a landscape plan prepared and signed by a State Licensed Landscape Architect and include all proposed/existing plan materials (location, type, size, quantity), and irrigation plan, a grading plan, an approved site plan, and a copy of the entitlement conditions of approval. The landscape plans shall be in conformance with Chapter 232 Landscape Improvements of the Huntington Beach Zoning and Subdivision Ordinance. The set must be approved by both departments prior to issuance of building permits. Any existing mature trees that must be removed shall be replaced at a 2 to 1 ratio with minimum 36-inch box trees, which shall be incorporated into the project's landscape plan.

Light and Glare

A. Prior to the submittal for building permits, the applicant/owner shall ensure that if outdoor lighting is included, high-pressure sodium vapor lamps or similar energy saving lamps shall be used. All outside lighting shall be directed to prevent "spillage" onto adjacent properties and shall be noted on the site plan and elevations.

Transportation/Circulation

A. Prior to issuance of building permits (or certificate of occupancy, if determined appropriate by the Traffic Division and Planning Division), a Trip Generation Analysis shall be submitted for review and approval by the Public Works Department, Traffic Engineering Division. The analysis shall be used to determine the project's Traffic Impact Fee. This has been accomplished; refer to Appendix B of this EIR. The traffic impact fees shall be paid prior to issuance of the certificate of occupancy.

B. All applicable Public Works fees shall be paid.

C. An interim parking and/or building materials storage plan shall be submitted to the Department of Community Development to assure adequate parking is available for employees, customers, contractors, etc., during the project's construction phase.

Air Quality

A. During construction, the applicant shall use water trucks or sprinkler systems on all areas where vehicles travel to keep damp enough to prevent dust from being raised when leaving the site.

B. During construction, the applicant shall use low sulfur fuel (.05%) by weight for construction equipment.

C. During construction, the applicant shall attempt to phase and schedule construction activities to avoid high ozone days (first stage smog alerts).

D. During construction, the applicant shall discontinue construction during second stage smog alerts.

Noise

A. Construction shall be limited to Monday - Saturday 7:00am to 8:00pm. Construction shall be prohibited Sundays and Federal holidays.

Earth Conditions

A. Prior to submittal for building permits, a detailed soils analysis shall be prepared by a registered Soils Engineer. This analysis shall include onsite soil sampling and laboratory testing of materials to provide detailed recommendations regarding grading, chemical and fill properties, foundations, retaining walls, streets and utilities.

B. Prior to issuance of building permits, a grading plan shall be submitted to the Department of Public Works for review and approval (by issuance of a grading permit). A plan for silt control for all water runoff from the property during construction and initial operation of the project may be required if deemed necessary by the Director of Public Works.

Drainage and Hydrology

A. Prior to issuance of building permits, drainage and hydraulic studies shall be submitted for Public Works approval.

Natural Resources/Energy

A. The intent of this section is to state standard City conditions and requirements which reduce impacts identified previously in this section. No standard City conditions or requirements are applicable to identified project impacts.

Public Services and Utilities

A. All applicable Public Works fees shall be paid. The developer will be responsible for the payment of any additional fees adopted in the "upcoming" Water Division Financial Master Plan.

Agriculture

A. The intent of this section is to state standard City conditions and requirements which reduce impacts identified previously in this section. No standard City conditions or requirements are applicable to identified project impacts.

Socioeconomic

A. The intent of this section is to state standard City conditions and requirements which reduce impacts identified previously in this section. No standard City conditions or requirements are applicable to identified project impacts.

9.0 REPORT PREPARATION RESOURCES

9.1 ORGANIZATION AND PERSONS CONSULTED

City of Huntington Beach

Planning Department	Melanie S. Fallon Howard Zelefsky Herb Fauland Julie Osugi
Public Works Department	Les M. Jones, II Bob Eichblatt Daryl Smith Chuck Davis Dave Webb Jim Otterson Bruce Gilmer Jeff Renna Steve Kreiger Deborah DeBow Ron Hagan
Community Services Department	Jim Engle
Huntington Beach Fire Department	Michael Dolder, Fire Chief Duane Olson, Fire Marshal
Huntington Beach Police Department	Ron Lowenberg, Police Chief Sylvia A. Franklin, Planner/Drafter

Other Agencies

County Sanitation Districts of Orange County	David A. Ludwin, P.E.
Huntington Beach Union High School District	Dr. Patricia Koch, Asst. Superintendent
Westminster School District	Barbara Winars, Deputy Superintendent
The Gas Company	Ronald E. Reed, Technical Supervisor
Huntington Central Library	Ronald Hayden, Library Director

Rainbow Disposal Co., Inc.	Richard R. Timm, Manager
Orange County Transportation Authority	Jorge L. Duran, Transportation Analyst
Metropolitan Water District	Jay Malinowski, Chief of Operations
Municipal Water District of Orange County Orange County Water District	Karl Seckel, Asst. General Mgr. Steve Conklin, Engineering Director
Vencor Hospital Orange County	Dianna Dunn
Columbia/HCA	Susan Alex, Director
Orange County Vector Control District	Gary Reynolds, Biologist
GTE	P. Klopp, Administrator
County of Orange EMA	Herb Nakasone, Manager
Ocean View School District	James R. Tarwater, Ed.D.

9.2 REPORT PREPARATION STAFF

EDAW, Inc.	Jayna Morgan Sally Mirabella Mike Baird Khara Covington Elissa Palmer Glenn Taylor Geoff Preston

9.3 CONTRIBUTORS

Traffic and Circulation	Steve Sasaki WPA
Water, Sewer and Storm Drain Master Plan	Don Karpinen, Mo Abadhi Adams-Streeter Civil Engineers Inc.
McDonnell Douglas Realty Company	Tom Overturf Stephen J. Barker Merle Pautsch Gary Powley
Richard Harlow & Associates	Dick Harlow
Adams Associates	Mike Adams

9.4 REFERENCES

Report of Foundation Investigation, LeRoy Crandall & Associates, June 30, 1982

Phase I Environmental Assessment, CDM, April 23, 1991

Memorandums, Weston Pringle & Associates, December 12, 13, and 18, 1991

Analysis of Land Use Alternatives for the City of Huntington Beach, MDRC, April 12, 1992

Foundation Investigation, Law/Crandall, September 21, 1992

Update of the Phase I Environmental Assessment, CDM, December 3, 1993

Results of Phase II Soils Investigation, CDM, December 3, 1993

Preliminary Geotechnical Investigation, NorCal Engineering, December 7, 1993

Report of Paving Studies, Law/Crandall, October 4, 1995

Interim Report of Observation and Testing Services, Law/Crandall, December 8, 1995

Traffic Impact Analysis, Kimley-Horn & Assoc., Inc., 1995

Final EIR, City of Huntington Beach, February 1988

California Air Quality Data, California Air Resources Board.

California Statistical Abstract, California Department of Finance.

Huntington Beach General Plan Update, Envicom Corporation, 1995.

APPENDIX A

PUBLIC PARTICIPATION AND REVIEW

1. INITIAL STUDY AND NOP
2. NOP DISTRIBUTION LIST
3. CORRESPONDENCE RELATED TO NOP AND UTILITY LETTERS

See NOTE below

SCH#________________

NOTICE OF COMPLETION **Appendix F**

Mail to: State Clearinghouse, 1400 Tenth Street, Sacramento, CA 95814 916/445-0615

Project Title: McDonnell Centre Business Park Specific Plan EIR 96-1
Lead Agency: City of Huntington Beach — Contact Person: Julie Osugi
Street Address: 2000 Main Street — Phone: (714) 536-5274
City: Huntington Beach — Zip: 92648 — County: Orange

Project Location

County: Orange — City/Nearest Community: Huntington Beach
Cross Streets: Springdale Street, Bolsa Avenue, Bolsa Chica Street, Rancho Road — Total Acres: 307
Assessor's Parcel No. See Initial Study page 1 — Section: 9 — Twp: 5 — Range: 11 — Base: Seal Beach, Los Alamitos Quad
Within 2 Miles: State hwy #: I-405 — Waterways:____ — Airports:____
Railways: U.S. Navy Railroad Right-of-Way — Schools:____

Document Type

CEQA: X NOP; ___ Early Cons; ___ Neg Dec; ___ Draft EIR; ___ Supplement/Subsequent; ___ EIR (Prior SCH No.) ____; ___ Other____
NEPA: ___ NOI; ___ EA; ___ Draft EIS; ___ FONSI
Other: ___ Joint Document; ___ Final Document; ___ Other____

Local Action Type

___ General Plan Update; ___ General Plan Amendment; ___ General Plan Element; ___ Community Plan
X Specific Plan; ___ Master Plan; ___ Planned Unit Development; ___ Site Plan
X Rezone; ___ Prezone; ___ Use Permit; ___ Land Division (Subdivision Parcel Map, Tract Map, etc.)
___ Annexation (Water District); ___ Redevelopment; ___ Coastal Permit; ___ Other Sphere of Influence Amend

Development Type

X Residential:	Units *	Acres____		
X Offices:	Sq.Ft. *	Acres____	Employees____	
X Commercial:	Sq.Ft. *	Acres____	Employees____	
X Industrial:	Sq.Ft. *	Acres____	Employees____	
___ Educational:	School			
___ Recreational:				
___ Water Facilities:	Type____			MGD____
___ Transportation:	Type____			
___ Mining:	Mineral____			
___ Power:	Type____			Watts____
___ Waste Treatment:	Type____			
___ Hazardous Waste:	Type____			
___ Other:				

* See attached Project Synopsis and Table A.

Project Issues Discussed in Document

X Aesthetic/Visual; X Agricultural Land; X Air Quality; ___ Archaeological/Historical; ___ Coastal Zone; X Drainage/Absorption; X Economics/Jobs; ___ Fiscal
X Flood Plain/Flooding; ___ Forest Land/Fire Hazard; X Geologic/Seismic; ___ Minerals; X Noise; X Population/Housing Balance; X Public Services/Facilities; X Recreation/Parks
X Schools/Universities; ___ Septic Systems; X Sewer Capacity; X Soil Erosion/Compaction/Grading; X Solid Waste; X Toxic/Hazardous; X Traffic/Circulation; ___ Vegetation
X Water Quality; X Water Supply/Groundwater; ___ Wetland/Riparian; ___ Wildlife; X Growth Inducing; X Land Use; X Cumulative Effects; X Other Light/Glare

Present Land Use/Zoning/General Plan Use

See Page 1 and 2 (Initial Study).

Project Description

The project will involve preparation of a *Specific Plan* to allow for the cohesive development of a mix of industrial and commercial/retail/office uses that are submitted under the existing Industrial Limited (IL) zoning designation. The specific plan will also allow for optional residential development on a portion of the site. Approximately 173 acres of the 307 acre project site are currently developed or have been granted entitlement for development of industrial storehouse/distribution and McDonnell Douglas aerospace uses.

NOTE: Clearinghouse will assign identification numbers for all new projects (i.e., from a Notice of Preparation or previous draft document) please fill it in.

P:\1996\6N11601\NTCCOMP DOC

City of Huntington Beach

2000 MAIN STREET CALIFORNIA 92648

DEPARTMENT OF COMMUNITY DEVELOPMENT

Building 536-5241
Planning 536-5271

NOTICE of PREPARATION

CITY OF HUNTINGTON BEACH

McDONNELL CENTRE BUSINESS PARK EIR
EIR # 96-1

Contents

JUNE 14, 1996

Notice of Preparation

To: State, County, Lead Agencies, and Interested Parties

Subject: Notice of Preparation of a Draft Environmental Impact Report

Lead Agency	Consulting Firm
Agency Name: City of Huntington Beach	**Firm Name:** EDAW, Inc.
Street Address: 2000 Main Street	**Mailing Address:** 17875 Von Karman Ave., Suite 400
City/State/Zip: Huntington Beach, California 92648	**City/State/Zip:** Irvine, California 92714
Telephone: 714.536.5271	**Telephone:** 714.660.8044
City Contact: Ms. Julie Osugi	**Firm Contact:** Ms. Jayna Morgan

Request for Agency Input Regarding the Scope of the EIR

The City of Huntington Beach will be the Lead Agency for the proposed project described in the attachments to this Notice of Preparation (NOP). The Agency will prepare an Environmental Impact Report for this project. The City needs to know the views of your agency regarding the scope and content of the environmental information which will be included in the EIR. The document to be prepared by the City of Huntington Beach should include any information necessary for your agency to meet any statutory responsibilities related to the proposed project. Your agency will need to use the EIR prepared by the City of Huntington Beach when considering any permit or other approvals necessary to implement the project.

The project description, location, and a brief description of the potential effects of the undertaking as they are presently understood are contained in the attached materials.

Due to the time limits mandated by State law, your response must be sent to the City at the earliest possible date but not later than 30 days after receipt of this notice. **Please send your response to Ms. Julie Osugi, City of Huntington Beach, 2000 Main Street, Huntington Beach, CA 92648.** Agency responses to this NOP should include the name of a contact person within the commenting agency.

Project Title: McDonnell Centre Business Park Specific Plan

Project Location: Refer to the attached description and exhibits.

Project Description: A complete Project Description is attached.

Date: June 14, 1996

Signature Julie K Osugi
Ms. Julie Osugi
Associate Planner

Reference: California Code of Regulations, Title 14 (CEQA Guidelines) Section 15082(e), 15103, 15375.

NOP Distribution List

Brian Fisk, Director of Planning
City of Westminster
8200 Westminster Avenue
Westminster, CA 92683

Dick Harlow
211-B Main Street
Huntington Beach, CA 92648

Tom Overturf
McDonnell Douglas Realty Co.
4060 Lakewood Blvd., 6th Floor
Long Beach, CA 90808

Orange County Sanitation District
P.O. Box 8127
Fountain Valley, CA 92728-8127
Attn: Don McIntyre

Mr. Herb Nakasone
General Manager
O.C. Flood Control District
300 N. Flower Street
Santa Ana, CA 92702-4048

Ms. Tish Koch
Assistant Superintendent of Business
H.B. Union High School District
10251 Yorktown Avenue
Huntington Beach, CA 92646

Dr. James Tarwater
Superintendent
Ocean View Elem. School District
17200 Pinehurst Drive
Huntington Beach, CA 92647

Tom Ryan, Chairman
H.B. Environmental Board
8852 Luss
Huntington Beach, CA 92646

Mr. Gilbert Challet
District Manager
O.C. Vector Control District
P.O. Box 87
Santa Ana, CA 92702

Mr. John Nelson
Assistant Superintendent
O.C. Department of Education
200 Kalmus Drive
Costa Mesa, CA 92628

Ms. Nancy A. Pollard, President
Board of Trustees
O.C. Community College District
1370 Adams Avenue
Costa Mesa, CA 92626

Mr. John Wodraska
General Manager
Metropolitan Water District of S.C.
P.O. Box 54153
Los Angeles, CA 90054

Stan Oftelie, CEO
Orange County Transit Authority
(OCTA)
P.O. Box 14184
Orange, CA 92613-1581

Mr. Stanley Sprague
General Manager
O.C. Municipal Water District
P.O. Box 20895
Fountain Valley, CA 92728

Mr. William R. Mills, Jr.
General Manager
Orange County Water District
P.O. Box 8300
Fountain Valley, CA 92708

Mr. Jerry Buchanan
Asst. Superintendent of Adm. Serv.
H.B. Elementary School District
P.O. Box 71
Huntington Beach, CA 92648

Ms. Gail Wickstrom
Superintendent
Westminster Elem. School Dist.
14121 Cedarwood Avenue
Westminster, CA 92683

Mr. Robert Mazzola
Engineer-Telephone Operations
GTE
7292 Slater Avenue
Huntington Beach, CA 92647-6240

Ms. Patricia Wolf
Regional Manager, Region 5
Department of Fish and Game
330 Golden Shore, Suite 50
Long Beach, CA 90802

SCAG Clearinghouse
818 West Seventh Street, 12th Floor
Los Angeles, CA 90017

Ms. Vivian Doch-Boulos
Intergovernmental Review
SCAG Clearinghouse
818 West Seventh Street, 12th Floor
Los Angeles, CA 90017-3436

Mr. Robert Joseph
Chief, Advance Planning Branch
Caltrans, District 12
2501 Pullman Street
Santa Ana, CA 92705

Mr. Robert S. Warth
Technical Supervisor
The Gas Company
P.O. Box 3334
Anaheim, CA 92803-3334

Mr. Wayne Pitzer
Supervising Engineer
Southern California Edison Co.
1325 South Grand Avenue
Santa Ana, CA 92705

Mr. Antero Rivasplatu
State Clearinghouse
OPR
1400 Tenth Street
Sacramento, CA 95825-8202

California Energy Commission
1516 Ninth Street
Sacramento, CA 92803-3334

Time Warner Communications
7441 Chapman Avenue
Garden Grove, CA 92641
Attn: Robert Moel
Vice President & General Manager

Dwight Sanders
Division Chief, Env. Planning
100 Howe Avenue, Suite 100 South
Sacramento, CA 92825-8202

Department of Food and Agriculture
1220 N. Street, Room 101
Sacramento, CA 95814

South Air Quality Management
District (SCAQMD)
21865 E. Copley Drive
Diamond Bar, CA 91765-4182
Attn: Aileen Taber

State Water Resources Control
Board
P.O. Box 100
Sacramento, CA 95801

California Integrated Waste
Management Board
8800 Cal Center Drive
Sacramento, CA 95826-3268

Public Works Commission
505 Van Ness Avenue
San Francisco, CA 94102

Project Synopsis

Project Title:	McDonnell Centre Business Park
Entitlement Requests:	Code Amendment 96-1 (Zoning Text and Map Amendment) Specific Plan Review 96-1 Development Agreement* **Applications for this entitlement has not yet been submitted, therefore the permit number has yet to be assigned.*
Location:	The project area is situated in the northwest section of the City of Huntington Beach. The site is bounded on the north by Rancho Road and the U.S. Navy railroad right-of-way, on the east by Springdale Street, on the south by Bolsa Avenue, and on the west by Bolsa Chica Street. The location of the project in relation to the local and regional setting is displayed in Exhibit 1 and Exhibit 2.
Acreage:	307 acres
Project Components:	The project will involve preparation of a Specific Plan to allow for the cohesive development of a mix of industrial and commercial/retail/office uses that are submitted under the existing Industrial Limited (IL) zoning designation. The specific plan will also allow for optional residential development on a portion of the site. Approximately 173 acres of the 307 acre project site are currently developed or have been granted entitlement for development of industrial storehouse/distribution and McDonnell Douglas aerospace uses. Tables A and B provide breakdowns of site components by planning area and current development status. Exhibit 3 illustrates the location of the planning areas on the site. The EIR and Specific Plan will also evaluate the potential for alternative uses for development of the currently vacant lands on the project site (other than those listed in Table A). Alternative uses could include: retail power center, hotel, restaurant, theater and residential. The intent of establishing the specific plan is to allow subsequent development, that is consistent with the specific plan and EIR to go forward without requiring additional entitlement. City staff has been working with a manufacturing company that is proposing to establish operations on the site. The party is proposing to construct a manufacturing/warehousing/distribution/office building totaling approximately 165,000 square feet on approximately 7.5 acres located at the southeast corner of Skylab and Able. Although formal applications have not yet been submitted by the party, the City expects submittal of applications within the coming weeks; therefore, processing of this request is expected to occur separately from the specific plan and EIR. Environmental processing for this project will be conducted separately from the EIR. The proposed development of the site falls within the 0.75 floor area ratio projected for the area under the specific plan. However, since the project is neither entitled or existing at this time, the subject area has been included in the overall maximum development calculations for Planning Area 2, in the event that the project is not pursued.
Applicant:	McDonnell Douglas Realty Company 4060 Lakewood Blvd., 6th Floor Long Beach, CA 90808 310.627.3200 Mr. Tom Overturf

Applicant Representative:	Richard A. Harlow and Associates Mr. Dick Harlow (714) 960-2147

Assessor's Parcel Numbers:

195-11-111-1	195-11-111-8	195-11-111-13	195-11-112-7
195-11-111-2	195-11-111-9	195-11-111-14	195-11-112-8
195-11-111-3	195-11-111-10	195-11-111-15	195-11-112-9
195-11-111-4	195-11-111-11	195-11-112-5	195-11-112-10
195-11-111-5	195-11-111-12	195-11-112-6	

Utilities and Services:

<u>Electric</u>:	Southern California Edison Company 1325 South Grand Avenue Santa Ana, CA 92705
<u>Telephone</u>:	GTE 7292 Slater Avenue Huntington Beach, CA 92647-6240
<u>Natural Gas</u>:	Southern California Gas Company Orange County Division PO Box 3334 Anaheim, CA 92803-3334
<u>Water</u>:	City of Huntington Beach Water Department - Water Operations PO Box 190 Huntington Beach, CA 92648
<u>Sewer</u>:	*(collection of wastewater)* City of Huntington Beach Public Works Department Sewage Division 17371 Gothard Huntington Beach, CA 92647 *(treatment of wastewater)* County of Orange County Sanitation Districts 10844 Ellis Avenue PO Box 8127 Fountain Valley, CA 927288-8127

Project Land Uses: The proposed project is comprised of commercial, residential, and industrial land uses. The acreage dedicated to each major project component is summarized in Table A.

Project Configuration: Exhibit 3 displays the planning areas of the project and their relationship to the project boundaries.

Land Use Designations: The existing zoning on the property within the project is Limited Industrial, with a multi-story suffix on a portion of the site. The zoning for the property would be changed to Specific Plan with approval of the project. The standards within the Specific Plan have yet to be developed. Appropriate zoning modifications will be made for the various project components.

The existing General Plan designation on the property is General Industrial. The project is consistent with the policies of the General Plan for this land use designation. The General Plan map will require an administrative map revision to reflect the final approved specific plan designation.

Final decisions about the proposed land use designations for the various components of the project will be made in conjunction with development of the Specific Plan which will occur prior to circulation of the Draft EIR.

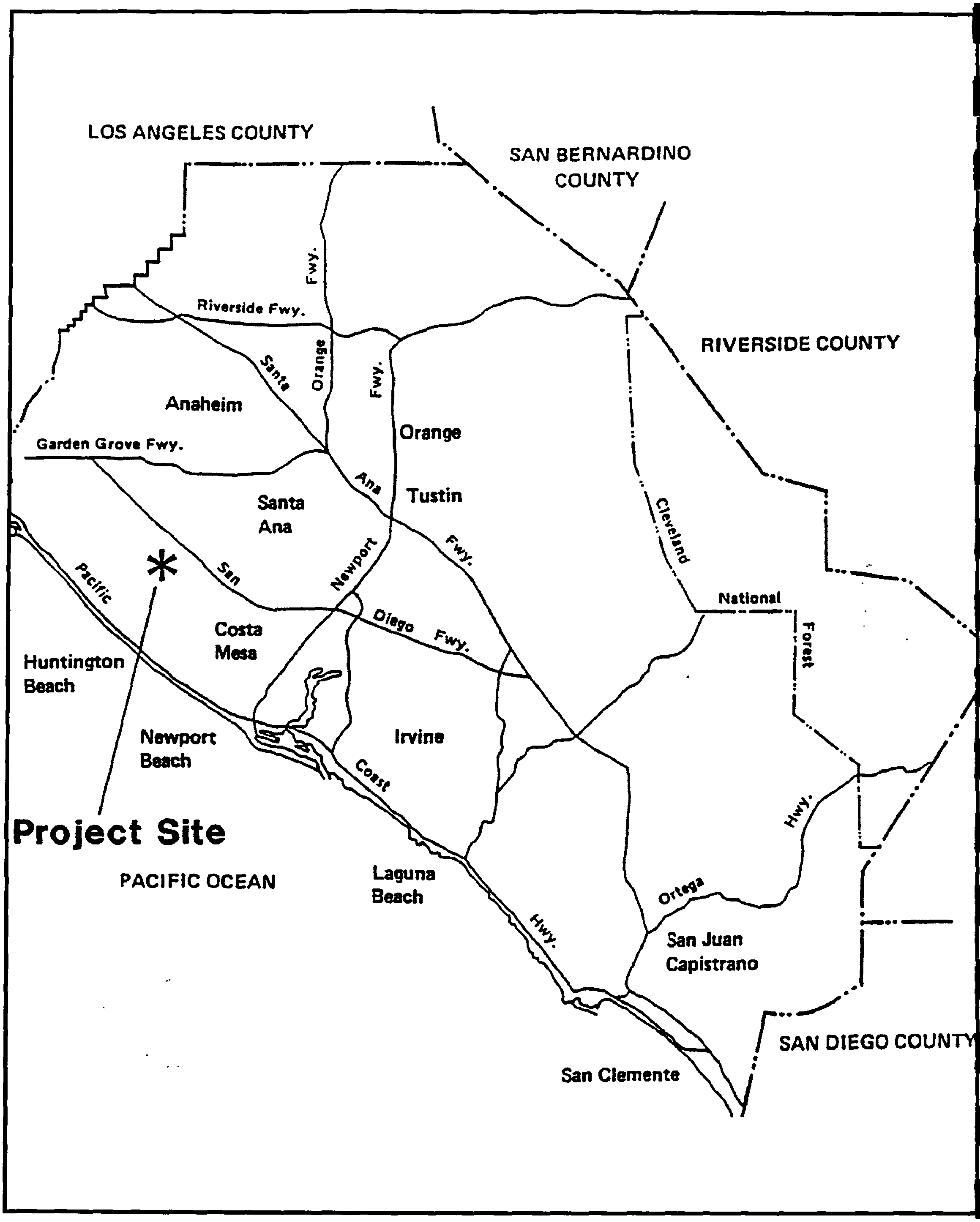
Property Owners:

McDonnell Douglas Realty Company
4060 Lakewood Blvd., 6th Floor
Long Beach, CA 90808

Cambro Manufacturing Company
Sharp Electronics
7601 Clay
Huntington Beach, CA 92647

Applicant's Engineer:

South West Civil
Jesse W. Green, President
18008 Sky Park Circle, Suite 125
Irvine, CA 92714
(714) 852-8852

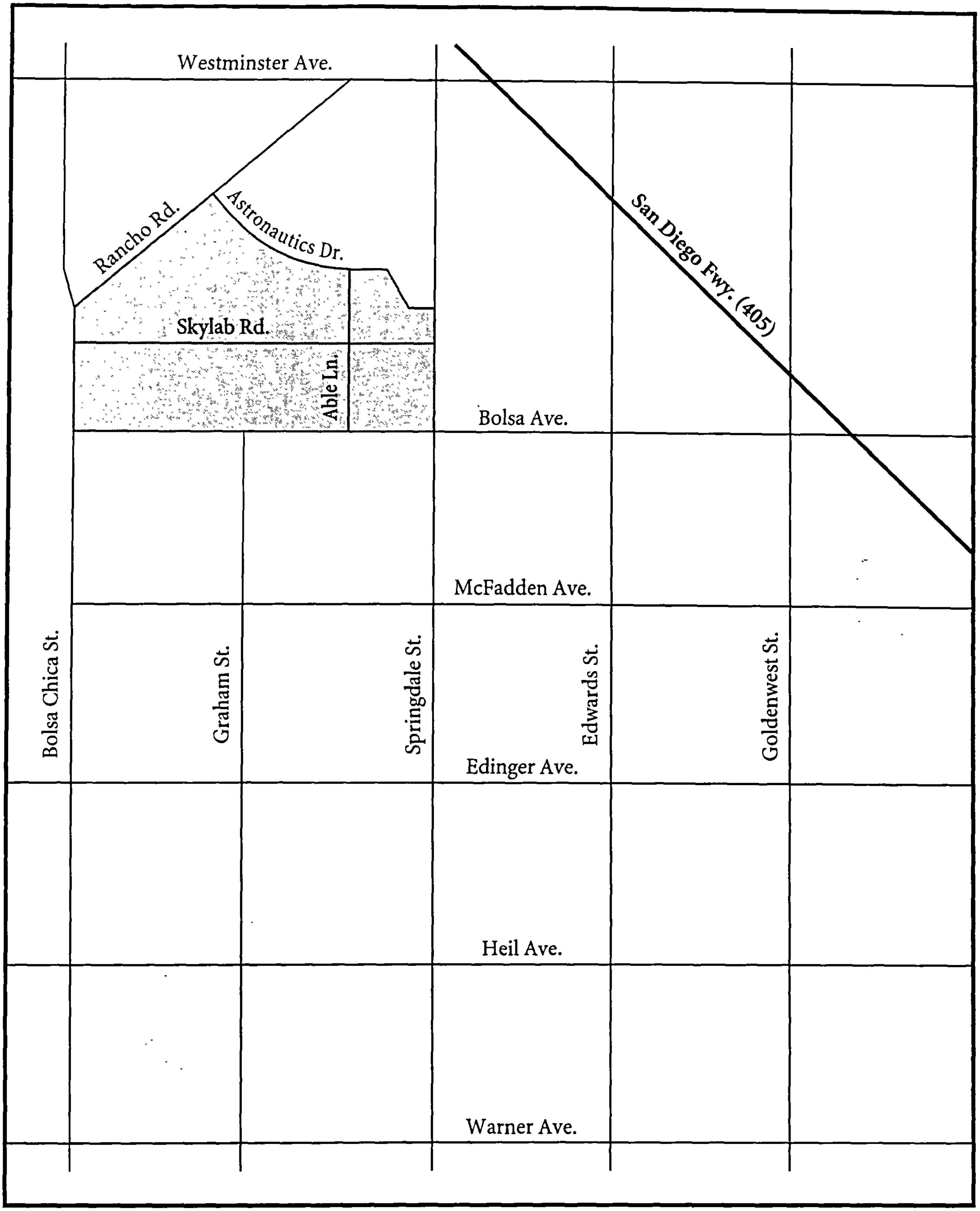


Source: EDAW, Inc.

Regional Location
McDonnell Douglas Initial Study for EIR 96-1
City of Huntington Beach

Exhibit 1

EDAW, Inc.

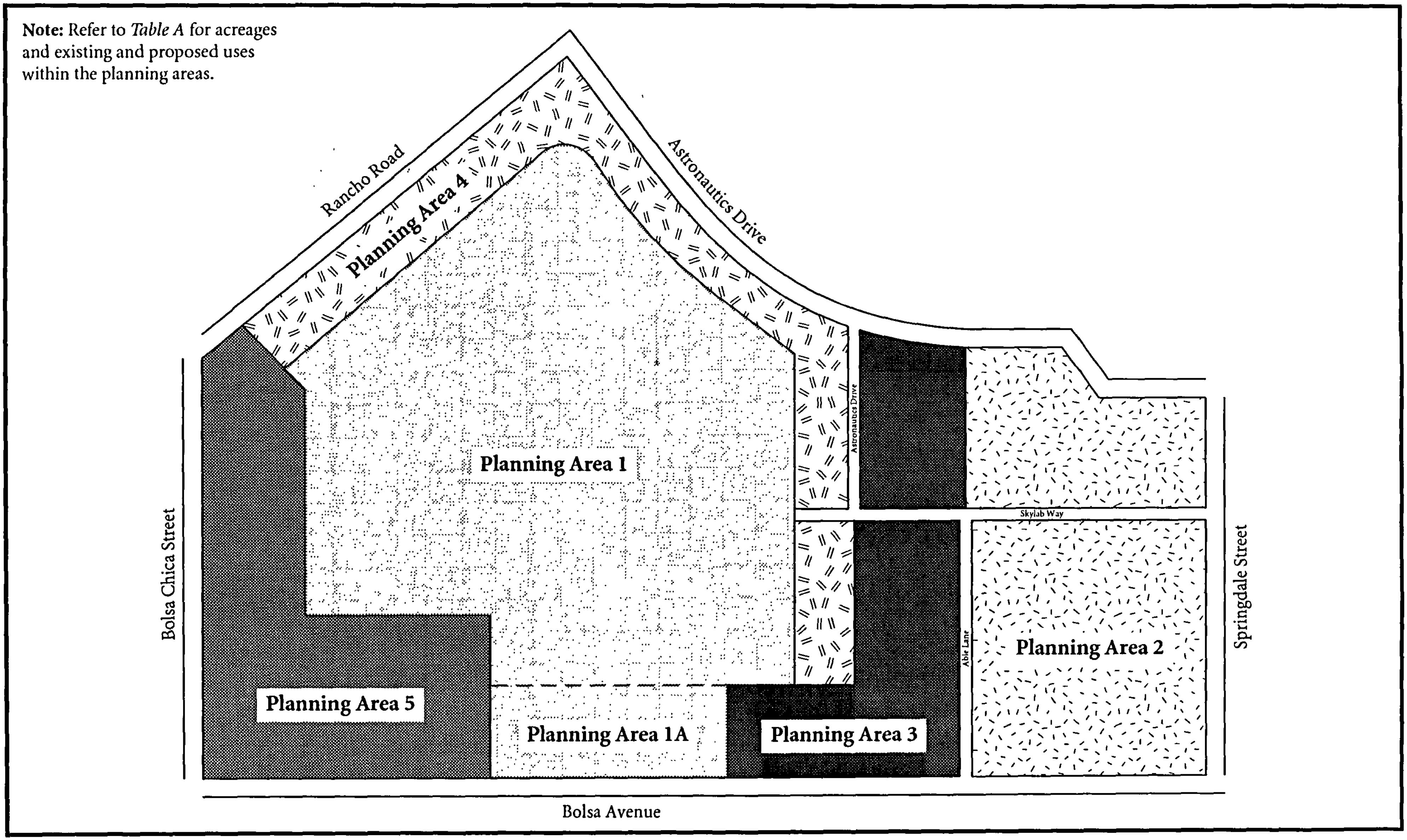


Source: EDAW, Inc.

Local Vicinity
McDonnell Douglas Initial Study for EIR 96-1
City of Huntington Beach

Exhibit 2

EDAW, Inc.



Source: McDonnell Douglas Reality Company

Site Plan/Planning Areas
McDonnell Douglas Initial Study for EIR 96-1
City of Huntington Beach

Exhibit 3

May 1996

EDAW, Inc.

Table A
Project Components

Project Components	Acres	Existing Uses	Approved Uses	Future Uses
<u>Planning Area 1 and Area 1A</u> **McDonnell Douglas Aerospace**	120	2,789,053 sf of manufacturing /aerospace		1,131,347 sf of manufacturing /aerospace/R/D
<u>Planning Area 2</u> **Cambro Manufacturing**	11.9			
Phase I		120,000 sf of warehouse		
Phase II			10,000 sf of office 40,000 sf of warehouse	
Phase III			110,400 sf of manufacturing	
Future Potential				108,373 sf of office/warehouse manufacturing
Sharp Electronics Corporation	23.4			
Phase I			400,032 sf of warehouse/ distribution 88,139 sf of office	
Phase II			50,700 sf of warehouse/ distribution	
Future Potential				225,607 sf of office/warehouse
Vacant Land - Phase I	8			261,360 sf of R/D, distribution, office, manufacturing
Vacant Land - Phase II	14.7			480,249 sf of R/D, distribution, office, manufacturing
<u>Planning Area 3</u> **Vacant Land - Phase IIIa**	36			1,176,120 sf of R/D, distribution, office, manufacturing

Table A
(Continued)
Project Components

Project Components	Acres	Existing Uses	Approved Uses	Future Uses
<u>**Planning Area 4**</u>				
Vacant Land - Phase IIIb	35.0			1,143,450 sf of R/D, distribution, office, manufacturing
<u>**Planning Area 5**</u>				
Mixed Use Office Complex				
Phase I -	9	235,831 sf of office (8-story building)		
Phase II -	31		345,551 sf of office (12-story building) 14,000 sf of restaurant 9,600 sf of support retail	
Future Potential				701,818 sf of mixed use[1]
Streets, Roads, etc.	18			
Totals	**307**	**3,144,884 sf**	**1,068,422 sf**	**5,228,324 sf**

Source: McDonnell Douglas Realty

sf = square feet

[1] The mixed use area will allow for retail/commercial/office uses, hotel, and optional residential development (at maximum 15 du/acre).

Table B
Land Use Summary

	Planning Area	Area (acres)	Percent of Total
McDonnell Douglas Aerospace (Aerospace Operations)	1	120	39%
McDonnell Centre Business Park		94	31%
Cambro Manufacturing (11.9 acres)	2		
Sharp (23.4 acres)	2		
Phase I (8.0 acres - vacant)	2		
Phase II (14.7 acres - vacant)	2		
Phase III (36 acres - vacant)	3		
Perimeter Area - vacant	4	35	11%
Mixed Use Office Complex	5	40	13%
Street, Roads, etc.		18	6%
Total		**307**	**100%**

Initial Study

An Initial Study/Environmental Concerns Checklist is the preliminary analysis that is prepared by a Lead Agency to determine whether to prepare a Negative Declaration, EIR or some other form of environmental document. In the case of the proposed project, based on the data contained in the following Initial Study, the City of Huntington Beach has determined that an Environmental Impact Report is the appropriate environmental document for processing this application. As required by CEQA Guidelines Section 15063, the Initial Study/Environmental Concerns Checklist has been annotated to provide documentation of the factual basis for this finding.

Project Title: McDonnell Centre Business Park

Entitlement Permit Numbers: Code Amendment 96-1 (Zoning Text and Map Amendment)
Specific Plan Review 96-1
Development Agreement*

**Applications for this entitlement has not yet been submitted, therefore the permit number has yet to be assigned.*

Date of Initial Study: June 14, 1996

Applicant: McDonnell Douglas Realty Company
4060 Lakewood Blvd., 6th Floor
Long Beach, CA 90808
(310) 627.3200
Mr. Tom Overturf

Applicant Representative: Richard A. Harlow and Associates
Mr. Dick Harlow
(714) 960-2147

Location of Project: The project area is situated in the northwest section of the City of Huntington Beach. The site is bounded on the north by Rancho Road and the U.S. Navy railroad right-of-way, on the east by Springdale Street, on the south by Bolsa Avenue, and on the west by Bolsa Chica Street. The location of the project in relation to the local and regional setting is displayed in Exhibit 1.

Assessor's Parcel Numbers:

195-11-111-1	195-11-111-8	195-11-111-13	195-11-112-7
195-11-111-2	195-11-111-9	195-11-111-14	195-11-112-8
195-11-111-3	195-11-111-10	195-11-111-15	195-11-112-9
195-11-111-4	195-11-111-11	195-11-112-5	195-11-112-10
195-11-111-5	195-11-111-12	195-11-112-6	

General Plan Designation: General Industrial.

Zoning: Limited Industrial, with a multi-story suffix on a portion of the site.

Description of Project: The project will involve preparation of a Specific Plan to allow for the cohesive development of a mix of industrial and commercial/retail/office uses that are submitted under the existing Industrial Limited (IL) zoning designation. The specific plan will also allow for optional residential development on a portion of the site. Approximately 173 acres of the 307 acre project site are currently developed or have been granted entitlement for development of industrial storehouse/distribution and McDonnell Douglas aerospace uses.

Tables A and B provide breakdowns of site components by planning area and current development status. Exhibit 3 illustrates the location of the planning areas on the site. The EIR and Specific Plan will also evaluate the potential for alternative uses for development of the currently vacant lands on the project site (other than those listed in Table A). Alternative uses could include: retail power center, hotel, restaurant, theater and residential. The intent of establishing the specific plan is to allow subsequent development, that is consistent with the specific plan and EIR to go forward without requiring additional entitlement.

City staff has been working with a manufacturing company that is proposing to establish operations on the site. The party is proposing to construct a manufacturing/warehousing/distribution/office building totaling approximately 165,000 square feet on approximately 7.5 acres located at the southeast corner of Skylab and Able. Although formal applications have not yet been submitted by the party, the City expects submittal of applications within the coming weeks; therefore, processing of this request is expected to occur separately from the specific plan and EIR. Environmental processing for this project will be conducted separately form the EIR. The proposed development of the site falls within the 0.75 floor area ratio projected for the are under the specific plan.

However, since the project is neither entitled or existing at this time, the subject area has been included in the overall maximum development calculations for Planning Area 2, in the event that the project is not pursued.

Description of Project Site: The project site consists of 307 acres under *multiple* ownership. It is located in the northwest portion of the City of Huntington Beach. The majority of the site is characterized as developed urban. A portion of the project site is currently used for agricultural purposes.

Surrounding Land Uses: North: An at grade spurtrack of the U.S. Navy (Railroad Right-of-Way) and Rancho Road form the northern boundary of the site. Low density residential uses are located north of the railroad tracks and Rancho Road.

South: Bolsa Avenue, a Major Arterial Highway (120 foot right-of-way), forms the southern boundary of the site. Office and manufacturing uses are located south of Bolsa Avenue.

East: Springdale Street, a Primary Arterial Highway (100 foot right-of-way), forms the eastern boundary. Low density residential and commercial uses are located east of Springdale Street.

West: Bolsa Chica Street and the Orange County Flood Control District Channel form the western boundary. The property west of Bolsa Chica Street and the flood control channel is owned by the U.S. Navy and is primarily vacant.

Other Responsible Public Agencies: Orange County Sanitation District, Huntington Beach Public Works Sewer Division, Orange County Environmental Management Agency, Huntington Beach Water District, Orange County Transit District, CALTRANS, State Department of Conservation, Southern California Air Quality Management District.

IS THE PROPOSED PROJECT CONSISTENT WITH:

<u>Huntington Beach General Plan</u>: The project is consistent with the policies of the General Plan and density range for this land use designation. The General Plan map will require administrative modification to reflect the final approved Specific Plan designation.
<u>Applicable Specific Plan</u>: Not applicable. The Specific Plan is currently under preparation.
<u>Huntington Beach Municipal Code:</u> Maybe. The Specific Plan for the project will detail any variation from the existing code standards.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED: The environmental factors listed below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

- Land Use & Planning
- Public Services
- Utility and Service Systems
- Geological Problems
- Water
- Recreation
- Population & Housing
- Transportation/Circulation
- Air Quality
- Noise
- Aesthetics
- Hazards
- Energy and Mineral Resources
- Mandatory Findings of Significance

ARE ANY OF THE FOLLOWING STUDIES REQUIRED:

Noise Study:	yes
Air Quality Analysis:	yes
Geotechnical and Phase I & II Soil Investigation Reports:	no (existing information available)
Traffic Study:	yes

EVALUATION OF ENVIRONMENTAL IMPACTS (CHECKLIST):

The purpose of the checklist is to assist in determining potential environmental impacts associated with project development. Questions are grouped into major environmental issue categories. All answers take into account the whole action involved, including offsite as well as onsite, cumulative as well as project-specific, impacts. The basic response to each question is selected from four possibilities:

- ***Potentially Significant Impact*** - This response is appropriate if there is substantial evidence that an effect is significant. If there are one or more **Potentially Significant Impact** entries in the checklist, an EIR is required.
- ***Potentially Significant Unless Mitigation Incorporated*** - This response applies where the incorporation of mitigation measures has reduced an effect from **Potentially Significant Impact** to a **Less Than Significant Impact**. If this response is used, the mitigation measures must be described along with an explanation how they reduce the effect to a less than significant level.
- ***Less Than Significant Impact*** - If the project will create an impact, but the impact is so small that it is not considered to be significant, this response is used.
- ***No Impact*** - This response is used if the project will not have any effect related to the question.

I. **LAND USE AND PLANNING.** *Would the proposal:*

a. Conflict with general plan designation or zoning?

Potentially Significant Impact

Response: The project will require a Code Amendment (zoning text and map amendment to reflect the new specific plan) and a Specific Plan Review. The significance of this issue will be evaluated in the EIR. (Sources: 1, 2)

b. Conflict with applicable environmental plans or policies adopted by agencies with jurisdiction over the project?

Potentially Significant Impact

Response: The project's significance of this issue is currently unknown. The project's consistency with other agency plans and policies will be evaluated in depth in the EIR.

c. Be incompatible with existing or planned land use in the vicinity?

Potentially Significant Impact

Response: The project will require a Code Amendment and a Specific Plan Review prior to development. The significance of potential land use effects will be determined once additional research on the physical effects of the project have been completed. (Sources: 1, 2)

d. Affect agricultural resources or operations (e.g., impacts to soils or farmlands), convert agricultural land to nonagricultural use, and/or result in an inadequate buffer between incompatible land uses?

Potentially Significant Impact

Response: A portion of the site is currently being used for agricultural purposes. The EIR will evaluate the significance of converting this land to urban uses and the potential issue of incompatible land uses. (Sources: 1, 2)

e. Disrupt or divide the physical arrangement of an established community (including a low-income or minority community)?

No Impact

Response: The buildout of the project area is accounted for in the General Plan and future growth scenarios for the City. (Sources: 1, 4)

II. **POPULATION AND HOUSING.** *Would the proposal:*

a. Cumulatively exceed official regional or local population projections?

Potentially Significant Impact

Response: The buildout of the project area is accounted for in the General Plan and future growth scenarios for the City. However, the project's alternative buildout scenarios, which may allow for some residential development, may differ from what was analyzed in the General Plan. The EIR will evaluate the potential impacts related to this issue. (Sources: 1, 4)

b. Induce substantial growth in an area either directly or indirectly (e.g. through projects in an undeveloped area or extension of major infrastructure)?

Potentially Significant Impact

Response: The project will serve as an attractor for additional growth in the local area or region. The EIR will consider both the direct and indirect beneficial and adverse economic and population related effects of the project. (Sources: 1, 4)

c. *Displace existing residents or housing, especially affordable housing?*

No Impact

Response: No residential structures currently exist on the project site, no housing will be displaced. The project may generate new housing opportunities and will also potentially serve as an attractor for additional housing growth in the region. (Sources: 1, 4)

III. GEOLOGIC PROBLEMS. *Would the proposal result in or expose people to potential impacts involving:*

a. Fault rupture?

Potentially Significant Impact

Response: Several geotechnical studies of the project site have been prepared. The reports detail the potential geologic constraints of the property and outline preliminary guidance for grading and soil stabilization. The reports characterize the project vicinity as being susceptible to several potentially significant geologic conditions which will require project mitigation. The existing reports will be reviewed and evaluated in the EIR. (Sources: 3, 4, 5, 7, 10, 11, 12, 14, 15, 16, 17, 18)

b. Seismic ground shaking?

Potentially Significant Impact

Response: Refer to the response under question "a" above.

c. Seismic ground failure, including liquefaction?

Potentially Significant Impact

Response: Refer to the response under question "a" above.

d. Seiche, tsunami, or volcanic hazard?

Less Than Significant Impact

Response: None of these potential hazards have been identified in the City of Huntington Beach General Plan Safety Element (as updated and approved by City Council May 13, 1996). It is not anticipated that these hazards exist on the project site. Geotechnical studies specific to the project site have been prepared and will be reviewed and evaluated in the EIR. (Sources 1, 3, 4)

e. Landslides or mudflows?

Less Than Significant Impact

Response: Refer to the response under question "a" above.

f. Erosion, changes in topography or unstable soil conditions from excavation, grading, and/or fill?

Potentially Significant Impact

Response: Minor landform modifications are proposed by the project. Geotechnical studies specific to the project site have been prepared and will be reviewed and evaluated in the EIR. (Sources: 3, 4, 5, 7, 14, 15, 16, 17, 18)

g. Subsidence of the land?

Potentially Significant Impact

Response: Refer to the response under question "a" above.

h. Expansive soils?

Potentially Significant Impact

Response: Refer to the response under question "a" above.

i. Unique geologic or physical features?

Potentially Significant Impact

Response: Refer to the response under question "a" above.

IV. WATER. *Would the proposal result in:*

a. Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?

Potentially Significant Impact

Response: The net acreage of impermeable surface will be increased due to the creation of streets and structures. Drainage and runoff patterns will be modified compared to existing conditions. Hydrological conditions on the site will be reviewed and evaluated in the EIR. (Sources: 3, 4, 7)

b. Exposure of people or property to water related hazards such as flooding?

Less Than Significant Impact

Response: The General Plan indicates that the project lies outside the flood plain area. Hydrological conditions on the site will be reviewed and evaluated in the EIR. (Sources: 1, 3, 4)

c. *Discharge into surface waters or other alteration of surface water quality (e.g. temperature, dissolved oxygen or turbidity)?*

Less Than Significant Impact

Response: It is not anticipated that the amount of surface runoff from the project will significantly alter water quality. Water quality effects related to surface runoff will be evaluated in the EIR.

d. *Changes in the amount of surface water in any water body?*

Potentially Significant Impact

Response: The project may alter the amount of surface water downstream from the site. Hydrological conditions on the site will be reviewed and evaluated in the EIR. (Sources: 3, 4)

e. *Changes in currents, or the course or direction of water movements?*

Potentially Significant Impact

Response: Construction of the project will alter water flow within the site. Hydrological conditions on the site will be reviewed and evaluated in the EIR. (Sources: 3, 4)

f. *Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations or through substantial loss of groundwater recharge capability?*

Potentially Significant Impact

Response: It is anticipated that the domestic water supplies for the project site will be obtained from locally available domestic water supplies serving the City and, when available, from reclaimed water sources in the region. Both the project-specific and cumulative effects of this project's water use will be analyzed in the EIR. (Sources: 3, 4)

g. *Altered direction or rate of flow of ground water?*

No Impact

Response: The project will not modify ground water by drilling wells or diverting underground resources.

h. *Impacts to groundwater quality?*

Less Than Significant Impact

Response: Water quality effects related to surface runoff will be evaluated in the EIR. The amount of impervious surfaces is not significant enough to alter the ground water recharge and effect ground water quality.

i. *Substantial reduction in the amount of groundwater otherwise available for public water supplies?*

Potentially Significant Impact

Response: Reclaimed water will be used where available. Refer to the response for question "f" above. Both the project-specific and cumulative effects of this project's water use will be analyzed in the EIR.

j. *Location of project within a 100-year flood hazard area as identified on the Federal Emergency Management Agency Flood Insurance Rate Map for the City of Huntington Beach?*

Less Than Significant Impact

Response: Refer to the response for question "b" above.

V. AIR QUALITY. *Would the proposal:*

a. *Violate any air quality standard or contribute to an existing or projected air quality violation?*

Potentially Significant Impact

Response: Long-term emissions resulting from the construction of 5,228,324 square feet of mixed use structures will exceed the pollutant thresholds for some pollutants established by the South Coast Air Quality Management District. The EIR will contain an analysis of the air quality impacts of the project and detail mitigation for both short and long-term effects. (Sources: 3, 4, 6, 9)

b. *Expose sensitive receptors to pollutants?*

Potentially Significant Impact

Response: The project consists of uses which have the potential to generate significant stationary and mobile source pollutants. The EIR will identify potential local sensitive receptors in the immediate project vicinity and determine if impacts are anticipated to occur. (Sources: 3, 4, 9)

c. *Alter air movement, moisture, or temperature, or cause any change in climate?*

Less Than Significant Impact

Response: The scale of this project is not so large as to alter air movement, moisture, or temperature, or cause any change in climate.

d. *Create objectionable odors?*

Potentially Significant Impact

Response: The project proposes industrial uses which have the potential to generate objectionable odors. The EIR will evaluate if the proposed uses will have a significant effect on odor generation as a result of this project.

e. *Result in a significant adverse air quality impact (based on the estimated date of project completion), as identified in the South Coast Air Quality Management District, <u>CEQA Handbook for Air Quality Analysis</u>?*

Potentially Significant Impact

Response: Refer to the response to question "a" above. (Sources: 3, 4, 6, 9) *f.*. *Result in a significant cumulative adverse air quality impact based on inconsistency with the South Coast Air Quality Management Plan?*

Potentially Significant Impact

Response: The project will result in cumulative impacts since the SCAQMD Guidelines required such a finding in the case of projects with significant project specific effects. This issue will be evaluated in the EIR. (Sources: 3, 4, 6, 9)

VI. TRANSPORTATION/CIRCULATION. *Would the proposal result in:*

a. *Increased vehicle trips or traffic congestion?*

Potentially Significant Impact

Response: A traffic study will be prepared prior to completion of the Draft EIR. The results of this analysis will be summarized and included in the EIR. The study will evaluate the effects of the trips generated by project related traffic and the addition of these trips to the local and regional street and highway system. Other effects that will be considered include roadway capacity impacts, parking capacity and conflicts with alternative transportation, declines in the Level of Service at area intersections, internal circulation problems, ingress and egress concerns, and the effects on the regional highway system. (Sources: 3, 4, 6)

b. *An intersection level of service less than the City's system performance objective?*

Potentially Significant Impact

Response: Refer to the response to question "a" above.

c. *Hazards to safety from design features (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?*

Potentially Significant Impact

Response: Refer to the response to question "a" above.

d. *Inadequate emergency access or access to nearby uses?*

Potentially Significant Impact

Response: Refer to the response to question "a" above.

e. *Insufficient parking capacity on-site or off-site?*

Potentially Significant Impact

Response: Refer to the response to question "a" above.

f. *Hazards or barriers for pedestrians or bicyclists?*

Potentially Significant Impact

Response: Refer to the response to question "a" above.

g. *Conflicts with adopted policies supporting alternative transportation (e.g. bus turnouts, bicycle racks)?*

Potentially Significant Impact

Response: Refer to the response to question "a" above.

h. *Rail, waterborne or air traffic impacts?*

No impacts

Response: The project does not propose to interfere with the existing U.S. Navy railroad spur located immediately north of the project site. No development will take place within the existing railroad right-of-way.

VII. BIOLOGICAL RESOURCES. *Would the proposal result in impacts to:*

a. *Endangered, threatened or rare species or their habitats (including but not limited to plants, fish, insects, animals, and birds)?*

No Impact

Response: The entire site is considered to be in a disturbed urban state. Properties are either developed or, if vacant, used for agriculture. No useful habitat exists onsite for endangered, threatened or rare species. (Sources: 1, 3, 4)

b. *Locally designated species (e.g. heritage trees)?*

No Impact

Response: Refer to response to question "a" above.

c. *Locally designated natural communities (e.g. oak forest, coastal habitat, etc.)?*

No Impact

Response: Refer to response to question "a" above.

d. *Wetland habitat (e.g. marsh, riparian or vernal pool)?*

No Impact

Response: Refer to response to question "a" above.

e. *Wildlife dispersal or migration corridors?*

No Impact

Response: Refer to response to question "a" above.

VIII. **ENERGY AND MINERAL RESOURCES.** *Would the proposal:*

a. *Conflict with adopted energy conservation plans?*

Potentially Significant Impact

Response: The project will utilize energy for the construction period and operating energy needs typical of industrial and commercial uses. The EIR will provide mitigation to ensure compliance with energy saving plans and policies in effect. (Sources: 3, 4)

b. *Use non-renewable resources in a wasteful and inefficient manner?*

Potentially Significant Impact

Response: Implementation of the project will result in the consumption of energy and resources typical of industrial, commercial, and potential residential projects. Impacts related to energy consumption are anticipated to be insignificant on a project specific basis. The cumulative effects of non-renewable resources use will be analyzed in the EIR. (Sources: 3, 4)

c. *Result in the loss of availability of a known mineral resource that would be future value to the region and the residents of the State?*

No Impact

Response: No significant mineral resource is known to occur within the project boundaries. (Sources: 1, 3, 4)

IX. **HAZARDS.** *Would the proposal involve:*

a. *A risk of accidental explosion or release of hazardous substances (including, but not limited to: oil, pesticides, chemicals or radiation)?*

Potentially Significant Impact

Response: Implementation of the project will involve substances normally used by construction related activities. The existing agricultural areas have a history of pesticide use. The past use of pesticide onsite and other impacts related to risk of upset will be evaluated in greater detail in the EIR.

b. *Possible interference with an emergency response plan or emergency evacuation plan?*

Less Than Significant Impact

Response: During preparation of the Draft EIR, emergency agencies will be contacted to ensure that potential interference with emergency response or emergency evacuation plans will be eliminated with project mitigation.

c. *The creation of any health hazard or potential health hazard?*

Less Than Significant Impact

Response: Implementation of the project will involve activities normally used by mixed use construction. Impacts related to potential health hazards will be evaluated in greater detail in the EIR.

d. *Exposure of people to existing sources of potential health hazards?*

Potentially Significant Impact

Response: Portions of the site have historical pesticide use. This potential impact will be evaluated in the EIR. No other known health hazards have been identified within the project boundaries. (Sources: 10, 11, 12)

e. *Increased fire hazard in areas with flammable brush, grass, or trees?*

Less Than Significant Impact

Response: The project site consists of typical developed urban areas. No increased fire hazard will result due to flammable brush, grass, or trees. (Sources: 1, 3, 4)

X. **NOISE.** *Would the proposal result in:*

a. *Increases in existing noise levels?*

Potentially Significant Impact

Response: Construction noise effects are anticipated to be potentially significant given the distance of the property to potential noise sensitive uses in the vicinity. The effects of increased noise resulting from additional vehicle movements on streets in the area is anticipated to be significant. A noise analysis, including sample measurements of ambient noise, will be completed and included in the EIR. (Sources: 1, 3, 4)

b. *Exposure of people to conditionally acceptable or unacceptable noise levels based on the City's Noise Element?*

Potentially Significant Impact

Response: Refer to response for question "a" above.

XI. **PUBLIC SERVICES.** *Would the proposal have an effect upon, or result in a need for new or altered government services in any of the following areas:*

a. *Fire protection?*

Potentially Significant Impact

Response: The proposed project will generate significant additional demands on public services, water and sewer infrastructure, and related facilities. The impacts on related municipal services and infrastructure will be analyzed in the EIR. (Sources: 1, 3, 4) *b. Police protection?*

Potentially Significant Impact

Response: Refer to response for question "a" above.

c. Schools?

Potentially Significant Impact

Response: Refer to response for question "a" above.

d. Maintenance of public facilities, including roads and parks?

Potentially Significant Impact

Response: Refer to response for question "a" above.

e. Other governmental services?

Potentially Significant Impact

Response: Refer to response for question "a" above.

XII. UTILITIES AND SERVICES SYSTEMS. *Would the proposal result in a need for new systems or supplies, or substantial alterations to the following utilities:*

a. Power or natural gas?

Potentially Significant Impact

Response: The proposed project will generate significant additional demands on public services, water and sewer infrastructure, and related facilities. The impacts on related municipal services and infrastructure will be analyzed in the EIR. (Sources: 1, 3, 4)

b. Communications systems?

Potentially Significant Impact

Response: Refer to response for question "a" above.

c. Local or regional water treatment or distribution facilities?

Potentially Significant Impact

Response: Refer to response for question "a" above.

d. Sewer or septic tanks?

Potentially Significant Impact

Response: Refer to response for question "a" above.

e. Storm water drainage?

Potentially Significant Impact

Response: Refer to response for question "a" above.

f. Solid waste disposal?

Potentially Significant Impact

Response: Refer to response for question "a" above.

g. Local or regional water supplies?

Potentially Significant Impact

Response: Refer to response for question "a" above.

XIII. AESTHETICS. *Would the proposal:*

a. Affect a scenic vista or scenic highway?

Potentially Significant Impact

Response: The EIR evaluation will include consideration of the project's architectural and landscape design guidelines and concepts and other site design proposals and will include mitigation to minimize any aesthetic impacts of the project. (Sources: 1, 2, 4)

b. Result in the loss, covering, or modification of any unique geologic or physical features?

No Impact

Response: No unique geologic or physical feature exists on the project site. (Sources: 1, 3, 4)

c. Create an aesthetically offensive site open to public view?

Response: Refer to the response for question "a" above.

d. Result in the loss of a distinctive historic or landmark tree or stand of mature trees?

No Impact

Response: No distinctive history or significant mature trees exist on the project site. (Sources: 1, 3, 4)

e. Create light or glare?

Potentially Significant Impact

Response: The project will result in the addition of exterior night lighting and sources of glare in the vicinity. Nighttime lighting and glare impacts to the adjacent areas will be assessed. This issue will be evaluated in the EIR. (Sources: 1, 3, 4)

XIV. CULTURAL RESOURCES. *Would the proposal:*

a. Disturb paleontological resources?

No Impact

Response: Within the project boundaries, no cultural resources have been identified in the General Plan. The entire site is considered to be disturbed urban, with no paleontological, archaeological and historical resources within the project boundaries. (Sources: 1, 3, 4)

b. Disturb archaeological resources?

No Impact

Response: Refer to response for question "a" above.

c. Affect historical resources?

No Impact

Response: Refer to response for question "a" above.

d. Have the potential to cause a physical or aesthetic change which would affect unique ethnic cultural values?

No Impact

Response: Refer to response for question "a" above.

e. Restrict existing religious or sacred uses within the potential impact area?

No Impact

Response: Refer to response for question "a" above.

XV. RECREATION. *Would the proposal:*

a. Increase the demand for neighborhood or regional parks or other recreational facilities?

Potentially Significant Impact

Response: The proposed project which allows for some (optional) residential development on the site and, therefore, has the potential to generate demands on recreational facilities. The City's subdivision ordinance requires 5 acres per 1,000 persons be dedicated for park and recreation purposes under the Quimby Act for residential development. The EIR will evaluate the project alternatives to ensure that the plan meets the Quimby Act requirement. (Sources: 1, 3, 4)

b. Affect existing recreational opportunities?

Potentially Significant Impact

Response: Refer to response for question "a" above.

XVI. MANDATORY FINDINGS OF SIGNIFICANCE.

a. *Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?*

Potentially Significant Impact

b. *Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals?*

Potentially Significant Impact

c. *Does the project have impacts that are individually limited, but cumulatively considerable? (Cumulatively considerable? Means that he incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)*

Potentially Significant Impact

d. *Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?*

Potentially Significant Impact

XVII. EARLIER ANALYSES. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, one or more effects have been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case a discussion should identify the following on attached sheets:

a. *Earlier analyses used. Identify earlier analyses and state where they are available for review.*

Response: The following documents are available for review at the City of Huntington Beach Planning & Zoning Information Counter, located on the 3rd floor of the Huntington Beach Civic Center, 2000 Main Street, Huntington Beach.

- ***Negative Declaration No. 95-6*** for the Sharp Electronics Industrial project.
- ***Negative Declaration No. 93-24*** for the Cambro Manufacturing Industrial project.
- ***Environmental Impact Report No. 91-2*** for a General Plan Amendment and Zone Change request to establish commercial and residential land use and zoning designations on approximately 61 acres at the northwest corner of Bolsa and Springdale.
- ***Environmental Impact Report No. 80-2*** for the McDonnell Douglas Industrial Office Complex.

b. *Impacts adequately addressed. Identify which effects from the above checklist were within the scope of an adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.*

Response: Portions of the project site have been addressed in the above referenced documents. The above documents will be incorporated and referenced were applicable.

c. *Mitigation measures. For effects that are Less than Significant with Mitigation Incorporated, describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.*

Response: Portions of the project site have been addressed in the above referenced documents. The mitigation measures from the above documents will be incorporated and referenced were applicable.

XVIII. REFERENCE LIST:

The references used in responding to this questionnaire include the following:

Standard References

1. City of Huntington Beach, Huntington Beach General Plan (Adopted May 13, 1996).
2. City of Huntington Beach, Zoning and Subdivision Ordinance.
3. City of Huntington Beach, EIR 91-2.
4. City of Huntington Beach, General Plan Update EIR, 1995.
5. City of Huntington Beach, General Plan Technical Appendices, 1995.
6. Institute of Transportation Engineers, Trip Generation, 1987.
7. City of Huntington Beach, Geotechnical Inputs.
8. U.S.G.S. Topographic Quadrangle Maps for Huntington Beach.
9. South Coast Air Quality Management District, CEQA Handbook for Air Quality Analysis, 1993.

Applicant Supplied References

10. CDM, Phase I Environmental Assessment, April 23,1991.
11. CDM, Update of the Phase I Environmental Assessment, December 3, 1993.
12. CDM, Results of Phase II Soils Investigation, December 3,1993.
13. MDRC, Analysis of Land Use Alternatives for the City of Huntington Beach, April 12, 1992.
14. NorCal Engineering, Preliminary Geotechnical Investigation, December 7,1993.
15. LeRoy Crandall, Report of Foundation Investigation, June 30, 1982.
16. Law/Crandall, Foundation Investigation, September 21,1992.
17. Law/Crandall, Report of Paving Studies, October 4, 1995.
18. Law/Crandall, Interim Report of Observation and Testing Services, December 8,1995.
19. Kimley-Horn & Assoc. Inc., Traffic Impact Analysis, 1995.
20. Weston Pringle & Associates, Traffic Memorandums, December 12,13 and 18, 1991.

DETERMINATION:

On the basis of this initial evaluation:

- ☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

- ☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A NEGATIVE DECLARATION will be prepared.

- ☑ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

- ☐ I find that the proposed project MAY have a significant effect(s) on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets, if the effect is a "potentially significant impact" or "potentially significant unless mitigated." An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

- ☐ I find that although the proposed project could have a significant effect on the environment, there WILL NOT be a significant effect in this case because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project.

6·11·96
Date

Jayna L. Morgan
Ms. Jayna Morgan
EDAW, Inc.

6·11·96
Date

Julie K. Osugi
Ms. Julie Osugi
Associate Planner

EIR Scope of Work Summary

Based on available information, the scope of work for the EIR will involve research, analysis, and study of the following issues and concerns. If the concerns outlined in this scope statement include issues relevant to your agency, it is not necessary to provide a response to this Notice of Preparation since all topics included in this outline will be included in the EIR. Consideration will be given to both the project-specific and cumulative effects of each of these impacts.

Land Use

- Project consistency with the City General Plan
- Consistency with County, State, and regional long-term planning goals for population, solid waste planning, air quality management, and other plans and policies considered relevant by responsible and trustee agencies.
- Compatibility with state and federal planning and resource management regulations
- Compatibility with surrounding existing and planned land uses
- Potential conflicts with agricultural uses
- Pedestrian and bicycle trail considerations and provision of safe access
- Consistency with land use development trends and urban design objectives in the City

Transportation/Circulation

- Project effects on existing and future roadway capacity
- Impacts on intersection capacity
- Offsite roadway effects on the regional road network
- Internal circulation patterns and streetscape planning
- Effects on General Plan buildout projections
- Safety considerations (bicycle and pedestrian safety, increased accident potential)
- Egress-ingress alternatives
- Conformance with City of Huntington Beach transportation planning and Level of Service projections and requirements

Air Quality

- Short-term construction related impacts
- Long-term operational impacts
- Consistency with the AQMP and other governing plans, policies, and guidelines

Noise

- Changes to CNEL contours resulting from project and cumulative traffic
- Construction noise

Geology and Soils

- Review of the geotechnical feasibility of development as proposed and scope of grading
- Potential erosion related grading impacts
- Review of Phase I & II Soil Assessments and onsite pesticide use
- Slope stability evaluation
- Expansive soil problems
- Grading concept and design
- Consistency with applicable General Plan policies

Hydrology and Drainage

- Surface water quality modifications
- Flooding potential and downstream effects
- Erosion, siltation, changes to downstream water bodies, creeks, and rivers

Aesthetics/Light and Glare

- Site design and planning
- Effects on public and private view corridors
- Community aesthetics an quality of life
- Lighting an illumination planning
- Architectural and landscape design standards
- Streetscape and street tree planning

Public Service and Utilities

- Impacts to domestic water supplies and associated groundwater aquifers
- Effects from and regulation of reclaimed water use
- Reclaimed water service effects

- Solid waste impacts
- Project effects on the school system
- Impacts on essential municipal services (libraries, police, fire, maintenance and operations, capital improvement requirements, etc.)

Agriculture

- Loss of existing agricultural uses
- Compatibility with proposed project uses
- Historical pesticide use

Natural Resources/Energy

- Use of non-renewable natural resources

Socioeconomic

- Direct and secondary population, employment, and housing effects
- Job/housing target ratio analysis

Growth Inducement

- Population an employment relate growth inducement potential
- Extension of public services and utilities
- Direct and indirect economic effects on the local economy

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JUL [illegible] 1996

EDAW [illegible]

HUNTINGTON BEACH WATER DEPT.

FAX TRANSMITTAL

TO: Jayna Morgan

COMPANY: EDAW

FAX NO.: (714) 660-1046

SUBJECT: McDonnell Center Business Park

DATE: 7-16-96

NO. OF PAGES (including cover sheet): 4

HARD COPY TO FOLLOW: Yes ☒ No ☐

Message:

attached please find our response to your questionaire. If you have any additional questions, please don't hesitate to call. Thank you!

CC: Ms Julie Osugi
CHB Planning

Jeff Renna

From the desk of...

Deborah M. DeBow, P.E., Associate Civil Engineer
City of Huntington Beach Water Division
19001 Huntington Street, P.O. Box 190
Huntington Beach, CA 92648

Phone: 714 536-5528, 714 536-5921
Fax: 714 847-1067

ATTACHMENT B

TO: **City of Huntington Beach Water Department** **Water**
P.O. Box 190
Huntington Beach, CA 92648

1. **What types of services do you provide to the project site?**

   Potable water for domestic, fire and irrigation service could be provided to the project site, if land use is consistent with that described in the City of Huntington Beach Water Master Plan (WMP).

2. **List the names and location of facilities which would serve the project site and their distance from the project site. Provide their capacity and the level at which they are presently operating.**

   The following existing facilities could serve the project site:

   (a) 12-in. water line in Bolsa Avenue, immediately adjacent to Planning Areas 5, 1A, 3, 2; approximately 44-ft. south of centerline.

   (b) 12-in. line in Skylab Way, adjacent to Planning Areas 2, 3; approximately 10-ft. south of centerline.

   (c) 12-in. line in Able Lane, adjacent to Planning Areas 2, 3; approximately 26-ft. west of centerline.

   These facilities are able to meet the demands of the existing development.

3. **Will the proposed project adversely impact the level of service you presently provide?**

   The proposed project will have an adverse impact on the level of service presently provided, until the WMP improvements and project related infrastructure are built.

   The specific impact of the proposed projects could be determined by performing a (hydraulic) network analysis modeling of the area, with the proposed development. The cost for these services is approximately $1,000.

4. What are the current plans for expansion of your facilities (include use, location, capacities, and completion dates)?

The expansion (and scheduling) of future City-wide improvements are detailed in the 1995 WMP.

Pursuant to the conditions of approval for the Sharp Development, the City of Huntington Beach Water system will likely be expanded by restoring the 12-in. line in Springdale to domestic use (currently piped as a well line to Peck Reservoir) and building a new "well line" in Springdale from Bolsa to Peck Reservoir (estimated completion December '96).

Additionally, to complement the improvements described above, a 12-in. line in Astronautics Drive will also need to be constructed.

5. Will the project create a need for the expansion of facilities or the addition of staff? If so, give a brief description of anticipated needs. Please provide the water consumption rates for the proposed land uses.

The project will likely require that a new water main be built in Rancho Road (min. size: 12-in.) Bolsa Chica Street (min. size 12-in.), and Astronautics Drive (est. size 12-in.).

The estimated water consumption rates for the proposed land use are as follows:

Planning Area	Acres	Future Use	Domestic Demand*
1 & 1A	120	Manufacturing	444 gpm
2: Cambro	11.9	Manufacturing	44 gpm
2: Sharp	23.8	Warehouse/Office (Commercial?)	31 gpm
2: Vacant Phase I	8	Manufacturing	30 gpm
2: Vacant Phase II	14.7	Manufacturing	54 gpm
3: Vacant Phase IIIa	36	Manufacturing	133 gpm
4: Vacant Phase IIIb	35	Manufacturing	130 gpm
5: Phase I	9	Commercial	12 gpm
5: Phase II	31	Commercial	40 gpm
5: Future Potential	16.11	High Density Res.	44 gpm

*Annual demand coefficient based upon City of Huntington Beach 1988 Water Master Plan, Table 3-8.

It is important to note that the above table represents domestic demand only; not fire demand. Fire demand is dictated by the Fire Department and is the critical factor in designing new pipeline. As a means of comparison, where the domestic demand may be 300 gpm, the fire flow demand may be 3000 gpm. Please contact the City of Huntington Beach Fire Department for specific fire flow demand for this project.

6. **Is there revenue budgeted for such an expansion? If not, what methods would be used to secure capital revenue?**

Revenue is not budgeted for the expansion described in No. 5 above. The developer would be required to construct these facilities as a condition of the development of the adjacent property.

Projects detailed in the WMP will be financed as described in the corresponding (WMP) Financial Plan.

7. **What problems do you foresee in serving the proposed project? Identify any particular concerns.**

The existing water infra-structure cannot support the proposed development. Additional facilities would be required as described in No. 5, above, and the 1995 WMP.

Scheduling of WMP projects relative to scheduling of proposed project improvements may be a concern.

8. **What measures can you recommend for mitigating project impacts identified above?**

Construction of the additional facilities described in No. 5 above and related WMP projects would likely mitigate proposed project impacts.

9. **If possible, please provide a map showing the service boundaries in relationship to the project site.**

Attached please find Water Facilities Map page numbers 117, 126 and 127 which illustrate the existing water facilities.

Prepared By: Deborah DeBow

Title: Associate Civil Engineer

Date: 7-16-96

Phone: (714) 536-5528

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JUL 1 [illegible] 1996

CITY OF HUNTINGTON BEACH

2000 MAIN STREET P. O. BOX 190 CALIFORNIA 92648

Public Works Department
(714) 536-5431

July 8, 1996

Hayna Morgan
EDAW, Inc.
17875 Von Karman Avenue, Suite 400
Irvine, CA 92714

Re: Questionnaire for Draft EIR for the McDonnell Centre Business Park project

Gentlemen:

Per your request I have enclosed the completed questionnaires that you sent to John Tarvin and Dave Webb for the above project.

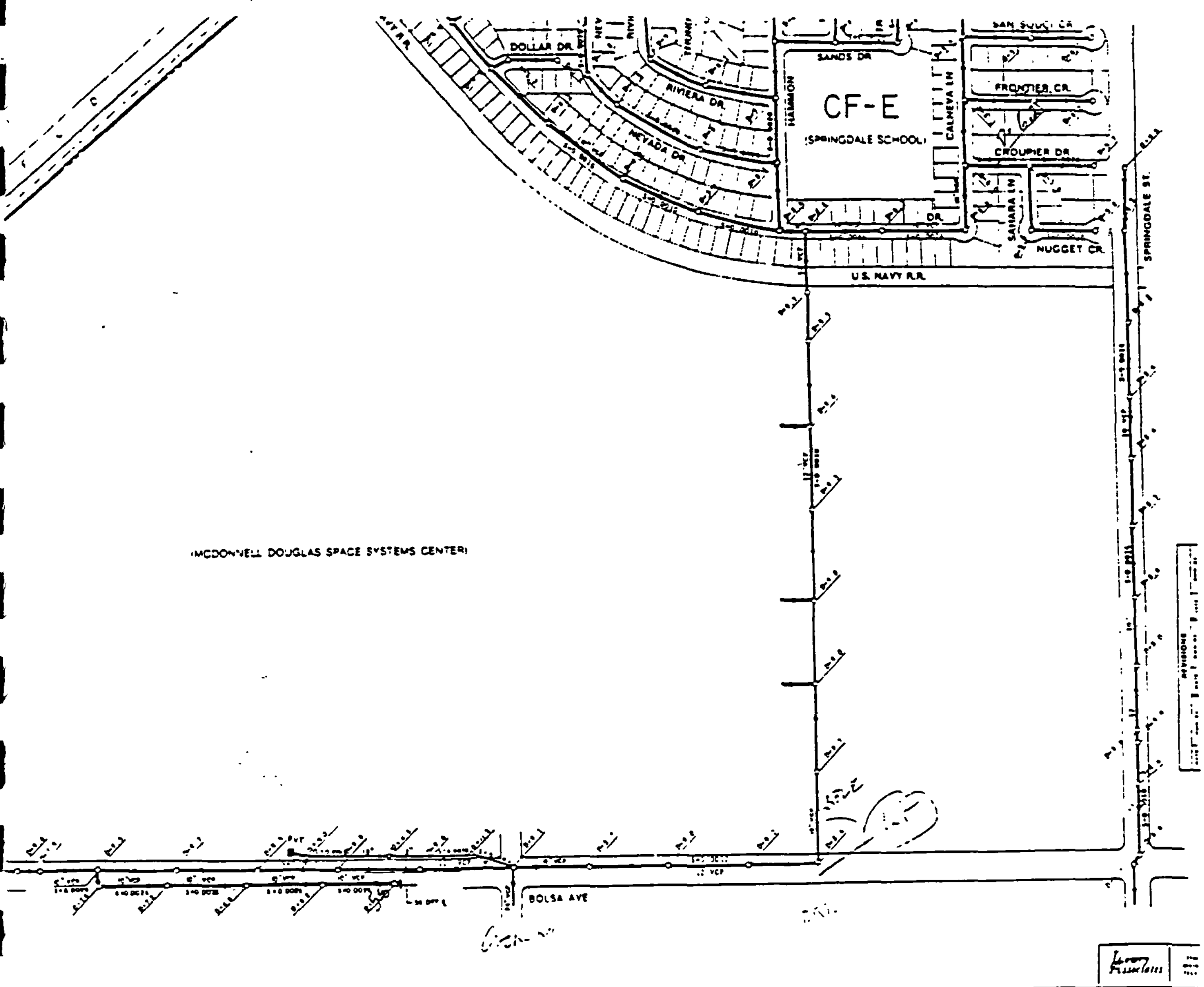
If you should have any other question please call me at (714) 536-5431.

Respectfully.

Steve Krieger
Engineering Tech

enclosures

cc: Dave Webb
John Tarvin
Bruce Crosby



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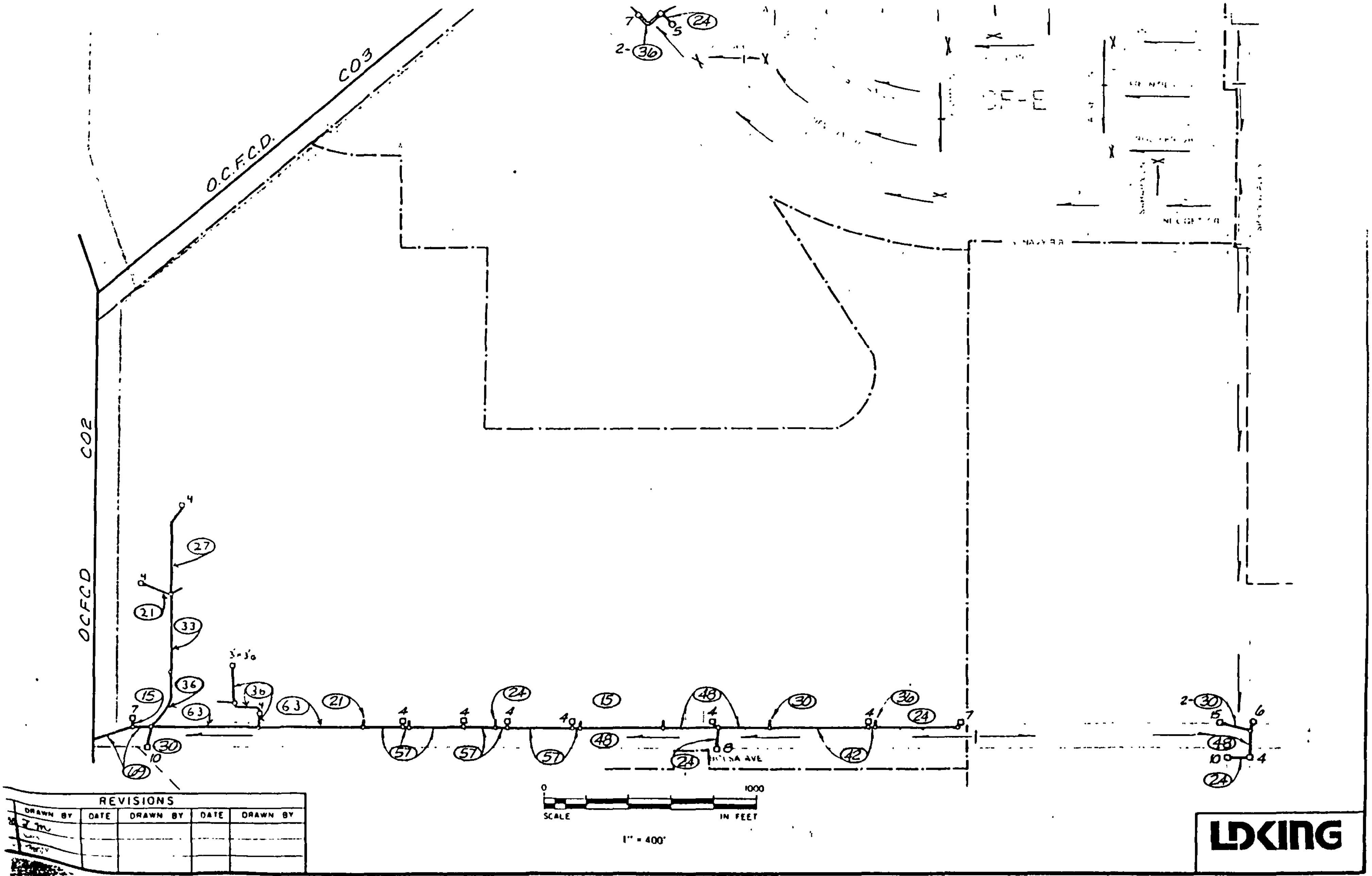
SAN SOUCI CR.
RIVIERA DR.
NEVADA DR.
HAMMON
CF-E
(SPRINGDALE SCHOOL)
CALNEVA LN
FRONTIER CR.
CROUPIER DR.
SAHARA LN
NUGGET CR.
SPRINGDALE ST.
U.S. NAVY R.R.
(MCDONNELL DOUGLAS SPACE SYSTEMS CENTER)
BOLSA AVE
REVISIONS



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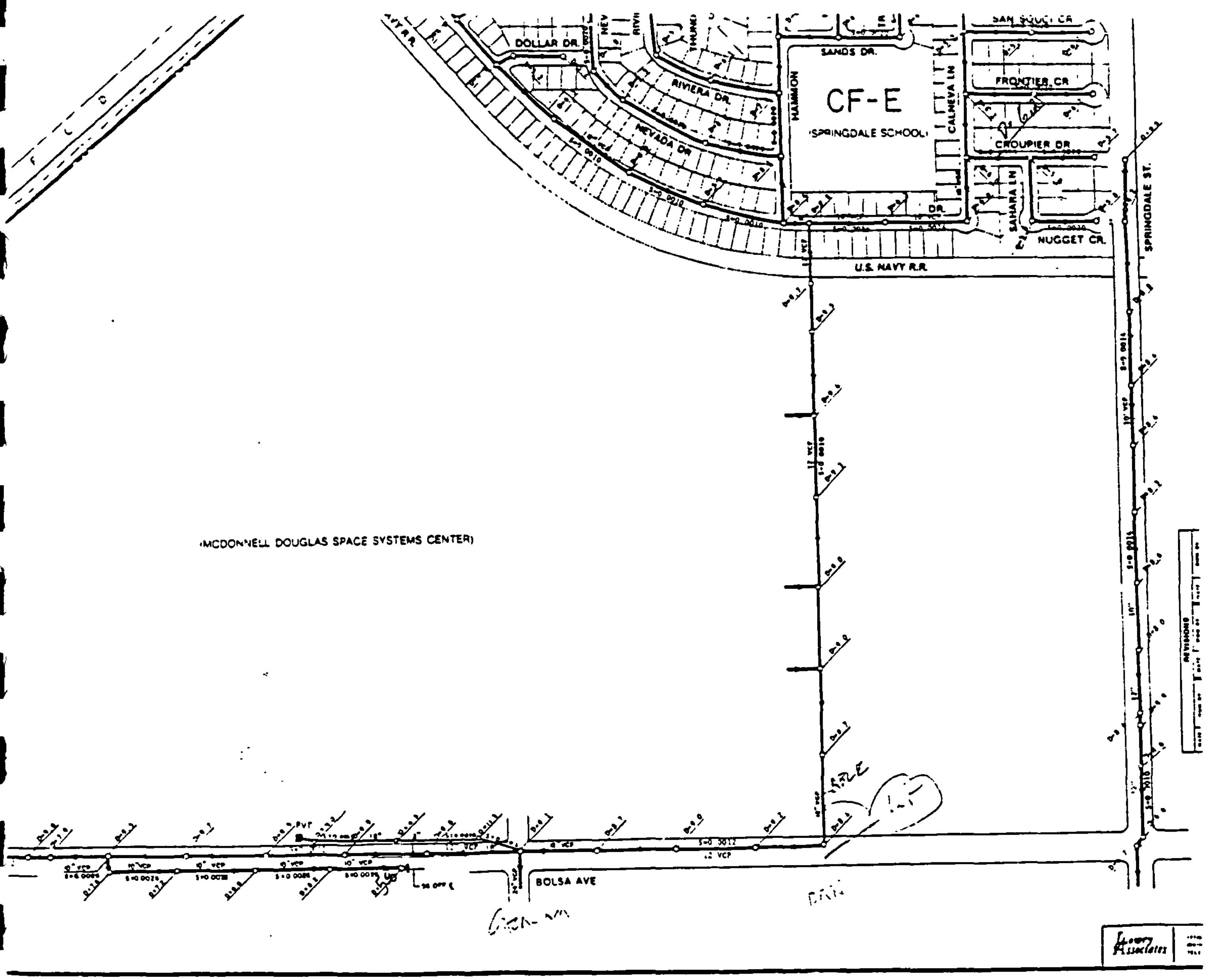

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SAHARA LN
NUGGET CR.
SPRINGDALE ST.
CF-E
(SPRINGDALE SCHOOL)
U.S. NAVY R.R.
(MCDONNELL DOUGLAS SPACE SYSTEMS CENTER)
BOLSA AVE

yayna mergen

COUNTY SANITATION DISTRICTS OF ORANGE COUNTY, CALIFORNIA

RECEIVED
JUN 26 1996
EDAW, INC., IRVINE, CA

phone:
(714) 962-2411

mailing address:
P.O. Box 8127
Fountain Valley, CA
92728-8127

street address:
10844 Ellis Avenue
Fountain Valley, CA
92708-7018

June 21, 1996

Ms. Julie Osugi
City of Huntington Beach
2000 Main Street
Huntington Beach, CA 92648

SUBJECT: Notice of Preparation of EIR
Re McDonnell Centre Business Park

This is in response to your notice dated June 14, 1996 that the City will prepare a Draft Environmental Impact Report for the development of the McDonnell Centre Business Park. The project includes approximately 307 acres from between Bolsa Chica Street and Springdale Street north of Bolsa Avenue. The area is within County Sanitation District No. 11 and previous planning has been based on industrial land uses for this parcel.

You are requested to calculate the expected sewage to be generated from the proposed development and compare it to the District's previous plans. For your calculations, use flow coefficients of:

- 100 gallons per day per acres (gpd/acre) for estate density residential (1-3 d.u./acre);
- 1615 gpd/acres for low density residential (4-7d.u./acre);
- 3880 gpd/acre for medium density residential (8-16 d.u./acre);
- 5880 gpd/acre for medium-high density residential (17-25 d.u./acre);
- 7945 gpd/acre for high density residential (26-35 d.u./acre);
- 3230 gpd/acre for commercial;
- 4520 gpd/acre for industrial;
- 200 gpd/1,000 sq.ft. gross floor area (GFA) for high intensity office or high-rise commercial;
- 150 gpd/room for hotels and motels;
- 50 gal./seat for restaurants, and
- 200 gpd/acre for recreation and open space usage.

Wastewater generated within the Districts' service area is processed at treatment plants located in Fountain Valley and Huntington Beach. The Districts operate under an NPDES permit issued by the California Regional Water Quality Control Board and the United States Environmental Protection Agency. This permit has a set discharge limit for biochemical oxygen demand (BOD) and suspended solids (SS), which are affected by the flow received for treatment. Increases in flow require additional, costly increases in pumping energy, secondary treatment and solids disposal. Industrial users should take on-site measures to reduce the load strength of the sewage. Commercial users should incorporate all practical and mandated water conservation measures. All users should use ultra-low flow water fixtures to reduce the volume of sewage to the system.

Other regulations such as those adopted by the South Coast Air Quality Management District (SCAQMD) pursuant to the Air Quality Management Plan (AQMP) may also impact the proposed project. Therefore you should also review this project in light of the rules and requirements of other regulating agencies.

David A. Ludwin, P.E.
Director of Engineering

TMD:dl
J:\WPDOC\ENG\TMD\PLANNING\062096.L1

c: Jayna Morgan
EDAW, Inc.
17875 Von Karman Avenue
Suite 400
Irvine, CA 92714

TO; EDAW, Inc.
Ms Jana Morgan

FROM: Jim B. Engle, Community Services Deputy Director

DATE: July 6, 1996

SUBJECT: MC DONNELL CENTRE BUSINESS PARK
ENVIRONMENTAL IMPACT REPORT

SURVEY RESPONSES

1. **Question:** What types of services do you provide?

   Answer: Recreation, park development, arts and cultural services, human services, beach maintenance, parking (downtown parking structure, meters, and beach parking lots), and marine safety (beach lifeguards).

2. **Question:** List the names and locations of facilities which would serve the project site and their distance from the project site.

   Answer:

Name	Location	Distance
Marina Community Park,	Edinger Avenue/Graham Street	1 mile
Murdy Community Center and Park	Norma Avenue/Golden West St.	3 1/2 miles
Municipal Art Center	538 Main Street	7 miles
Seniors Recreation Center	1706 Orange Avenue	7 miles
Seniors Outreach Center	1708 Orange Avenue	7 miles

   Note: No neighborhood parks within area.

Note: There are no neighborhood parks in your immediate area (within a half mile radius).

3. **Question:** Currently, what level of service do you provide to the project area?

   Answer: Limited, People from the McDonnell area would have to travel to existing facilities.

4. **Question:** Will the proposed project adversely impact the level of service you presently provide?

   Answer: Yes, if the users, especially residential, do not have on-site park facilities, then they would have to travel, thereby, possibly over utilizing existing parks. If residential is to be developed, it should include recreation and park facilities. Also, existing arts, human services and beach programs/facilities will be impacted.

5. **Question:** What are the current plans for expansion of your facilities (include use, location, capacities and completion date)? Include any of these which may serve the project site.

July 5, 1996
Page two

Answer: The city is putting a measure on the November ballot for youth facilities which would include a pool, gymnasium, and outdoor youth sports complex. These could possibly serve this project site. Pier Plaza will also be completed by mid summer, 1997.

6. **Question:** Will the project create a need for the expansion of facilities or the addition of staff? If so, give a brief description of anticipated needs. Please provide the water consumption rates for the proposed land uses.

   Answer: The need for additional facilities or expansion of existing facilities or staff would depend on the type of project created. There may be a need to expand adult programs such as adult sports leagues, for workers who utilize your facilities, including aero space business or mixed use office facilities. If there is residential developed, there will be a need for new neighborhood park facilities created as part of the residential development. Also, other areas would be impacted (see #4).

7. **Question:** Is there revenue budgeted for such an expansion? If not, what methods will be used to secure capital revenue?

   Answer: Participation fees are in most cases used to pay operational costs; therefore, if additional programs are necessary, the participation fee could possibly cover those costs. There is no source of capital costs at this time. In the case of parks, the park acreage or in-lieu fees would have to be dedicated per the Quimby Act.

8. **Question:** Explain how you determine service demands for the land use categories. Detail below (i.e., park acreage/population ratios, etc.) for land use categories described below.

Answer: Land Use	Density	Demand Ratio
Medium Density/Residential	15 units per acre	5 acre parks per 1,000 population
Medium High Density	25 units per acre	Same as above
Residential	35 units per acre	Same as above
High Density/Residential	10,000 sq. ft. per acre	Same as above
General Commercial	17,000 sq. ft. per acre	To be determined
General Industrial		To be determined

9. **Question:** What problems do you foresee in serving the proposed project? Define any particular concern.

July 5, 1996
Page three

Answer: Five acres per thousand population is park standard for the city. The equation would have to include the availability of existing parks as well as the types of parks. For example, there would be a need for neighborhood parks to serve individual quarter sections, and there would also be a need for youth sports facilities. Youth sports needs are currently are not being met in this community and this would be a major consideration for youth sports facilities including game and practice fields and lighted facilities. Human services and arts impacts would also have to be evaluated.

10. **Question:** What measures do you recommend for mitigating project impacts that may be incorporated into the project?

Answer: As with the Holly/Seacliff development area, I would recommend providing land for parks as well as development of those parks to city standards as part of the project. The need will, again, be for neighborhood parks and youth sports facilities with other facilities/program needs for human services, beach and arts impacts to be evaluated.

PREPARED BY: JIM B. ENGLE
DATE: July 5, 1996

TITLE: Community Services Deputy Director
DAY PHONE: (714) 536-5495

JBE:as

ATTACHMENT B

TO: Huntington Beach Union High School District **Schools**
10251 Yorktown Avenue
Huntington Beach, CA 92646

1. List the names and locations of the District's schools which would serve the project site, their capacity, current enrollment, and their distance from the project site.

   Marina High School
   15871 Springdale
   Huntington Beach, CA
   Permanent Capacity: 2,226
   1996-97 projected enrollment: 2,142

2. What are the school generation factors at the elementary, intermediate, and secondary levels that you would use for this project?

   Secondary level: .20

3. Will the proposed project adversely impact the level of service you presently provide?

   The proposed project will result in additional students to be served by the District. Our enrollment projections indicate that the District will exceed its permanent capacity in the near future due to natural growth. Therefore, this project will have an adverse impact on our ability to house students.

   In addition, Marina High School is more than 30 years old and is in need of exetensive modernization.

4. Will the project create a need for the expansion of educational facilities or the addition of staff? If so, give a brief description of anticipated needs.

   Yes. Marina High School's enrollment is rapidly approaching the capacity of the school. This development is likely to accelerate that process resulting in the need to expand the facility. Additional staff will also be required to provide the instructional programs and support services for students from the project.

5. What are the current plans for expansion of your facilities (include use, location, capacities, and completion dates)? Identify any of these which may specifically serve the project site.

   None at this time. The District has applied for State Modernization funds.

6. Is there revenue budgeted for such an expansion? If not, does the school district implement any development fees? How are these fees determined (e.g., per housing unit) and what is the cost?

   The District has applied for State Modernization funds.

   The District implements development fees pursuant to Government Code. The determination of the fees is done through a Development Fee Findings Report, most recently dated February 27, 1996. Current fees are the District's share of $1.84 (residential) and $.30 (commercial).

   In addition, the District has negotiated a number of individual agreements for additional mitigation.

ATTACHMENT B

7. What problems do you foresee in serving this project? Identify any particular concerns.

   It is difficult to assess the full extent of problems arising from this project based on the information available at this time. It will result in increased enrollment, for which the District lacks capacity.

8. What measures can you recommend for mitigating project impacts identified above?

   Construction of additional facilities.

Prepared By: [signature]

Title: Asst Supt. - Bus Svcs

Date: 6-26-96

Phone: 714-964-3337

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ATTACHMENT B

TO: **Westminster School District** **Schools**
14121 Cedarwood
Westminster, CA 92683

1. List the names and locations of the District's schools which would serve the project site, their capacity, current enrollment, and their distance from the project site.

   Schroeder Elementary School, 15151 Columbia Lane, Huntington Beach
   Clegg Elementary School, 6311 Larchwood Drive, Huntington Beach
   Stacey Intermediate School, 6311 Larchwood Drive, Huntington Beach

   (Please see attached map for proximity to project site)

2. What are the school generation factors at the elementary, intermediate, and secondary levels that you would use for this project?

   The projected student generation factor for the Westminster School District, including special education is 0.3862

3. Will the proposed project adversely impact the level of service you presently provide?

   It is anticipated that the proposed project will result in an increase in enrollment at the schools serving the designated area. East of these three school sites is already at its permanent capacity, therefore this project will adversely impact our ability to house and serve students.

4. Will the project create a need for the expansion of educational facilities or the addition of staff? If so, give a brief description of anticipated needs.

Yes. Additional students depending upon the number, will necessitate adding relocatable classrooms to these sites as well as additional classroom teachers and possibly other non-certificated staff.

5. What are the current plans for expansion of your facilities (include use, location, capacities, and completion dates)? Identify any of these which may specifically serve the project site.

None finalized at this time for these three sites.

6. Is there revenue budgeted for such an expansion? If not, does the school district implement any development fees? How are these fees determined (e.g., per housing unit) and what is the cost?

The Westminster School District has applied to the state for modernization funds but has not yet received any such funding. The current developoer fees are the district's share of $1.84 per s.f. for residential and $.30 per s.f. for commercial pursuant to Government Code. The district has also negotiated individual agreements for additional mitigation.

ATTACHMENT B

7. What problems do you foresee in serving this project? Identify any particular concerns.

   Unknown at this time other than those related to insufficient housing capacity.

8. What measures can you recommend for mitigating project impacts identified above?

   Addition of relocatable classrooms on cited campuses and/or funds to modernize a currently closed elementary school site in the area pursuant to possible reopening should enrollment increase to that extent.

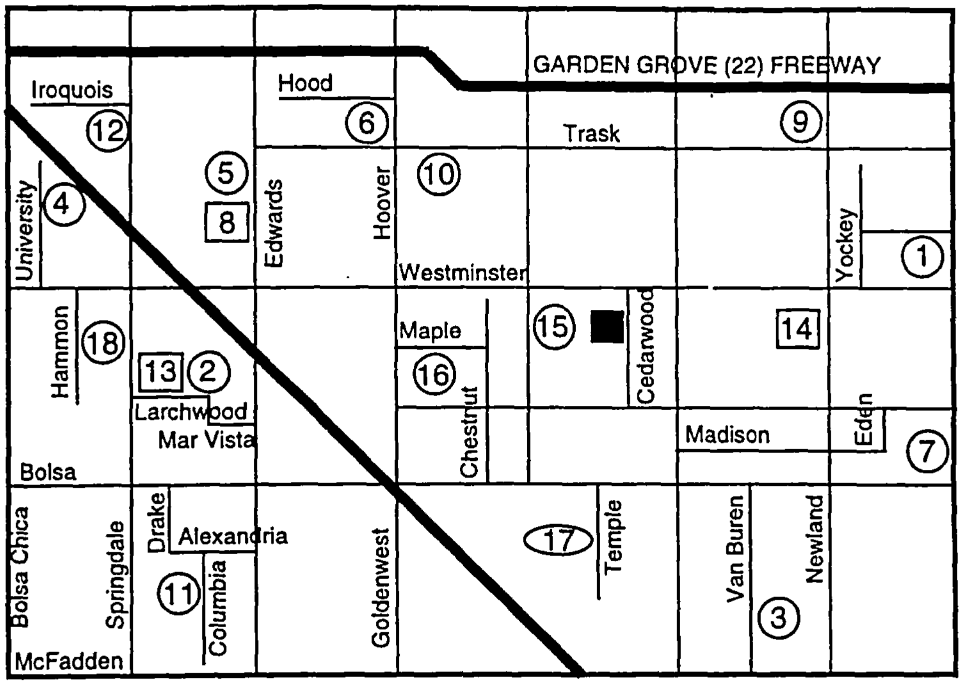
Prepared By: Barbara Winars

Title: Deputy Superintendent

Date: July 1, 1996

Phone: (714) 894-7311

DISTRICT •MAP•



◯ elementary schools
☐ intermediate (7-8) and middle (6-8) schools
⬭ special programs facility

Westminster School District
14121 Cedarwood Avenue
Westminster, CA 92683
(714) 894-7311

•SCHOOLS DIRECTORY•

1	**Anderson Elementary** (K-6) 8902 Hewitt Place Garden Grove, CA 92644	Gail Borowick, Principal (714) 894-7201
2	**Clegg Elementary** (K-6) 6311 Larchwood Drive Huntington Beach, CA 92647	Ray Rodriguez, Principal (714) 894-7218
3	**DeMille Elementary** (K-6) 15400 Van Buren Street Midway City, CA 92655	Cherrille Collier, Principal (714) 894-7224
4	**Eastwood Elementary** (K-6) 13552 University Street Westminster, CA 92683	Ed Kissee, Principal (714) 894-7227
5	**Finley Elementary** (K-6) 13521 Edwards Street Westminster, CA 92683	Hodge Hill, Principal (714) 895-7764
6	**Fryberger Elementary** (K-5) 6952 Hood Drive Westminster, CA 92683	Geniavon Pickett, Principal (714) 894-7237
7	**Hayden Elementary** (K-5) 14782 Eden Street Midway City, CA 92655	Duane Collier, Principal (714) 894-7261
8	**Johnson Middle** (6-8) 13603 Edwards Street Westminster, CA 92683	Christine Harrison, Principal Jill Sloan, Assistant Principal (714) 894-7244
9	**Meairs Elementary** (K-5) 8441 Trask Avenue Garden Grove, CA 92644	Dr. Lucille Tambara, Principal (714) 638-0450
10	**Schmitt Elementary** (K-5) 7200 Trask Avenue Westminster, CA 92683	Dale Bischof, Principal (714) 894-7264
11	**Schroeder Elementary** (K-6) 15151 Columbia Lane Huntington Beach, CA 92647	Linda Baxter, Principal (714) 894-7268
12	**Sequoia Elementary** (K-6) 5900 Iroquois Road Westminster, CA 92683	Dick Weaver, Principal (714) 894-7271
13	**Stacey Intermediate** (7-8) 6311 Larchwood Drive Huntington Beach, CA 92647	Sheri Jones, Principal Carol Lind Jones, Assistant Principal (714) 894-7212
14	**Warner Middle** (6-8) 14171 Newland Street Westminster, CA 92683	Linda Paulsen, Principal Ron Zell, Assistant Principal (714) 894-7281
15	**Webber Elementary** (K-6) 14142 Hoover Street Westminster, CA 92683	Rich Guinn, Principal (714) 894-7288
16	**Willmore Elementary** (K-6) 7122 Maple Street Westminster, CA 92683	Harvey Morris, Principal (714) 895-3765
17	**Land School** (special programs) 15151 Temple Street Westminster, CA 92683	Beverlee Watson, Director (714) 898-8389

City of Huntington Beach
2000 MAIN STREET CALIFORNIA 92648
FIRE DEPARTMENT

June 28, 1996

Jayna Morgan
EDAW, Inc.
17875 Von Karman Avenue, Suite 400
Irvine, CA 92714

RE: QUESTIONNAIRE

Dear Ms. Morgan:

Attached is the response to your questionnaire we received. If you should have any question or require additional information, please contact me at 714-536-5565 or Howard Hubert at 714-536-5566.

Sincerely,

Duane Olson

Duane Olson
Fire Marshal

DO/HH/sg
attachment

c: Julie Osugi, Associate Planner

Environmental Impact Report - Mc Donnell Centre Business Park

Questionnaire Answers From Huntington Beach Fire Department

1. **What types of services do you provide to the project site and adjacent area?**

   Fire suppression, medical emergency response, hazardous material spill response and mitigation, fire prevention inspections and hazardous material inspections.

2. **List the names and locations of stations which would serve the project site, their distance and response times from each location to the project site and the size and type of company responding.**

   - Station # 8-Heil, 5891 Heil Avenue.
     Four person paramedic engine company - 2.1 miles.
     Response time - 5 minutes and 10 seconds.

   - Station #2-Murdy, 16221 Gothard Avenue.
     Four person paramedic engine company, four person truck/ladder company and two person ambulance company - 3.2 miles.
     Response time - 7 minutes and 20 seconds.

   - Station #7-Warner, 3831 Warner Avenue.
     Four person paramedic engine, 4.4 miles.
     Response time 9 minutes and 40 seconds.

3. **What level of service, if any, do you provide to the project site at this time?**

   The fire departments level of service to the property at this time is the same as above.

4. **Will the proposed land uses adversely impact the level of service you presently provide?**

   Yes. The fire departments responses will be directly affected by the increase in the number of buildings and the number of employees brought into the area. This will to some degree drain fire department resources, thereby increasing fire response times city wide.

5. **What are the current plans for expansion of your facilities (include location and completion dates)? Identify any of these which may specifically serve the project site.**

   The existing fire station at 5801 Heil Avenue is planned to be relocated to Graham and Production Lane by the year 2000. This would be the closest fire station to the subject area. At this time, staffing for this station is uncertain. Distance to the subject area will be 1.4 miles and the response time will be 3 minutes and 40 seconds.

6. **Will the project create a need for the expansion of facilities or the addition of staff? If so, give a brief description of anticipated needs and how the increase is determined; i.e., personnel to population ratio.**

   Yes. Potentially one additional fire company will be required at the new facility at Graham and Production.

7. **Is there revenue budgeted for such an expansion? If not, what methods would be used to secure capital revenue?**

   No. Capital revenue for this new facility is currently under negotiations with the development of the Bolsa Chica Wetlands. The most likely source for revenue will come from the City's General Fund.

8. **What problems do you foresee in serving the proposed project? Identify any particular concerns.**

   Currently, fire department response time to the project area does not meet the criteria established by the Cities Growth Management Committee. This policy requires a fire department response time under five minutes 80% of the time. Because of the distance from the nearest fire station response time to the proposed project will consistently be above this established standard.

9. **What measures can you recommend for mitigating project impacts identified above?**

   Recommendation to mitigate the excessive response time would be to condition the project in a manner that the new fire station at Graham and Production be in service at a point when the project area has been built to a particular level. Example: When the project area is 50% built no further construction will be allowed until the fire facility is in service.

HUNTINGTON BEACH

FAX COVER SHEET

HUNTINGTON BEACH POLICE DEPARTMENT

Ronald E. Lowenberg
Chief of Police
2000 Main Street
Huntington Beach, CA 92648
Telephone: (714) 960-8811 **FAX**: (714) 536-2895

CONFIDENTIAL

TO: (Company name) EDAW, Inc.

TO: (Contact name) Jayna Morgan

TO FAX NUMBER: (714) 660-1046

SENDER: (Name) Sylvia Franklin

CASE NUMBER:

DESCRIPTION: McDonnell Centre EAI Report

DATE AND TIME SENT: 7/3/96, 1455

A TOTAL OF 4 PAGES, INCLUDING THIS COVER PAGE, ARE BEING SENT TO YOU. IF ALL PAGES ARE NOT RECEIVED, CALL (714) 536-5652 IMMEDIATELY.

A:A45FL.95
1/95 - /mk

ATTACHMENT B

TO: **Huntington Beach Police Department**
2000 Main Street
Huntington Beach, CA 92648

Law Enforcement

1. What types of services do you provide to the project site and adjacent area?

The McDonnell Douglas project site encompasses Reporting District #126 and #127. We provide police support to the area with patrol responses, reporting, and investigative support. The patrol area is the portion of the City northwest of Goldenwest/Edinger.

2. List the names and locations of stations which would serve the project site, their distance and response times from each location to the project site and the size and type of unit responding.

The project site is located 6 miles from the Huntington Beach Police Department, located at 2000 Main St. Police The averages for response times include dispatch time in minutes.

Priority 1 = 7.9 min.
Priority 2 = 14.65 min.
Priority 3 = 19.05 min.

One patrol unit is out at a time with one police officer.

3. What level of service, if any, do you provide to the project site at this time?

We provide the project site with patrolling units at this time. The patrol area is the northwest section of Huntington Beach bounded by Goldenwest, Edinger, Bolsa Chica, and the City of Westminster.

ATTACHMENT B

4. Will the proposed land uses adversely impact the level of service you presently provide?

The increase in population increases the calls for service.

5. What are the current plans for expansion of your facilities (include location and completion dates)? Identify any of these which may specifically serve the project site.

We are presently at a hiring freeze for police officers. Consequently, the project would increase the calls for service, increasing the workload.

6. Will the project create a need for the expansion of facilities or the addition of staff? If so, give a brief description of anticipated needs and how the increase is determined (i.e., personnel to population ratio).

Equation: ((Square footage / 2,986 calls per square foot) / 356 calls per officer) = Total number of additional officers needed.
(1,068,422 sq. ft. / 2,986 calls per sq. ft. / 356 calls per officer) = 1.005 additional officers needed.

ATTACHMENT B

7. Is there revenue budgeted for such an expansion? If not, what methods would be used to secure capital revenue?

Presently, we are at a hiring freeze and are unable to fill open positions for police officers.

8. What problems do you foresee in serving the proposed project? Identify any particular concerns.

The increase in population would effect the response time. Commercial property has a tendency to increase the calls for service, due to the increase in patrons/population. An additional officer would cost $80,000 in salary and benefits. At a difficult time when there are budget cuts, would either mean additional cuts in other areas or not hiring an officer. The number of calls for service would increase the workload of the officers already assigned. If any of the future projects are actualized, then the need for additional officers would increase to an additional 5 officers.

9. What measures can you recommend for mitigating project impacts identified above?

For future projects, some of the costs could be absobed by the project. Another possibility is to increase private security.

Prepared By: Sylvia A. Franklin

Title: Planner/Drafer

Date: July 3, 1996

Phone: (714) 536-5652

The Gas Company®

Orange Coast Region

RECEIVED

JUL 9 1996

EDAW, INC., IRVINE, CA

July 5, 1996

EDAW, Inc.
17875 Von Karman Avenue
Suite 400
Irvine, CA 92714

Southern California Gas Company
Mailing Address:
Box 3334
Anaheim, CA
92803-3334

Attention: Ms. Jayna Morgan

Subject: WILL SERVE - MCDONNELL CENTRE BUSINESS PARK EIR #96-1 IN THE CITY OF HUNTINGTON BEACH.

This letter is not to be interpreted as a contractual commitment to serve the proposed project, but only as an information service. Its intent is to notify you that the Southern California Gas Company has facilities in the area where the above named project is proposed. Gas service to the project could be served from an existing main as shown on the attached atlas sheet without any significant impact on the environment. The service will be in accordance with the company's policies and extension rules on file with the California Public Utilities Commission at the time contractual arrangements are made.

The availability of natural gas service, as set forth in this letter, is based upon present conditions of gas supply and regulatory policies. As a public utility, the Southern California Gas Company is under the jurisdiction of the federal regulatory agencies. Should these agencies take any action which affects gas supply or the condition under which service is available, gas service will be provided in accordance with revised conditions.

Residential (System Area Average)	Yearly
Single-family	750 therms/year/dwelling unit
Multi-family units	475 therms/year/dwelling unit

These averages are based on total gas consumption in residential units served by Southern California Gas Company during 1985 and it should not be implied that any particular home, apartment or tract or homes will use these amounts of energy.

We have developed several programs which are available, upon request, to provide assistance in selecting the most energy efficient appliances or systems for a particular project. If you desire further information on any of our energy programs, please contact this office at 1(800)427-2000. for assistance.

Sincerely,

Ronald E. Reed
Technical Supervisor

KRC
attachment

EIRRES.DOC

ATTACHMENT B

TO: Huntington Central Library
7111 Talbert Ave.
Huntington Beach, CA 92648

1. What types of library services do you provide?

The HB Public Library System offers a wide array of services from basic book circulating, reference research with print and electronic databases, extensive children's programming, specialized genealogy collection, media and technology center, gift shop, meeting rooms and a 320 fixed seat theater.

2. List the names and locations of facilities which will serve the sites, their distance from the site, their capacity, and the level at which they are presently operating.

facilities	address	site distance	capacity	operating level
Central Library and Cultural Center	7111 Talbert Ave 92648	4.5 miles	125,000 sf	$2,850,000 full service
Graham Branch	15882 Graham 92649	.5-1 mile	2,000 sf	$55,000 limited services
Main St. Branch	525 Main St. 92648	7.5 miles	5,000 sf	$55,000 limited services
Banning Branch	9281 Banning Ave. 92646	12.5 miles	3,000 sf	$55,000 limited services
Oak View Branch	17241 Oak Lane 92648	6.5 miles	1,200 sf	$30,000 limited services

3. What level of service, if any, do you provide to the project area at this time?

Complete library services are provided to all residents within Huntington Beach, including the project area. Nonresidents are charged a nonresident library card fee.

4. Will the proposed project adversely impact the level of service you presently provide?

Since the Graham Branch Library is within one mile, the project will impact this small, underfunded library. The expansion of this branch has been listed in the City's capital improvement program for several years. With the development of the surrounding area, the service demand on this facility will increase. The present operation will not be able to mitigate the increased demand. The Central Library and Cultural Center should be neutral to impact.

5. What are the current plans for expansion of your facilities (include use, location, capacities, and completion dates)? Indicate any of these which may serve the project site. Is there a library master plan for the community?

The Central Library and Cultural Center was recently expanded. However, the Graham Branch which is the closest to the project area is in critical need of expansion. Any increased development within the area will adversely impact this branch which is already too small for the present population.

6. Will the project create a need for the expansion of facilities or the addition of staff? If so, give a brief description of anticipated needs.

See #

7. Is there revenue budgeted for such an expansion? If not, what methods would be used to secure capital revenue?

No. It has been listed on the capital improvement plan for the City for years. However, a lack of funding has prohibited the expansion. There are no present sources for capital funding.

8. What problems do you foresee in serving the proposed project? Identify any particular concerns.

Increased demand on library services, especially Graham Branch. The Library System has already been reduced by approximately $340,000 (10%) . Increased population results in increased demand.

9. What measures can you recommend for mitigating project impacts that may be incorporated into the project?

Increasing development fee for library and have revenue from permits go directly into Library Service Fund would reduce impact

Prepared By: [signature]

Title: Library Director

Date: 7/3/96

Phone: 960 8936

ATTACHMENT B

TO: **Huntington Central Library**
7111 Talbert
Huntington Beach, CA 92648

Library

1. What types of library services do you provide?

2. List the names and location of facilities which will serve the sites, their distance from the site, their capacity, and the level at which they are presently operating.

3. What level of service, if any, do you provide to the project area at this time?

ATTACHMENT B

4. Will the proposed project adversely impact the level of service you presently provide?

5. What are the current plans for expansion of your facilities (include use, location, capacities, and completion dates)? Indicate any of these which may serve the project site. Is there a library master plan for the community?

6. Will the project create a need for the expansion of facilities or the addition of staff? If so, give a brief description of anticipated needs.

ATTACHMENT B

7. Is there revenue budgeted for such an expansion? If not, what methods would be used to secure capital revenue?

8. What problems do you foresee in serving the proposed project? Identify any particular concerns.

9. What measures can you recommend for mitigating project impacts that may be incorporated into the project?

Prepared By: [signature]

Title: Library Director

Date: 7/1/96

Phone: 9151836

P:\1996\6N11601\HAYEN.DOC

Serving Orange County For Over 40 Years

Rainbow Disposal Co. Inc.

P.O. BOX 1026 • HUNTINGTON BEACH, CA 92647 • PH: (714) 847-3581 FAX: (714) 841-4660

July 15, 1996

EDAW, Inc.
Attention: [redacted] Project Manager
17875 Von Karman Avenue, Suite 400
Irvine, CA 92714

Re: MCDONNELL CENTRE BUSINESS PARK
Environmental Impact Report
Attachment B

Dear Ms. Morgan:

Enclosed please find our response to your letter dated June 17, 1996, regarding the above referenced Environmental Impact Report Questionnaire, Attachment B.

If you have any questions or require additional information please do not hesitate to contact
me at (714) 847-3581, Ext. 229.

Sincerely,

Richard R. Timm
Manager]

RRT:sjj9608

Enclosure

ATTACHMENT B

TO: Rainbow Disposal **Solid Waste**
17121 Nichols
Huntington Beach, CA 92647

1. What services do you provide to the project site?

   Rainbow Disposal will provide the following services:

   1. Solid waste removal and recycling.
   2. Construction debris removal.
   3. Commercial pick-up service.
   4. Three cubic yard bin, roll-off container and compactor service.

2. Describe the type and location of facilities (i.e., sanitary landfills and waste haulers) which would serve the project site, their distance from the project site, their capacity, the level at which they are presently operating, and the class of the facility.

   All solid waste removed from the project site will be processed through the Rainbow Transfer/Recycling Facility. Recylables will be removed and the residual will be transported to the County Bauerman Landfill.

   The capacity of the Rainbow Transfer/Recycling Facility is 2800 tons per day and is presently at 1500 tons per day.

3. What are the current plans for expansion of your facilities (include use, location, capacities, and completion dates)? Identify any of these which may specifically serve the project site.

   There is no projected expansion at this time.

4. Will the proposed project adversely impact existing facilities or the level of service you presently provide?

There is no adverse impact.

5. Will the project create a need for the relocation of facilities, expansion of facilities, or the addition of staff? If so, give a brief description of anticipated needs.

Not applicable.

6. Is there revenue budgeted for relocation or expansion of facilities if required by this project? If not, what methods would be used to secure capital revenue?

Not applicable.

7. What are the solid waste generation rates you would use for this project? Please specify a rate per residential unit or square foot. What other agencies are involved, if any, in the provision of service to the project site?

Commercial rates for the City of Huntington Beach.

8. What problems do you foresee in serving the project? Identify any particular concerns.

None

9. What measures can you recommend for mitigating project impacts identified above?

None

Prepared by: Richard R. Timm

Title: Manager

Date: July 15, 1996

Phone: (714) 847-3581, Ext. 229

OCTA

July 3, 1996

Ms. Jayna Morgan
EDAW, Inc.
17875 Von Karman Avenue, Suite 400
Irvine, CA 92714

Subject: McDonnell Douglas Centre Business Park EIR

Dear Ms. Morgan:

The Orange County Transportation Authority (OCTA) received your request for information on transit service in the McDonnell Douglas Centre Business Park project area. Below are the responses to your questionnaire.

1. OCTA currently provides local bus service to the McDonnell Douglas facility. The service is offered during peak hours only.

2. OCTA bus route 64, which operates from Santa Ana to the project site primarily via Bolsa Avenue, provides service on weekdays during peak hours. Service consists of 26 daily trips operating about every 30 minutes. Currently there are six bus stops in the project area; four are located on Bolsa Avenue, one is located on Springdale Street just south of Bolsa Avenue and one is located on the McDonnell Douglas property. Combined, these bus stops account for about 66 daily passenger boardings and alightings. The service is significantly underutilized.

3. OCTA has no plans for expansion of our services in the project area.

4. There is no revenue budgeted for expansion of OCTA bus services.

5. Ridership is determined by several factors (i.e. customer requests, number of employees per work site, square feet of retail/commercial space, number of residents in the area, etc.).

6. The existing park and ride and bus stops should be retained, and if necessary, they could be modified to conform with the design of the new project. Furthermore, a project of such large scope may require expansion of

service. Due to the proposed mixed use of the project, there may be the demand to provide bus service during the middle of the day.

7. To mitigate the potential increase in travel to the site, OCTA recommends incorporating transit amenities such as bus stops, bus turnouts, bus stop shelters, and maintaining the existing park-and-ride.

Thank you for the opportunity to comment on this project. Please feel free to call me at (714) 560-5765 or Bill Batory regarding bus stop amenities at (714) 560-5912.

Sincerely,

Jorge L. Duran
Transportation Analyst

c: Bill Batory, OCTA

MWD

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

June 21, 1996

RECEIVED
JUN 1996
EDAW, INC., IRVINE, CA

Ms. Jayna Morgan
EDAW, Inc.
17875 Von Karman Avenue, Suite 400
Irvine, California 92714

Dear Ms. Morgan:

Our General Manager, John Wodraska, has forwarded your letter of June 17 (along with its accompanying survey sheet) to me for response. Because Metropolitan is a wholesaler of water to a 5200-square-mile service area that includes six counties and some 16 million people, the survey questions are not applicable to us. In order to determine any potential impacts of your project where water supply is an issue I recommend that you talk to the City of Huntington Beach and, perhaps, the Municipal Water District of Orange County.

In response to a few of the questions on your survey:

1. Metropolitan provides wholesale deliveries of potable and non-potable water to most of coastal Southern California from Oxnard to the Mexican Border, including Orange County and Huntington Beach.

2. Treated water for Orange County is generally delivered from our Robert B. Diemer Filtration Plant located in Yorba Linda. This plant has a design flow capacity of 520 million gallons of water a day.

3. Your project does not adversely impact the level of service we provide; nor would it require us to expand our facilities. Please keep in mind, however, that I am not speaking on behalf of your local water agency.

If I can provide you with additional information, or if there is some technical requirement that requires us to complete the survey form, please contact me.

Regards,

Jay Malinowski
Chief of Operations

cc: J. Wodraska
L. Gottlieb
N. Arias-Lee

OFFICERS
STANLEY E. SPRAGUE
GENERAL MANAGER
CATHLEEN M. HARRIS
SECRETARY
JAN L. ALLNUTT
TREASURER
RUSSELL G. BEHRENS
ATTORNEY

DIRECTORS
WAYNE A. CLARK
PRESIDENT
KENNETH H. WITT
VICE PRESIDENT
WILLIAM F. DAVENPORT
H.E. "BILL" HARTGE
ROBERT J. HUNTLEY

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

P.O. BOX 20895 • 10500 ELLIS AVENUE • FOUNTAIN VALLEY, CALIFORNIA 92728 • (714) 963-3058 • FAX (714) 964-9389

JUL 1996

July 03, 1996

EDAW, Inc.
17875 Von Karman Av., ste. 400
Irvine, CA 92714 fax 660-1046

attn: Ms. Jayna Morgan

Re: McDonnell Centre EIR Questionnaire

The Municipal Water District of Orange County (MWDOC) is a wholesale water agency. We deliver imported water to the local retailer, the City of Huntington Beach water department. Our planning goal is to meet the imported water needs of the local retailers. Although the McDonnnell Centre lies wholly within our agency (map attached), we do not make any decisions regarding serving water to individual projects such as this one.

MWDOC has no facilities in or near the subject property, and we do not foresee needing to construct any facilities to serve it.

Sincerely,

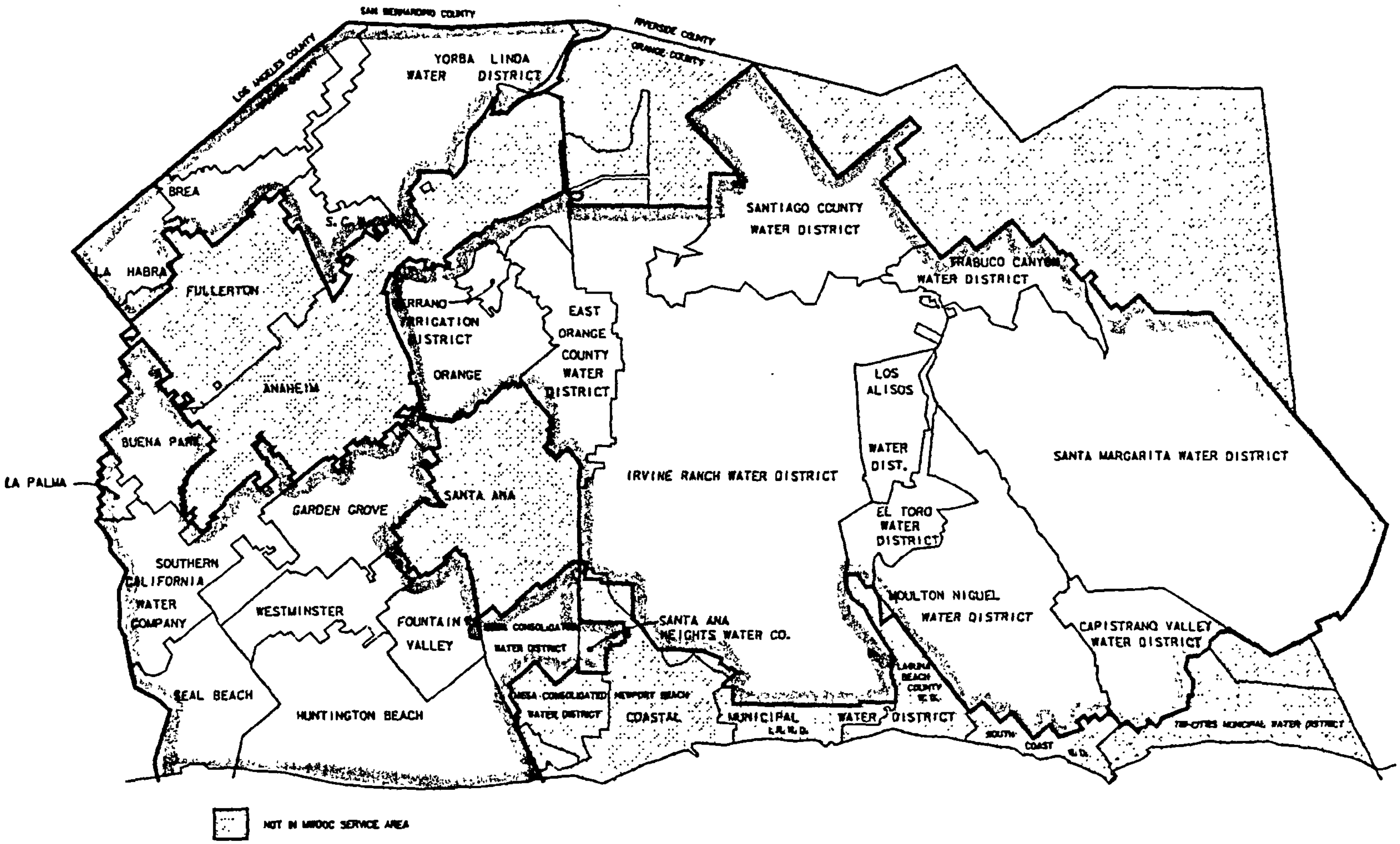
Karl Seckel

Karl Seckel
Assistant General Manager and District Engineer

attachment: MWDOC map

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY MEMBERS

as shown in light areas



RECEIVED
JUN 27 1996
EDAW, INC., IRVINE, CA

Jacque M.

ATTACHMENT B

TO: **Orange County Water District** **Water**
P.O. Box 8300
Fountain Valley, CA 92708

1. What types of services do you provide to the project site? None
We are not a retail water agency. The area is beyond where we might serve reclaimed water.

2. List the names and location of facilities which would serve the project site and their distance from the project site. Provide their capacity and the level at which they are presently operating.

3. Will the proposed project adversely impact the level of service you presently provide?

4. What are the current plans for expansion of your facilities (include use, location, capacities, and completion dates)? None to that area

5. Will the project create a need for the expansion of facilities or the addition of staff? If so, give a brief description of anticipated needs. Please provide the water consumption rates for the proposed land uses.

6. Is there revenue budgeted for such an expansion? If not, what methods would be used to secure capital revenue?

7. What problems do you foresee in serving the proposed project? Identify any particular concerns.

8. What measures can you recommend for mitigating project impacts identified above?

9. If possible, please provide a map showing the service boundaries in relationship to the project site.

Prepared By: Steve Conklin

Title: Director of Engineering

Date: 6/25/96

Phone: 378-3211

Vencor Hospital • Orange County

America's Long-Term Healthcare Network

200 Hospital Circle
Westminster, California 92683
(714) 893 • 4541
(714) 894 • 3407 Fax

RECEIVED
JUL 3 1996
EDAW, INC., IRVINE, CA

DATE: 7-3-96

TO: *PLEASE DELIVER THE FOLLOWING* 4 *PAGES (WHICH INCLUDES THIS COVER SHEET) TO:*

NAME: Jayna Morgan

COMPANY: EDAW, Inc.

DEPARTMENT:

FAX #: 660-1046

FROM: *IF YOU DID NOT RECEIVE ALL OF THE PAGES, PLEASE CALL:*

NAME: Dianna Dunn

DEPARTMENT: Admin.

PHONE #: 714) 893-4541, x 5148

FAX #: *714/894-3407*

MESSAGE/COMMENTS:

THANK YOU!

ATTACHMENT B

TO: **Vencor Hospital Orange County**
200 Hospital Circle
Westminster, CA 92683

Hospitals

1. What types of services does the hospital provide (i.e.,. general and/or acute care)?

Acute Care

2. What is the location of this facility, the distance from the project site, and the estimated emergency travel time from the project area to your facility?

2.3 miles

3. What is the capacity of your facility (include the number of general and/or acute care beds) and the level at which you are presently operating (include your annual occupancy rate)?

99 licensed beds

NO EMERGENCY SERVICES – NO ER

Occupancy: 48%

P:\1996\6N11601\HUNN.DOC

4. Will the proposed project adversely impact the level of service you presently provide?

NA -

5. What are the current plans for expansion of your facilities (include purpose, location, capacities, number of beds, and completion dates)? Indicate any of these which may specifically serve the project site.

Not at this time.

6. Will the project create a need for the relocation of facilities, expansion of facilities, or the addition of staff? If so, give a brief description of anticipated needs.

NA -

7. Is there revenue budgeted for relocation or expansion of facilities if required by this project? If not, what methods would be used to secure capital revenue?

NA -

8. What problems do you foresee in serving the project? Identify any particular concerns.

None

None.

9. What measures can you recommend for mitigating project impacts identified above?

NA

Prepared By: Michael Hunn

Title: Administrator

Date: 6-26-96

Phone: 714-893-4541-x5140.

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COLUMBIA/HCA

A New Commitment To Healthcare...Together

Healthcare Corporation

West Anaheim Medical Center
3033 W. Orange Avenue
Anaheim, California 92804
(714) 828-5759
(714) 828-6588 FAX

Huntington Beach Medical Center
17772 Beach Boulevard
Huntington Beach, California 92647

DATE: 7-18-96

TO: JAYNA MORGAN
Name

EDAW, INC
Company/Department

FAX #: (714) 660-1046

FROM: SUSAN ALEX

DIRECTOR, MANAGED CARE

NUMBER OF PAGES INCLUDING COVER SHEET: 4

COMMENTS: EIR QUESTIONNAIR FOR McDONNELL CENTRE BUSINESS PARK

JAYNA - PLEASE CALL IF YOU HAVE ANY QUESTIONS OR IF I CAN BE OF ASSISTANCE

Sincerely, Susie Alex

IF YOU DO NOT RECEIVE ALL OF THE PAGES -- PLEASE CALL ME AT (714) 828-5759.

ATTACHMENT B

TO: Columbia Huntington Beach Medical Center **Hospitals**
17772 Beach Boulevard
Huntington Beach, CA 92648

1. What types of services does the hospital provide (i.e.,. general and/or acute care)?

General Acute Care,Intensive & Coronary Care, Maternity Services with Labor / Delivery / Recovery Suites, Emergency Room (24 hour), Outpatient Surgical Services, Inpatient and Outpatient Psychiatric Services, Rehabilatation Services, Cardiopulmonary Services, Diagnostic Imaging Occupational Medicine Program for Work Injuries and Illnesses.

2. What is the location of this facility, the distance from the project site, and the estimated emergency travel time from the project area to your facility?

Located at 17772 Beach Boulevard, between Slater and Talbert, approximately five (5) miles by street from the project site. Emergency travel time, Approximately five (5) minutes.

3. What is the capacity of your facility (include the number of general and/or acute care beds) and the level at which you are presently operating (include your annual occupancy rate)?

Total Licensed Capacity 135 beds, 45% occupancy

ATTACHMENT B

4. Will the proposed project adversely impact the level of service you presently provide?

No.

5. What are the current plans for expansion of your facilities (include purpose, location, capacities, number of beds, and completion dates)? Indicate any of these which may specifically serve the project site.

New 4,075 square foot Emergency Department to be completed in August 1996.

6. Will the project create a need for the relocation of facilities, expansion of facilities, or the addition of staff? If so, give a brief description of anticipated needs.

No.

ATTACHMENT B

7. Is there revenue budgeted for relocation or expansion of facilities if required by this project? If not, what methods would be used to secure capital revenue?

N/A

8. What problems do you foresee in serving the project? Identify any particular concerns.

None. Columbia Huntington Beach Hospital and Medical would be pleased to serve the health care needs of this project.

9. What measures can you recommend for mitigating project impacts identified above?

N/A

Prepared By: Susan E. Alex

Title: Director, Managed Care

Date: July 15, 1996

Phone: (714)828-5759

Orange County Vector Control District

DISTRICT OFFICE • 13001 GARDEN GROVE BLVD., GARDEN GROVE, CA 92643
MAILING ADDRESS • P.O. BOX 87, SANTA ANA, CALIFORNIA 92702
PHONE (714) 971-2421 • FAX (714) 971-3940

July 15, 1996

Ms. Julie Osugi, Associate Planner
City of Huntington Beach
2000 Main Street
Huntington Beach, California 92648

RE: Vector Control Evaluation for McDonnell Centre Business Park Specific Plan in Huntington Beach

Dear Ms. Osugi:

We do not anticipate any significant vector problems at the above project site.

The site is about 2 miles from the Anaheim Bay National Wildlife Refuge where some mosquitoes are produced such as *Aedes taeniorhynchus* (a day biting mosquito) which could migrate towards the proposed site with prevailing winds. Also, flood channels that parallel Bolsa Chica and Rancho Road could be a source of mosquitoes and midges. Mosquitoes that could be produced in the channels include *Culex tarsalis, C. stigmatosoma, C. quinquefasciatus, C. inornata, and C. incidens.*

The refuge and flood channels are regularly monitored as part of our District's mosquito/encephalitis surveillance and treatment programs where good mosquito control is achieved.

All sites should be graded for proper runoff to avoid standing water that could breed mosquitoes. Also, trash should be held in fly proof containers and emptied weekly or preferably biweekly.

During the landscape phase of the project, plants that are attractive to rodents (Algerian ivy, bougainvillea, oleander, palm trees, yuccas, etc.) should be avoided. A list of alternate types of ground cover less attractive to rodents is enclosed.

Thank you for allowing us to review this project. If you have any questions regarding these comments, please feel free to contact me.

Sincerely,

Gary Reynolds

Gary Reynolds
Biologist

ORANGE COUNTY VECTOR CONTROL DISTRICT

GR/cs
Enc.
cc: Ms. Jayna Morgan
EDAW, Inc.
17875 Von Karman Avenue, Suite 400
Irvine, California 92714

A vector is any insect or other arthropod, rodent or other animal of public health significance capable of causing human discomfort, injury, or capable of harboring or transmitting the causative agents of human disease.

RECEIVED

JUL 3 1996

EDAW, INC., IRVINE, CA

ATTACHMENT B

TO: **GTE** **Telephone**
7352 Slater Avenue
Huntington Beach, CA 92647

1. What services do you provide to the project site?

Telecommunication Services

2. Describe the types and location of facilities on or adjacent to the site, which would serve the project site, their distance from the project site, their capacity, and the level at which they are presently operating.

Copper cable feed - 500' (approx.)
Fiber cable - 1000' (")

3. What are the current plans for expansion of your facilities? (include use, location, capacities, and completion dates) Identify any of these which may specifically serve the project site.

Facilities will be expanded as needed and will be determined based on most economically feasible serving arrangement.

ATTACHMENT B

4. Will the proposed project adversely impact existing facilities or the level of service you presently provide?

No adverse impact foreseen at this time.

5. Will the project create a need for the relocation of facilities, expansion of facilities, or the addition of staff? If so, give a brief description of anticipated needs.

Facility Expansion - additional cable placement will be required

6. Is there revenue budgeted for relocation or expansion of facilities if required by this project? If not, what methods would be used to secure capital revenue?

Budgeting to be secured as required.

ATTACHMENT B

7. Please explain how you determine service demands for the land use categories detailed below (ie., telephones per square foot) or per capita.

Land Use	Density	Demand Ratio
Medium Density Residential	15 units/acre	2.5 Per Unit
Medium High Density Residential	25 units/acre	2.0 " "
High Density Residential	35 units/acre	1.5 " "
General Commercial	10,000 square feet/acre	20 " Acre
General Industrial	17,000 square feet/acre	10 " "

8. What problems do you foresee in serving the project? Identify any particular concerns.

None foreseen at this time

9. What measures can you recommend for mitigating project impacts identified above?

Adequate lead time to provide services requested by the customer.

Prepared By: P. Klopp

Title: Administrator

Date: 7/3/96

Phone: (714) 375-6724

COUNTY OF ORANGE

ENVIRONMENTAL MANAGEMENT AGENCY
PUBLIC WORKS

MICHAEL M. RUANE
DIRECTOR, EMA

WILLIAM L. ZAUN
DIRECTOR OF PUBLIC WORKS

LOCATION:
300 N. FLOWER ST.
SIXTH FLOOR
SANTA ANA, CALIFORNIA

MAILING ADDRESS:
P.O. BOX 4048
SANTA ANA, CA 92702-4048

TELEPHONE:
(714) 834-5447
FAX # 834-2870

RECEIVED
JUL 1 0 1996
EDAW, INC., IRVINE, CA

JUL 0 9 1996

Jayna Morgan
Project Manager
EDAW, Inc.
17875 Von Karman Avenue, Ste 400
Irvine, CA 92714

SUBJECT: McDonnell Centre Business Park Notice of Preparation

Dear Ms. Morgan:

In response to your letter dated June 17, 1996, we have reviewed the above-mentioned document and offer the following comments:

1. Environmental Impacts Checklist IV.b states that the project lies outside a floodplain area, and therefore has less than significant impact. However, it is necessary to point out that Bolsa Chica Channel (Facility C02) adjacent to the project site is deficient in its ability to convey 100-year discharges. Because it lies within federal property FEMA has decided not to delineate its floodplain. **Therefore, a floodplain analysis at the project site for Bolsa Chica Channel should be accomplished.**

2. Environmental Impact Checklist IV.d states that the project may alter the amount of surface water downstream from the site and hydrologic conditions will be reviewed and evaluated in the EIR. We concur with this decision. The earthen-lined Bolsa Chica Channel adjacent to the development site cannot currently convey OCFCD's approved 100-year discharge. The developer will be required to determine impacts of the proposed development on Bolsa Chica Channel and mitigate resulting impacts and as a condition of development improve the deficient channel reach through the project limits to its ultimate configuration.

If you have any questions on this subject, please contact Lance Natsuhara at 834-5398.

Very truly yours,

Herb Nakasone, Manager
Flood Program Division

BWM:RSB:cd
(6185)6070313172926

cc: George Britton, EMA/Environmental Planning

OCEAN VIEW SCHOOL DISTRICT

Superintendent: James R. Tarwater, Ed.D.

"IN QUEST OF EXCELLENCE"

17200 PINEHURST LANE • HUNTINGTON BEACH • CALIFORNIA • 92647 • 714/847-2551 • FAX 714/847-1430

Jayna Morgan
EDAW, Inc.
17875 Von Karman Avenue, Suite 400
Irvine, California 92714

SUBJECT: MCDONNELL CENTRE BUSINESS PARK ENVIRONMENTAL IMPACT REPORT

Dear Ms. Morgan:

On June 19, 1996, Ocean View School District received the McDonnell Centre Business Park Environmental Impact Report (EIR). On July 3, 1996, I talked to Sally Mirabella in response to completing a questionnaire regarding the EIR. This letter is to officially inform you that the 307-acre project site you refer to is located within the Westminster School District boundaries, and therefore, has no impact on Ocean View School District.

This looks like an excellent project, and I wish you success in your endeavors. If you have any further questions or concerns, please do not hesitate to contact me.

Sincerely,

James R. Tarwater, Ed.D.
District Superintendent

JRT:gb

APPENDIX B

WESTON PRINGLE ASSOCIATES TRAFFIC STUDY

(Appendices A-D of this traffic study are bound under a separate cover)

TRAFFIC IMPACT ANALYSIS
FOR THE
MCDONNELL CENTRE BUSINESS PARK
IN HUNTINGTON BEACH

Prepared for:

EDAW, Inc.
17875 Von Karman Avenue, Suite 400
Irvine, California 92714

Prepared by:

WPA Traffic Engineering, Inc.
23421 South Pointe Drive, Suite 190
Laguna Hills, California 92653

MAY 1997

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TRAFFIC IMPACT ANALYSIS
FOR
MCDONNELL CENTRE BUSINESS PARK

EXECUTIVE SUMMARY

- The traffic analyses include 22 study intersection locations as directed by the City of Huntington Beach, with review of the study locations by the City of Westminster.

- The study intersections were analyzed for existing, interim, and buildout conditions. Future year projections for interim baseline conditions and buildout (Year 2015) volumes with and without the project were provided through traffic modeling, performed by RKJK.

- The potential improvement needs were evaluated at each analysis condition to provide a breakdown of the intersection improvements into "Level 1" through "Level 5". Levels 1 through 3 mitigate traffic operations existing through Interim conditions (with 60% of project buildout). Levels 4 and 5 provide proposed improvements for Buildout conditions with and without the project. This serves to provide a chronology of intersection improvements associated with each traffic condition. The improvements evaluation included review of General Plan studies, Traffic Fee Analyses, previously completed studies, etc. and it is limited to improvements determined to be feasible.

- The interim analyses assume a scenario where 60 percent of the proposed project development is assumed to be completed. Specific improvements (Levels 1-3) are identified which would address the cumulative plus project impacts under this level of development. These analyses serve to result in an interim "trip budget" for the McDonnell Centre project.

- For interim conditions, all of the study intersections would operate at acceptable levels or project impacts can be mitigated through improvements identified (see attached Executive Summary Figure).

- The street segments in the vicinity of the project were also evaluated and potential improvements identified, which would mitigate the impacted locations to acceptable operations.

- Under a yearly monitoring program for the project site, when the interim project "trip budget" threshold is met an additional study must be prepared by the developer to verify if the assumed buildout conditions impacts and improvements are still valid, prior to further development of the site. It is possible that adjustment to the improvement requirements, modification of the assumed project and/or added environmental analyses may be required, if conditions have changed significantly from the assumptions contained in this study.

- An analysis was performed for buildout conditions of the site. Under this long term analysis once the interim project "trip budget is exceeded, the subsequent set of proposed improvements (Levels 4 and 5) would need to be considered in conjunction with the added project development as it continues toward buildout conditions. It is assumed that given the long time frames involved, these improvements could be modified to provide the same level of benefit but best fit the actual traffic needs at that time.

- For buildout conditions, 19 of the 22 intersections are expected to operate or be mitigated to acceptable levels. At the three locations (Westminster/Bolsa Chica, Westminster/Rancho-Hammon and Bolsa/Golden West) where *feasible* improvements were not presently found to be available, potential significant impacts could remain. It should be noted that through the additional study, which will be performed as the interim "trip budget" threshold is met, findings could also change due to the actual and projected, non-McDonnell Douglas land uses that would become a part of the buildout assumptions. (Traffic modeling generally contains "worst case" land use development assumptions.)

- The street segment analyses for buildout conditions identifies improvements for all locations, except Bolsa Chica between Rancho and Bolsa. It would not be considered *feasible* to add more improvements at this location, so potential significant impacts could remain. As stated in the earlier paragraph, Level of Service and proposed improvements obtained for buildout conditions may be overstated which could be addressed through the future verification study.

PROPOSED CONDITIONS OF APPROVAL

- The City of Huntington Beach shall collect its traffic impact fee as "interim" levels of development occur. These fees will relieve the developer of traffic improvements obligations (as detailed for Levels 1, 2 & 3 as shown in Table 4 of the Traffic Impact Assessment) resulting from the interim levels of development.

- An updated Traffic Impact Assessment (TIA) shall be prepared at the expense of McDonnell Douglas as the interim trip budget is reached. This updated TIA shall be commenced when 90% of the interim trip budget is built or has approved development applications (entitled) and no further development shall be entitled or constructed (beyond that development that generates 100% of trips for the interim trip budget) until the updated TIA and required improvements are reviewed and approved by the City. The purpose of the updated TIA is to determine the required traffic proposed improvements for the remaining buildout of the McDonnell Center Specific Plan Area (currently estimated in Levels 4 & 5 as shown in Table 4 of the TIA). This revised TIA shall not relieve the developer of any obligation to pay any traffic impact fees (should the present or any other traffic impact fee program be in place) or provide for proposed improvements for future development at the time of future developments.

- The City will maintain and update an annual trip budget monitoring report to determine the status of the constructed and approved development applications (entitled) development and resulting expected trips within the McDonnell Center Specific Plan area. This annual trip budget monitoring report shall be based upon building permits issued and (entitled) development within the McDonnell Center. The trip budget monitoring report shall include gross and usable square footages of the constructed and/or entitled usages, a description of the land usage, and the trip generation rates used for the land usage proposed. The trip rates used in the monitoring report shall be those rates contained in the latest *Trip Generation* manual published by the Institute of Transportation Engineers (currently the 5th edition and 5th edition update) or another reliable source as approved by the City Traffic Engineer.

- The interim trip budget is agreed to be calculated upon the cumulative development within the McDonnell Center Specific Plan Area.

❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖

These are the findings and conclusions for the McDonnell Centre Business Park Traffic Impact Analysis Study.

Prepared by:
WPA TRAFFIC ENGINEERING, INC.

CITY OF HUNTINGTON BEACH

REGISTERED PROFESSIONAL ENGINEER
STEVEN S. SASAKI
No. C52768
Exp. 12/31/98
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
STEVEN S. SASAKI
No. TR1462
Exp. 12/31/99
TRAFFIC
STATE OF CALIFORNIA

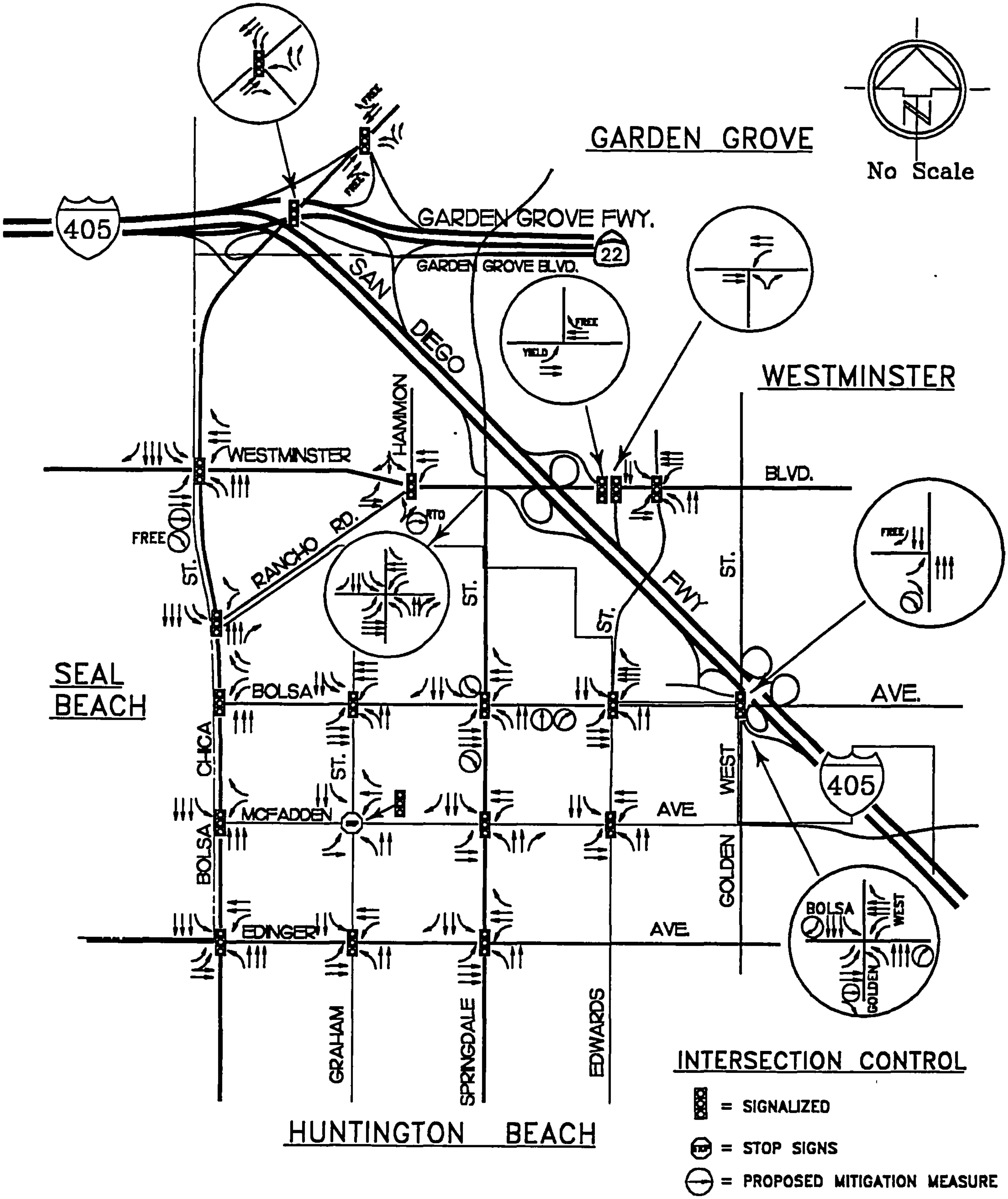
REGISTERED PROFESSIONAL ENGINEER
James Donald Otterson
No. 1578
Exp. 6/30/97
TRAFFIC
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
JAMES D. OTTERSON
No. 38580
Exp. 3-31-01
CIVIL
STATE OF CALIFORNIA

Steven S. Sasaki, P.E.
Registered Professional Engineer
State of California Numbers C52768 & TR1462

20/Aug/97

James D. Otterson, P.E.
City Traffic Engineer
City of Huntington Beach



INTERIM DEVELOPMENT GEOMETRICS (60%)

830405

WPA TRAFFIC ENGINEERING, INC.

EXECUTIVE SUMMARY FIGURE

TRAFFIC IMPACT ANALYSIS
FOR
MCDONNELL CENTRE BUSINESS PARK

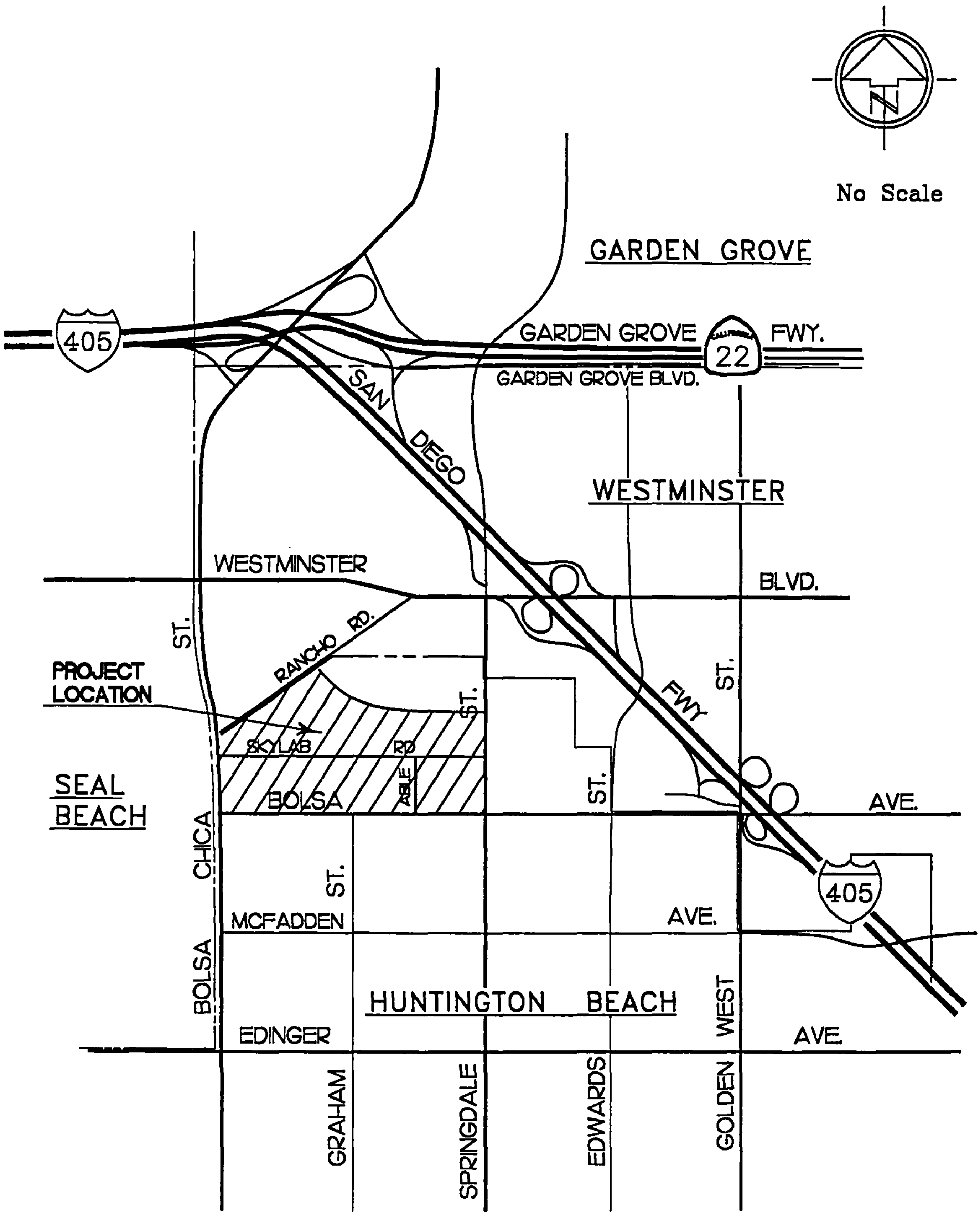
INTRODUCTION

This report presents a summary of our review of traffic factors related to the proposed McDonnell Centre project located north of Bolsa Avenue between Bolsa Chica Road and Springdale Street in the City of Huntington Beach. Figure 1 illustrates the location of the proposed project in relationship to the surrounding street system. This study is based upon information provided by City Staff, previously completed studies in the area, model data provided by a City consultant, field studies, and standard reference materials.

These analyses were completed on an interim and buildout basis. The interim study (Year 2000) presents traffic conditions assuming 60 percent development of the proposed project, which yields a *"trip budget"* for the development area for the interim period. Conditions have been set that a yearly monitoring program will be established and maintained by the City of Huntington Beach to monitor the project site. When the project development meets the interim project "trip budget" threshold, an additional study must be prepared by the developer to examine the impacts of the remaining proposed project "trip budget" on the surrounding street system. The future study will verify if the assumed buildout conditions impacts and improvements are still valid, prior to further development of the site. It is possible that adjustments to the proposed improvement requirements, modification of the assumed project and/or added environmental analyses may be required, if conditions have changed significantly from the assumptions contained in this study.

Both the interim and buildout scenarios were based upon the City's computer model, which was administered by the firm Robert Kahn, John Kain & Associates, Inc. (RKJK).

The proposed project consists of a mixed use development containing light industrial, research and development, manufacturing, warehouse, office, hotel, restaurant, and retail land uses with a total of 4,162,959 square feet (SF). Within the project site, there are five planning areas which contain not



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WPA TRAFFIC ENGINEERING, INC.

VICINITY MAP

FIGURE 1

only the proposed project, but also existing and entitled uses. Figure 2 presents the proposed site plan and the location of planning areas. Table 1 provides a breakdown of the proposed project by land use and square feet in each planning area.

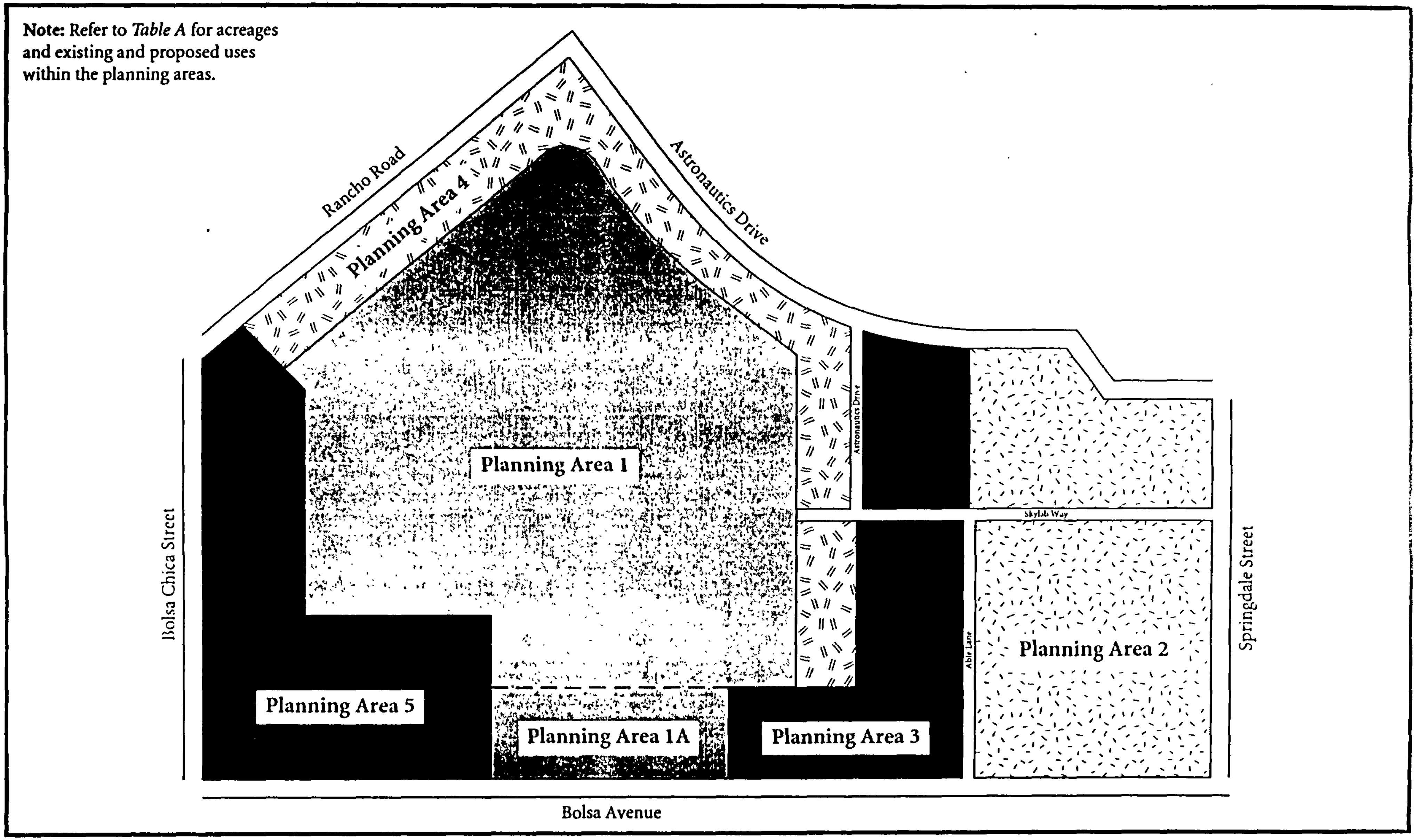
Project access is provided via Bolsa Avenue, Bolsa Chica Street, Rancho Road, and Springdale Street, while internal private road circulation is provided by Skylab Way, Able Lane, and Astronautics Drive.

EXISTING CONDITIONS

Bolsa Chica Road has a north-south alignment and is west of the project site. This roadway begins south of Warner Avenue and to the north becomes Valley View Street. In the vicinity of the project site, Bolsa Chica provides six through travel lanes separated by a raised or painted median. A 50 mile per hour limit is posted. Bolsa Chica Road is designated a Major Arterial on the County of Orange Master Plan of Arterial Highways (MPAH).

Springdale Street is also a north-south roadway. The southern terminus of Springdale is south of Slater Avenue, while to the north it becomes Holder Street in the City of Cypress. Four through lanes, separated by a painted median or a two-way left turn lane, are provided on Springdale in the vicinity of the project. The posted speed limit is 45 miles per hour. Springdale Street is designated a Primary Arterial on the County of Orange MPAH.

Bolsa Avenue is an east-west street, which begins at Bolsa Chica Road to the west and becomes First Street to the east. Bolsa Avenue provides six through lanes in the vicinity of the project, which are separated by a raised median. A 45 mile per hour speed limit was noted within the study area. Bolsa has not been improved to its ultimate roadway width along the proposed project site. Bolsa Avenue is designated a Major Arterial on the County of Orange MPAH.



Source: McDonnell Douglas Realty Company

Site Plan/Planning Areas
McDonnell Douglas Initial Study for EIR 96-1
City of Huntington Beach

FIGURE 2

TABLE 1

PROPOSED PROJECT DESCRIPTION
McDonnell Centre Business Park

PLANNING AREA		***PLANNING AREA***	
LAND USE	***SQUARE FEET***	***LAND USE***	***SQUARE FEET***
Planning Area 1		*Planning Area 3*	
Manufacturing	253,312 SF	Light Industrial	470,448 SF
Warehouse	76,472 SF	Warehouse	235,224 SF
Office/Office Park	148,164 SF	Office/Office Park	235,224 SF
SUBTOTAL:	477,948 SF	SUBTOTAL:	940,896 SF
Planning Area 1A		*Planning Area 4*	
Office/Office Park	261,360 SF	Light Industrial	457,380 SF
R & D	261,360 SF	Warehouse	228,690 SF
SUBTOTAL:	522,720 SF	Office/Office Park	228,690 SF
Planning Area 2		SUBTOTAL:	914,760 SF
Light Industrial	298,309 SF	*Planning Area 5*	
Warehouse	149,154 SF	Light Industrial	98,450 SF
Office/Office Park	149,154 SF	Office/Office Park	134,169 SF
Hotel	96,000 SF / 120 Rms	R & D	107,399 SF
Restaurant	4,000 SF	Hotel	120,000 SF / 150 Rms
SUBTOTAL:	696,617 SF	Retail	150,000 SF
		SUBTOTAL:	610,018 SF
		TOTAL	4,162,959 SF

Golden West Street, which runs in a north-south alignment, is a four-lane divided roadway north of the I-405 Freeway. South of the I-405 Freeway, Golden West Street is a six-lane facility. Golden West originates in the City of Huntington Beach at Pacific Coast Highway, travels through the City of Westminster to the Garden Grove Freeway where it becomes Knott Street. There is a posted speed limit ranging from 40 to 45 miles per hour. Golden West is designated a Primary Arterial on the County of Orange MPAH.

Edwards Street is a north-south roadway that runs between Garden Grove Boulevard to the north and Garfield Street to the south. This roadway provides four lanes of divided travel with a posted speed limit of 35-45 miles per hour. No on-street parking is permitted. Edwards Street is designated a Primary Arterial.

Westminster Boulevard is a four-lane roadway that runs in an east-west direction between Pacific Coast Highway to the west and Fairview Street to the east. There is a posted speed limit of 40 miles per hour within the vicinity of the proposed project. Westminster Boulevard is designated a Primary Arterial on the Orange County MPAH.

Valley View Street is a six-lane divided roadway with no on-street parking and a posted speed limit of 45 miles per hour. Valley View Street begins in Los Angeles County at Broadway and runs in a north-south direction to the I-405 Freeway, where it becomes Bolsa Chica Street. Valley View Street is designated a Major Arterial on the Orange County MPAH.

Garden Grove Boulevard, within the project vicinity of the project site, runs in an east-west direction with four lanes of undivided travel separated by a two-way left turn lane. In some segments, the travel lanes are reduced to three lanes of travel. There is a posted speed limit of 45 miles per hour and limited on-street parking. Garden Grove runs between Bolsa Chica Road in the City of Westminster to Bristol Street in the City of Santa Ana. Garden Grove Boulevard is designated a Primary Arterial on the Orange County MPAH.

Rancho Road-Hammon Avenue is a two-lane undivided roadway that serves residential uses, as well as the McDonnell Douglas site. There is a posted speed limit of 40 miles per hour. Rancho Road is designated a Secondary Arterial within the Huntington Beach General Plan EIR and within the Westminster General Plan.

McFadden Avenue is an east-west street which begins at Bolsa Chica Road to the west and terminates at Newport Avenue to the east. This roadway provides four lanes of divided travel with a posted speed limit of 45 miles per hour. No on-street parking is permitted. McFadden Avenue is designated a Primary Arterial.

Edinger Avenue begins at Sunset Way East which is located in the Sunset Aquatic Park area. It extends eastward through the Cities of Westminster, Fountain Valley, Santa Ana, Tustin and becomes Irvine Center Drive at Harvard Avenue in Irvine. It is designated as a four-lane primary arterial by the City of Huntington Beach Circulation Element. Edinger Avenue is currently configured as a two-lane facility between Sunset Aquatic Park and Bolsa Chica Street. It is a four-lane facility between Bolsa Chica Street and Edwards Street. It is a six-lane facility between Edwards Street and Beach Boulevard. It is a four-lane facility between Beach Boulevard and Newland Street. Edinger Avenue is designated a Primary Arterial on the Orange County MPAH.

Graham Street, which runs between Bolsa Avenue and Slater Avenue, is a north-south roadway that provides four lanes of undivided travel which are separated by a two-way left turn lane. There is a posted speed limit of 45 miles per hour with no on-street parking permitted. Graham Street is designated a Secondary Arterial on the Orange County MPAH.

Study Intersections & Existing Traffic Volumes

A total of 22 study intersections, in proximity to the proposed project, were selected to be analyzed within this study. The study intersections are located in the City of Huntington Beach, Westminster and one in Garden Grove. A list of the study intersections and jurisdictions can be found in Table 2.

TABLE 2

STUDY INTERSECTIONS & JURISDICTION
McDonnell Centre Business Park

	STUDY INTERSECTION	*JURISDICTION*
1.	Garden Grove Freeway (S.R. 22) & Valley View Street	City of Garden Grove
2.	Valley View Street-Bolsa Chica & Garden Grove Boulevard	City of Westminster
3.	Westminster Boulevard & Bolsa Chica Road	City of Westminster
4.	Westminster Boulevard & Rancho Road-Hammon Avenue	City of Westminster
5.	Westminster Boulevard & Springdale Street	City of Westminster
6.	Westminster Boulevard & I-405 NB On Ramp	City of Westminster
7.	Westminster Boulevard & I-405 NB Off Ramp	City of Westminster
8.	Westminster Boulevard & Edwards Street	City of Westminster
9.	Bolsa Chica Street & Rancho Road	Cities of Westminster & Huntington Beach
10.	Bolsa Chica Street & Bolsa Avenue	City of Huntington Beach
11.	Bolsa Chica Street & McFadden Avenue	City of Huntington Beach
12.	Bolsa Chica Street & Edinger Avenue	City of Huntington Beach
13.	Bolsa Avenue & Graham Street	City of Huntington Beach
14.	Bolsa Avenue & Springdale Street	City of Huntington Beach
15.	Bolsa Avenue & Edwards Street	Cities of Westminster & Huntington Beach
16.	Bolsa Avenue & Golden West Street	Cities of Westminster & Huntington Beach
17.	Golden West Street & I-1405 SB Off Ramp	City of Westminster
18.	McFadden Avenue & Graham Street	City of Huntington Beach
19.	McFadden Avenue & Springdale Street	City of Huntington Beach
20.	McFadden Avenue & Edwards Street	City of Huntington Beach
21.	Edinger Avenue & Graham Street	City of Huntington Beach
22.	Edinger Avenue & Springdale Street	City of Huntington Beach

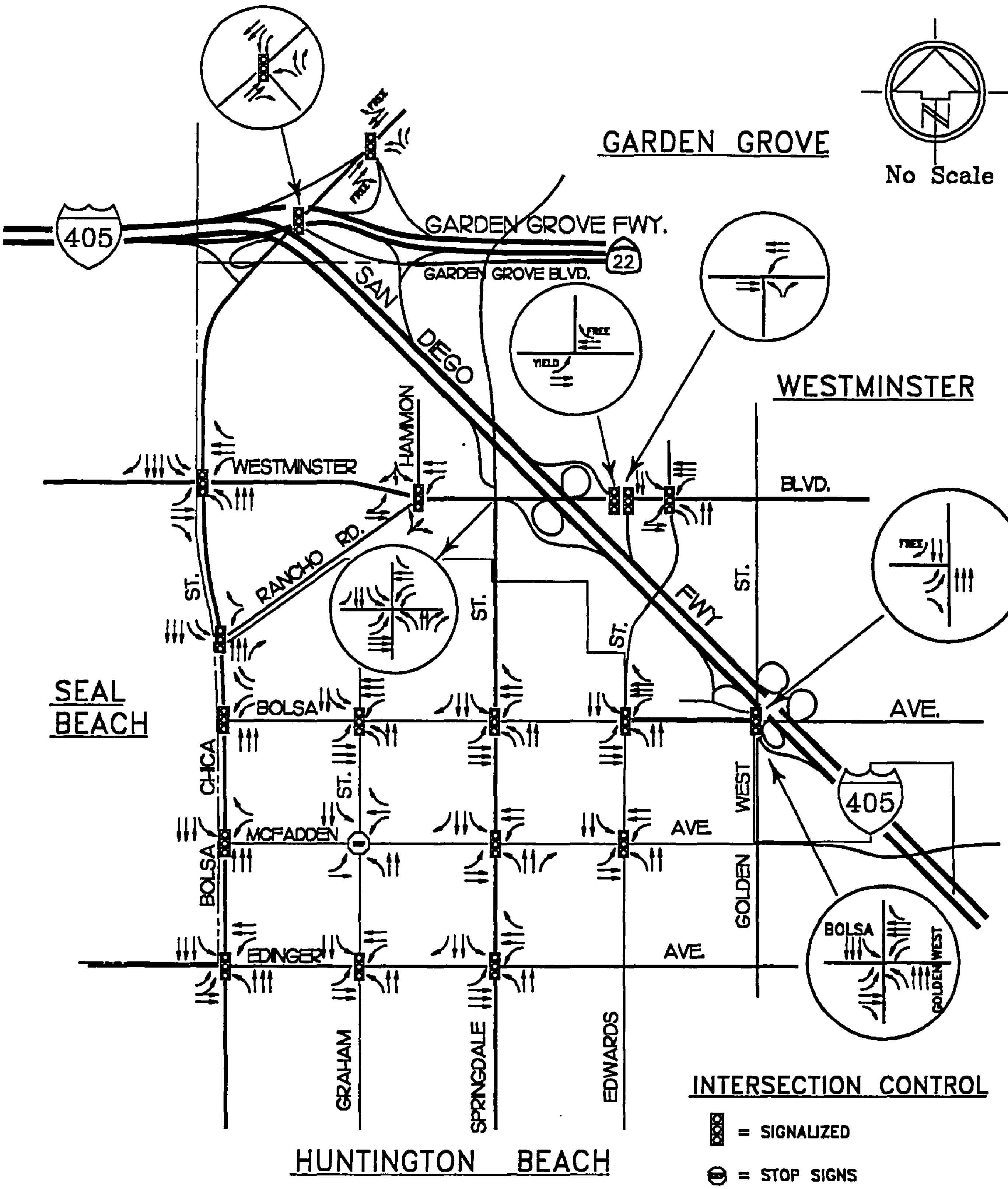
Existing AM and PM peak hour traffic counts were gathered at the 22 study intersections. The counts were provided to the City of Huntington Beach and RKJK for verification purposes. Field data were also collected regarding the existing lane geometrics and traffic controls. Figure 3 presents the existing lane geometrics and traffic control devices at each of the study intersections.

As shown in Figure 3, all of the study intersections are signalized, except for the intersection of Graham/McFadden which is a 4-Way STOP controlled intersection, and an uncontrolled intersection at Westminster/I-405 NB On Ramp. The existing AM and PM peak hour turning movements are shown on Figure 4.

Existing Level of Service

The intersection counts and field data for the signalized intersections were utilized in the Intersection Capacity Utilization (ICU) methodology of intersection analysis. An ICU value is calculated in this methodology based on a ratio of the critical peak hour volumes to available roadway capacity. These values are then related to Levels of Service (LOS), which are qualitative descriptions of intersection operations and range from LOS "A" (the best) to "F" (the worst). Appendix A contains a more detailed explanation of ICU, as well as the LOS definitions.

It is generally recognized that LOS A through D represent acceptable operations, while LOS E and F indicate over capacity operations. Within the Cities of Huntington Beach and Westminster, the acceptable Level of Service at an intersection is LOS "D". Although an acceptable LOS at a study intersection is A to D, the City of Huntington Beach indicates that if a study intersection has a LOS of D or worse, then the intersection must be reanalyzed utilizing the methodologies in the 1994 Highway Capacity Manual (94HCM). Within this methodology of intersection analysis, the operating conditions are also defined in terms of Level of Service (LOS), where "A" is considered the best and "F" is over capacity, but these calculations are based on vehicle delay. A further explanation of the relationship of delay to LOS is found in Appendix A.



INTERSECTION CONTROL

= SIGNALIZED

= STOP SIGNS

EXISTING GEOMETRICS

850403

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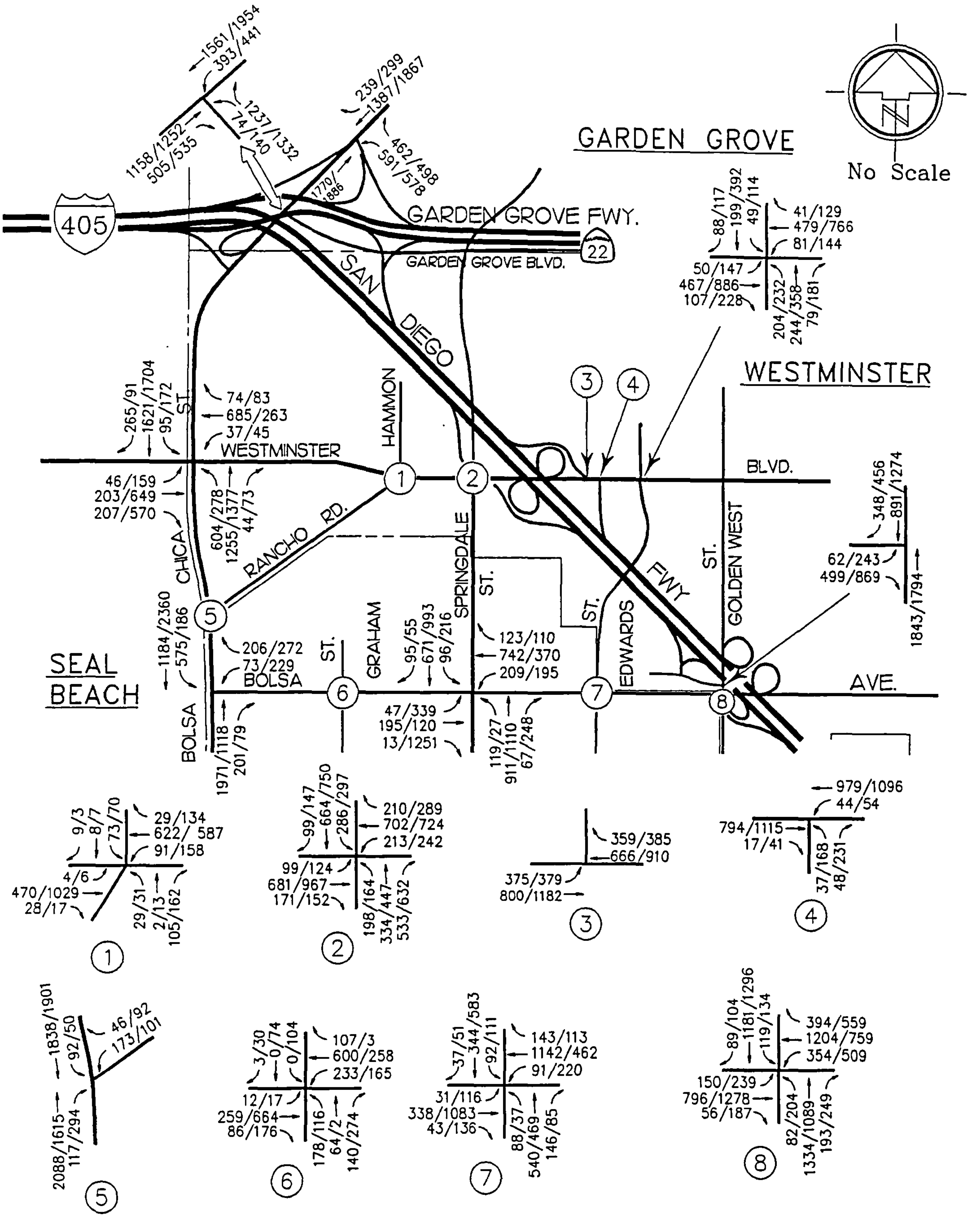
FIGURE 3



LEGEND:
31/116 =AM/PM PEAK HOUR

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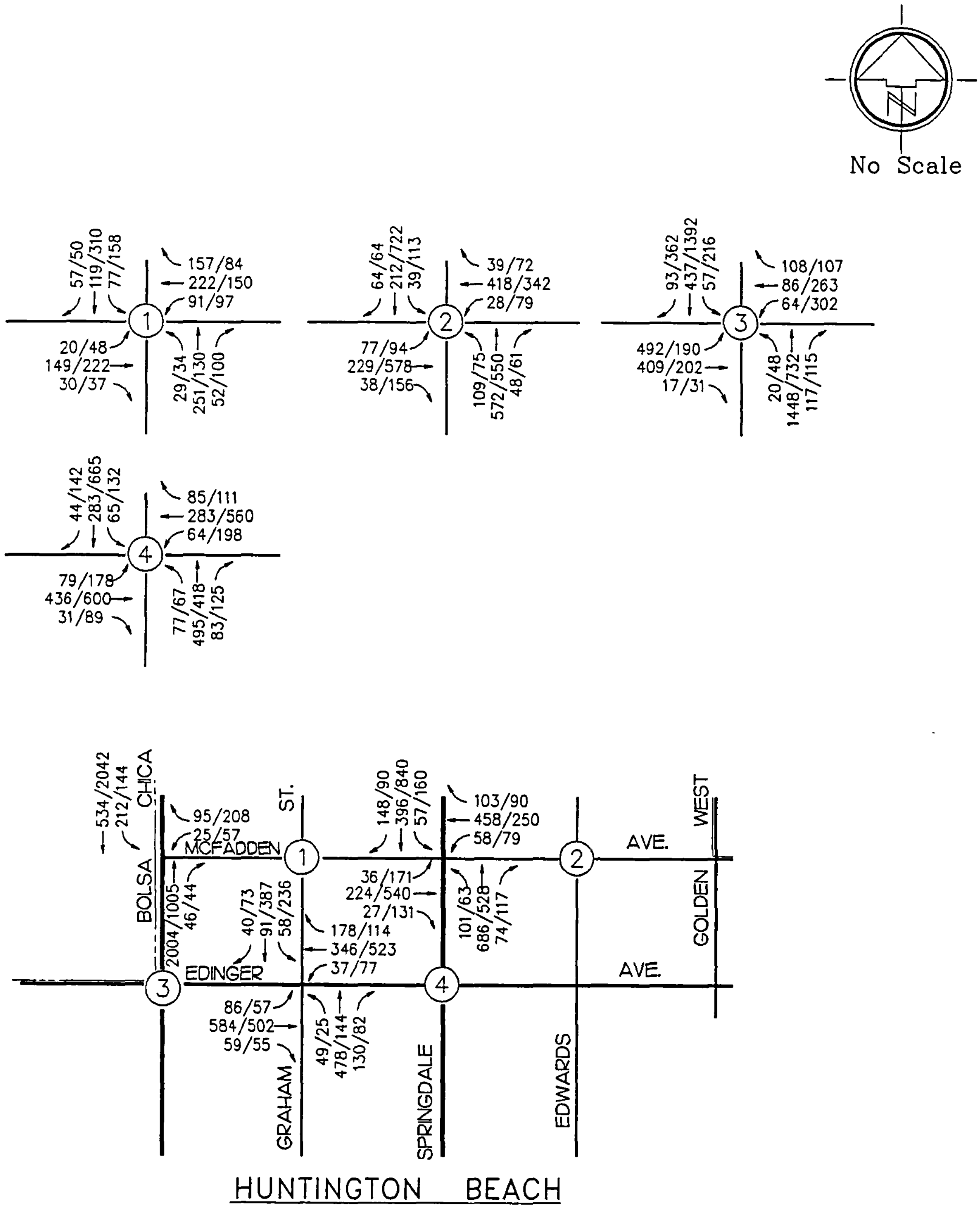
EXISTING AM AND PM PEAK HOUR TRAFFIC VOLUMES

FIGURE 4A



LEGEND:

31/116 =AM/PM PEAK HOUR

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EXISTING AM AND PM PEAK HOUR TRAFFIC VOLUMES

FIGURE 4B

Within the 94HCM methodology, there are input data assumptions that must be made. The City of Huntington Beach Engineering Department was contacted to obtain these parameters. Sample intersection analyses were completed utilizing the required input data and were sent to the City of Huntington Beach for review. The assumptions utilized in the intersection analyses were found to be acceptable to the City of Huntington Beach and were utilized in this report. Some of the assumptions made were a signal length of at least 120 seconds, a lost time of 3 seconds, and a yellow/red time of 5 seconds in the City of Huntington Beach and 4 seconds in the surrounding cities.

There was one study intersection, Graham/McFadden, which is currently controlled by a 4-Way STOP. This intersection was analyzed utilizing the 1995 Highway Capacity Software, which is based upon the 1994 Highway Capacity Manual (94HCM), for unsignalized intersections.

Table 3 lists the intersection analyses results under existing conditions. All of the study intersections have acceptable (LOS D or better) operations, except for the study intersections of Bolsa/Springdale, Bolsa/Golden West, Golden West/I-405 SB Off-Ramp, and Graham/McFadden during the PM peak hour. The ICU/HCM worksheets for all the study intersections can be referenced in Appendix B.

<u>Proposed Improvements - Intersection Analyses</u>

Proposed improvements listed within this study are based upon a "building block" theory to show the improvements associated with each analysis condition. For example, any proposed improvements required under existing conditions is assumed to be in place for the next analysis scenario, so the needed improvements for the next analysis scenario can be shown. In order to follow the stages of proposed improvements more efficiently, each set of proposed improvements for a study intersection under a particular condition was considered a "LEVEL". Any proposed improvements listed under existing conditions would be "Level 1" proposed improvements. These Level 1 proposed improvements, geometrics, would be utilized as the "base geometrics" for the next scenario of analysis, which in this case would be interim conditions without the project. If there are proposed improvements required at this stage of analysis, they are referred to as "Level 2" proposed

TABLE 3

INTERSECTION ANALYSES SUMMARY - EXISTING CONDITIONS
McDonnell Centre Business Park

INTERSECTION	*INTERSECTION CAPACITY UTILIZATION/ LEVEL OF SERVICE*			
	EXISTING CONDITIONS		*EXISTING CONDITIONS WITH IMPROVEMENTS (LEVEL 1)*	
	AM PK HR	*PM PK HR*	*AM PK HR*	*PM PK HR*
Garden Grove Fwy (S.R. 22) & Valley View St. (HCM Analyses)[1]	0.67/B (16.2/C)	0.81/D (22.3/C)	-	-
Valley View St. & Garden Grove Blvd. (HCM Analyses)[1]	0.75/C (24.5/C)	0.81/D (27.4/D)	-	-
Westminster Blvd. & Bolsa Chica Rd.	0.78/C	0.77/C	-	-
Westminster Blvd. & Rancho Rd. - Hammon Ave.	0.33/A	0.57/A	-	-
Westminster Blvd. & Springdale St.	0.55/A	0.64/B	-	-
Westminster Blvd. & I-405 NB On Ramp	0.47/A[2]	0.54/A[2]	(2)	(2)
Westminster Blvd. & I-405 NB Off Ramp	0.37/A	0.55/A	-	-
Westminster Blvd. & Edwards St.	0.41/A	0.69/B	-	-
Bolsa Chica St. & Rancho Rd.	0.59/A	0.48/A	-	-
Bolsa Chica St. & Bolsa Ave.	0.71/C	0.59/A	-	-
Bolsa Chica St. & Mc Fadden Ave.	0.63/B	0.57/A	-	-
Bolsa Chica St. & Edinger Ave.	0.61/B	0.68/B	-	-
Bolsa Ave. & Graham St.	0.33/A	0.43/A	-	-
Bolsa Ave. & Springdale St. (HCM Analyses)[1]	0.65/B (27.9/D)	0.95/E (*/F)	0.63/B (25.5/D)	0.88/D (38.1/D)
Bolsa Ave. & Edwards St.	0.54/A	0.65/B	-	-
Bolsa Ave. & Golden West St. (HCM Analyses)[1]	0.75/C (33.2/D)	0.92/E (*/F)	0.66/B (28.2/D)	0.78/C (33.2/D)
Golden West St. & I-405 SB Off Ramp (HCM Analyses)[1]	0.70/B (18.0/C)	0.93/E (*/F)	0.56/A (17.1/C)	0.68/B (18.4/C)

TABLE 3 (Cont.)

INTERSECTION ANALYSES SUMMARY - EXISTING CONDITIONS
McDonnell Centre Business Park

INTERSECTION	*INTERSECTION CAPACITY UTILIZATION/ LEVEL OF SERVICE*			
	EXISTING CONDITIONS		*EXISTING CONDITIONS WITH IMPROVEMENTS (LEVEL 1)*	
	AM PK HR	*PM PK HR*	*AM PK HR*	*PM PK HR*
McFadden Ave. & Graham St.	A-6.4	F-*	0.35/A	0.42/A
McFadden Ave. & Springdale St.	0.47/A	0.59/A	-	-
McFadden Ave. & Edwards St.	0.43/A	0.59/A	-	-
Edinger Ave. & Graham St.	0.47/A	0.48/A	-	-
Edinger Ave. & Springdale St.	0.39/A	0.55/A	-	-

(1) 94HCM analyses based upon delay. (Delay/LOS)

* Over the Limit

(2) Due to an examination of the volumes, signal warrants were examined at this location. The volume to capacity is shown to be acceptable, but a traffic signal was also found to be warranted.

improvements, and so on. Figure 5 shows the geometric proposed improvements at each of the study intersections, where proposed improvements were required.

Table 4 identifies the proposed improvements required under Existing Conditions - Level 1. As shown in Table 4, improvements were identified at five locations and are listed below.

❒ *Westminster/I-405 NB On Ramp* -	Signalize intersection with separate eastbound left turn phase
❒ *Bolsa Avenue/Springdale Street* -	Add a northbound right turn lane Add a third northbound through lane
❒ *Bolsa Avenue/Golden West Street* -	Add a northbound right turn lane Add a third eastbound through lane
❒ *Golden West Street/I-405 SB Off Ramp* -	Restripe the west leg to a separate eastbound left turn lane and dual eastbound right turn lanes
❒ *McFadden Avenue/Graham Street* -	Signalize intersection

With these improvements, the study intersections would operate at acceptable Levels of Service during both the AM and PM peak hours.

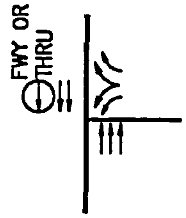
It should be remembered that if the ICU methodology indicated a LOS D or worse, the HCM methodology was then utilized to determine the final Level of Service. The proposed improvements shown on Table 4 were based upon obtaining an acceptable Level of Service D under the HCM methodology as indicated by City Staff, except where signalization mitigates conditions back to LOS A - C.

Signal Warrants

The intersection of McFadden Avenue and Graham Street is currently unsignalized and operating at an unacceptable LOS F during the PM peak hour. This study intersection was checked to ascertain if it satisfied the Caltrans traffic signal warrant. Warrants for the installation of traffic signals have been developed by the Federal Highway Administration and Caltrans. These warrants are based upon various factors including volumes and time periods.

VALLEY VIEW/S.R. 22 FWY.

BUILDOUT WITHOUT PROJECT
(LEVEL 4)

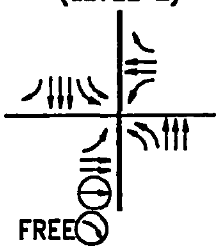


VALLEY VIEW/GARDEN GROVE

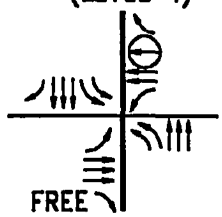
BUILDOUT WITHOUT PROJECT
(LEVEL 4)

WESTMINSTER/BOLSA CHICA

INTERIM WITHOUT PROJECT
(LEVEL 2)

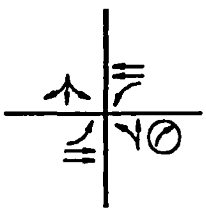


BUILDOUT WITHOUT PROJECT
(LEVEL 4)

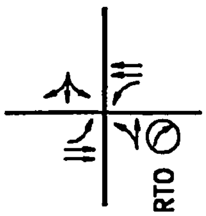


WESTMINSTER/RANCHO

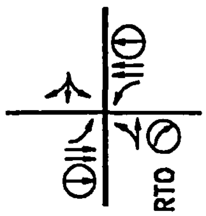
INTERIM WITHOUT PROJECT
(LEVEL 2)



INTERIM WITH PROJECT
(LEVEL 3)



BUILDOUT WITH PROJECT
(LEVEL 5)



LEGEND

= PROPOSED IMPROVEMENTS
= LANE TAKEN OUT

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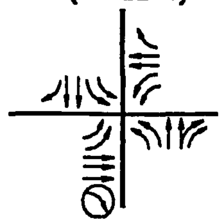
GEOMETRIC PROPOSED IMPROVEMENTS

FIGURE 5A

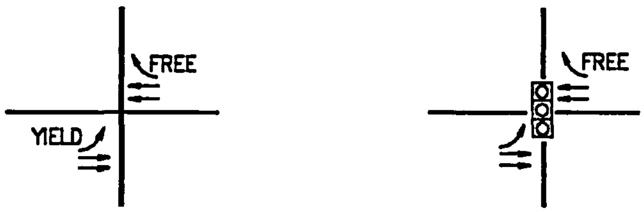
WESTMINSTER/SPRINGDALE

BUILDOUT WITHOUT PROJECT
(LEVEL 4)



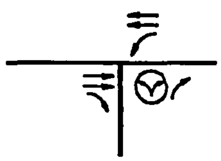
WESTMINSTER/I-405 N.B. ON RAMP

EXISTING
(LEVEL 1)



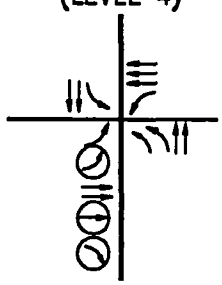
WESTMINSTER/I-405 N.B. OFF RAMP

BUILDOUT WITHOUT PROJECT
(LEVEL 4)



WESTMINSTER/EDWARDS

BUILDOUT WITHOUT PROJECT
(LEVEL 4)



LEGEND

Ø = PROPOSED IMPROVEMENTS

↖ = LANE TAKEN OUT

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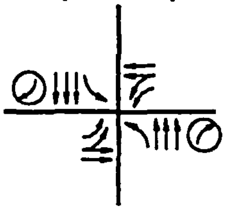
GEOMETRIC PROPOSED IMPROVEMENTS

FIGURE 5B

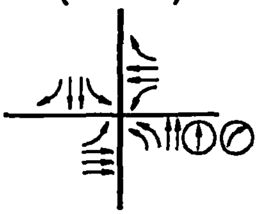
BOLSA CHICA/EDINGER

BUILDOUT WITHOUT PROJECT
(LEVEL 4)

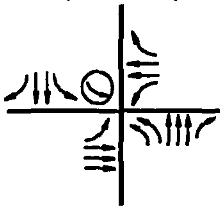


BOLSA/SPRINGDALE

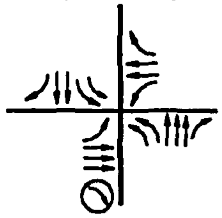
EXISTING
(LEVEL 1)



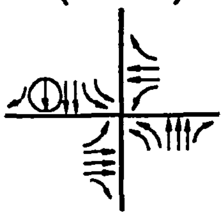
INTERIM WITHOUT PROJECT
(LEVEL 2)



INTERIM WITH PROJECT
(LEVEL 3)

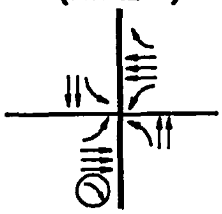


BUILDOUT WITH PROJECT
(LEVEL 5)



BOLSA/EDWARDS

BUILDOUT WITHOUT PROJECT
(LEVEL 4)



LEGEND

= PROPOSED IMPROVEMENTS

= LANE TAKEN OUT

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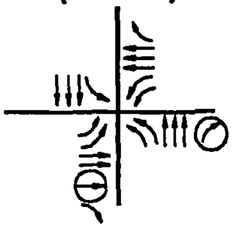
GEOMETRIC PROPOSED IMPROVEMENTS

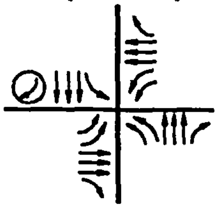
FIGURE 5C

BOLSA/GOLDEN WEST

EXISTING
(LEVEL 1)

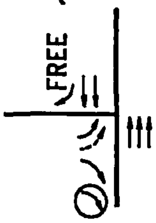


INTERIM WITHOUT PROJECT
(LEVEL 2)

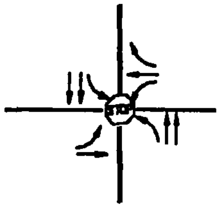


GOLDEN WEST/I-405 S.B. OFF RAMP

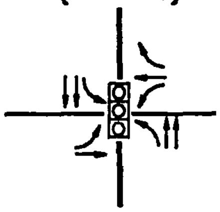
EXISTING
(LEVEL 1)



McFADDEN/GRAHAM

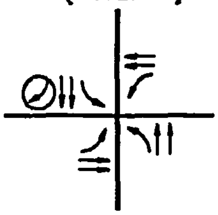


EXISTING
(LEVEL 1)



EDWARDS/McFADDEN

BUILDOUT WITHOUT PROJECT
(LEVEL 4)



LEGEND

Ø = PROPOSED IMPROVEMENTS

↘ = LANE TAKEN OUT

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GEOMETRIC PROPOSED IMPROVEMENTS

FIGURE 5D

TABLE 4
PROPOSED IMPROVEMENTS (BASED ON HCM)
McDonnell Centre Business Park

INTERSECTION	*PROPOSED IMPROVEMENTS*				
	LEVEL 1 ***(Existing)***	***LEVEL 2 - YEAR 2000*** ***(Interim Without Project)***	***LEVEL 3 - YEAR 2000*** ***(Interim With Project)***	***LEVEL 4 - YEAR 2015*** ***(Buildout Without Project)***	***LEVEL 5 - YEAR 2015*** ***(Buildout With Project)***
Valley View & S.R. 22 Freeway[a] (Garden Grove)				❒ Convert SB Freeway Only Lane to through/right option	
Valley View & Garden Grove[b] (Westminster)				❒ Add a third NB through lane ❒ Add a third SB through lane	
Westminster & Bolsa Chica[c] (Westminster)		❒ Construct an EB FREE right turn lane ❒ Add a third EB through lane		❒ Add a third WB through lane	
Westminster & Rancho[d] (Westminster)	(*Add a WB left turn lane[d]) Indicated by City of Westminster but not included in formal analyses	❒ Add a NB right turn lane	❒ Add a NB right turn overlap phase and restrict WB U-turns		❒ Add a third EB through lane ❒ Add a third WB through lane
Westminster & Springdale[e] (Westminster)				❒ Add an EB right turn lane	
Westminster & I-405 NB On Ramp[f] (Westminster)	❒ Signalize Intersection with separate EB left turn phase				
Westminster & I-405 NB Off Ramp[g] (Westminster)				❒ Convert NB left turn lane to a left/right combination lane	
Westminster & Edwards[h] (Westminster)				❒ Add a second EB left turn lane ❒ Add an EB right turn lane ❒ Add a third EB through lane	
Bolsa Chica & Edinger[i] (Huntington Beach)				❒ Add a NB right turn lane ❒ Add a SB right turn lane ❒ Restripe WB through to a left/through combo lane	

TABLE 4 (Cont.)
PROPOSED IMPROVEMENTS (BASED ON HCM)
McDonnell Centre Business Park

INTERSECTION	*PROPOSED IMPROVEMENTS*				
	LEVEL 1 ***(Existing)***	***LEVEL 2 - YEAR 2000*** ***(Interim Without Project)***	***LEVEL 3 - YEAR 2000*** ***(Interim With Project)***	***LEVEL 4 - YEAR 2015*** ***(Buildout Without Project)***	***LEVEL 5 - YEAR 2015*** ***(Buildout With Project)***
Bolsa & Springdale[j] (Huntington Beach)	❒ Add a NB right turn lane ❒ Add a third NB through lane	❒ Add a second SB left turn lane	❒ Add an EB right turn lane		❒ Add a third SB through lane and take out SB right turn lane
Bolsa & Edwards[k] (Huntington Beach & Westminster)				❒ Add an EB right turn lane	
Bolsa & Golden West[l] (Huntington Beach & Westminster)	❒ Add a NB right turn lane ❒ Add a third EB through lane	❒ Add a southbound right turn lane[k]			
Golden West & I-405 SB Off Ramp[m] (Westminster)	❒ Restripe West Leg to: - one EB left turn lane - dual EB right turn lanes				
McFadden & Graham[n] (Huntington Beach)	❒ Signalize Intersection				
Edwards & McFadden[o] (Huntington Beach)				❒ Add a SB right tun lane	

(a) These Level 4 Buildout improvements are consistent with the Westminster General Plan improvements identified for the intersection immediately south (Bolsa Chica/Garden Grove Boulevard)
(b) These Buildout improvements are identified in the Westminster General Plan and Citywide Fee study.
(c) The Level 2 improvements are a part of the Westminster General Plan (G.P.) and Citywide Fee program. The Level 4 improvements would require changes to the Westminster long range plans for this location The City of Westminster h indicated a preference for added EB and WB left turn lanes. These improvements will be considered as the intersection is improved.
(d) The added westbound left turn lane was identified by the City of Westminster as an existing operational need which would require median and signal modification, but is not "needed" in the intersection analyses so is not included in the analyses sheets. The added westbound left also requires widening/improvement to the west side of Rancho Road. The northbound right turn overlap phase requires striping and signal modification. The added eastbound and westbound through lanes involves restriping.
(e) The added eastbound right turn lane requires widening and acquisition of right-of-way on the west leg, south side of Westminster.
(f) This intersection is addressed in the Westminster Citywide Fee. If a traffic signal is implemented at this location it should be coordinated with the adjacent signals on Westminster Blvd.
(g) This intersection is addressed in the Westminster Citywide Fee. The improvements are expected to involve restriping for Buildout conditions.
(h) This intersection was not addressed in the Westminster General Plan. These Buildout improvements may involve some intersection widening.
(i) The added right turn improvements are expected to require some intersection widening to implement.
(j) The Level 1 and Level 2 improvements were identified in the Sharp Electronics traffic study. The Level 3 and Level 5 improvements were not previously identified The Huntington Beach General Plan indicates Springdale Street to be upgraded to a six-lane facility.
(k) This improvement is expected to require some intersection widening to implement.
(l) The Level 1 improvements were identified in the Mitigated Negative Declaration for the Westminster Mall Expansion and proposed payment of a "fair share" was identified
(m) Should be a relatively minor improvement which involves restriping of an existing lane.
(n) This intersection meets traffic signal warrants for existing conditions. Signalization is shown to improve the PM peak hour from over capacity to acceptable operations.
(o) This improvement is expected to require some intersection widening to implement.

The Caltrans Peak Hour Volume Warrant (Warrant 11) was applied to the intersection of McFadden/Graham. Based upon the guidelines for determining the applicable warrant, Figure 9-9 (Rural Areas) was utilized in the analysis as indicated in the Traffic Manual[1] for streets with speed limits over 40 MPH. Appendix C contains Figure 9-9 and the warrant for the unsignalized intersection of McFadden Avenue/Graham Street. As shown in Appendix C, the study intersection of McFadden Avenue/Graham Street currently satisfies the requirements for installation of a traffic signal under existing conditions.

The study intersection of Westminster and the I-405 NB On Ramp is currently not controlled. The eastbound left turn movement has an "presumed" yield control. Based upon the high eastbound left turn volumes, this intersection was examined to determine if a signal is warranted. Due to the fact that there are no minor street volumes some other means of evaluation is required. The eastbound left turn movement is a conflicting movement with opposing through traffic and can be compared to operations of a T-intersection. The eastbound left turn volumes may be considered as the minor street volumes in order to evaluate signalization needs. This methodology has been an accepted practice within the traffic engineering profession.

Based upon the guidelines for determining the applicable warrant, Figure 9-8 (Urban Areas) was utilized in the analysis as indicated in the Traffic Manual[2] for streets with speed limits under 40 MPH. Appendix C contains Figure 9-8 and the warrant for the unsignalized intersection of Westminster/I-405 NB On Ramp. As shown in Appendix C, the study intersection of Westminster/I-405 NB On Ramp currently satisfies the requirements for installation of a traffic signal under existing conditions.

1 Traffic Manual; California Department of Transportation (Caltrans); Chapter 9 "Traffic Signals and Lighting", Warrant 11; May 1992.

2 Traffic Manual; Ibid.

Left-Turn Phase Warrant

The intersection of Westminster/I-405 On Ramp was also checked to ascertain whether it met with the guidelines to consider a protected left turn phase for the eastbound direction on Westminster. The guidelines can be referenced in the Traffic Manual[3] and state that 50 or more left turning vehicles (per hour in one direction) are required, in combination with the product of the left turn movement and conflicting through traffic (during the peak hour) which exceeds 100,000 or more; would warrant protected left turn phasing. Based upon these guidelines, the eastbound left turn movement on Westminster at I-405 NB On Ramp warrants left turn phasing if the intersection is signalized.

Existing Road Segment Analysis

The average daily traffic (ADT) volumes for the surrounding street system were referenced through current traffic counts compiled by WPA, the City of Westminster General Plan, and the City of Huntington Beach Traffic Flow Map (dated July, 1994). Where 24 hour traffic count data was unavailable, ADT volumes were estimated by multiplying the total PM peak hour traffic volume for the subject link by a factor of 11.5, obtained through information provided by RKJK. In addition, at several locations in close proximity to the project 24-hour traffic counts were conducted by WPA to update and verify these base data. The existing ADT volumes utilized in this study are shown on Figure 6.

Road segment analyses were performed utilizing these ADT volumes. Roadway traffic operations are evaluated by the ratio of existing daily traffic volumes to the daily roadway capacity. The capacity guidelines for road segment volumes were referenced from both the City of Huntington Beach General Plan Update, dated October 24, 1994 and the City of Westminster General Plan. The capacity guidelines for each city can be found in Appendix D. The City of Huntington Beach acceptable Level of Service value for arterial links is LOS C and LOS D for the City of Westminster.

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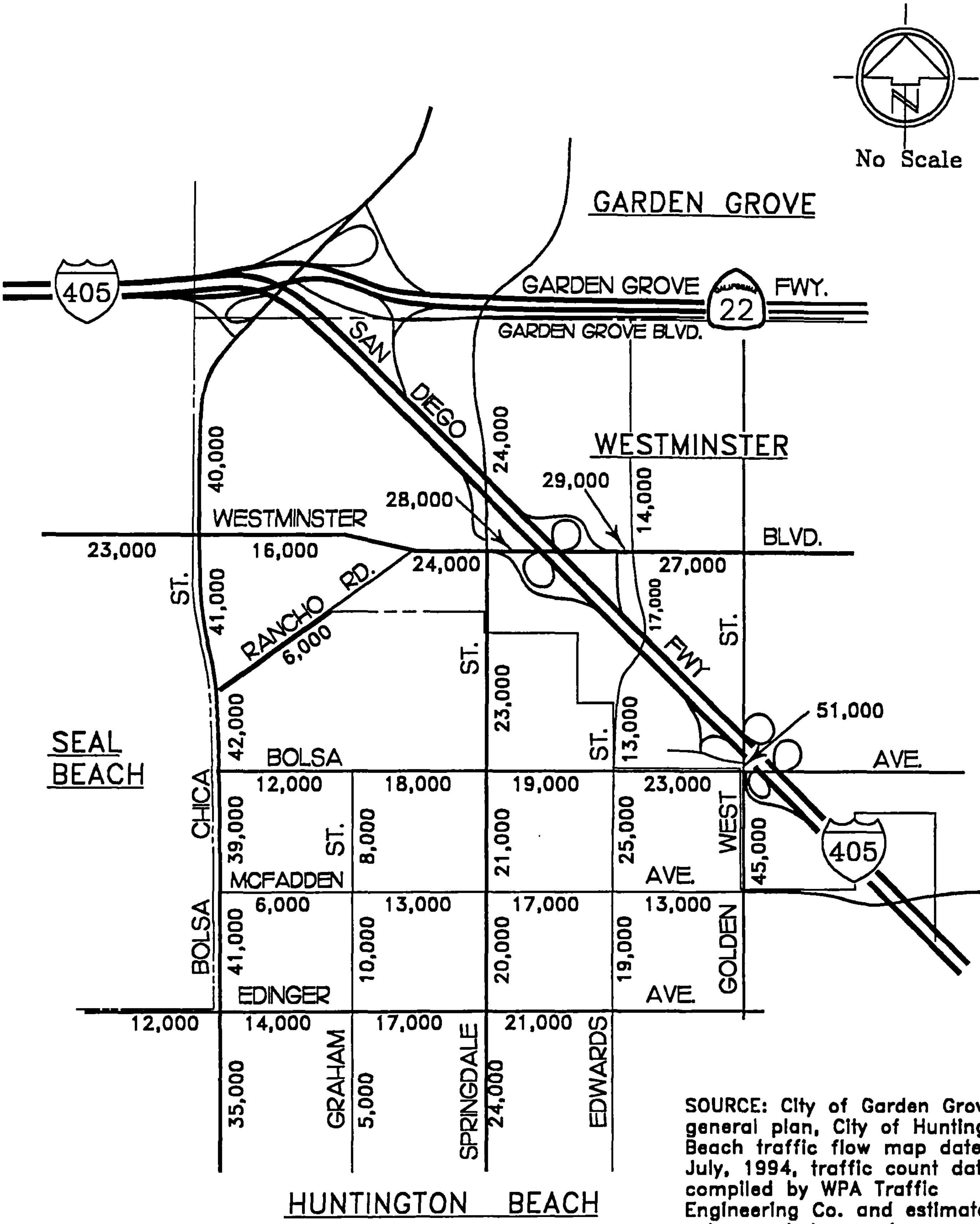
3 Traffic Manual; California Department of Transportation (Caltrans); Chapter 9, "Traffic Signals and Lighting", 9-01.3; May, 1992.



SOURCE: City of Garden Grove general plan, City of Huntington Beach traffic flow map dated July, 1994, traffic count data compiled by WPA Traffic Engineering Co. and estimates using peak hour volumes.

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EXISTING DAILY VOLUMES

FIGURE 6

Table 5 shows a comparison of the existing daily traffic volumes (ADT) to the estimated roadway capacity. As shown in Table 5, all of the study road segments are currently operating at an acceptable Level of Service.

Although the street segment analysis is an accepted indicator of the roadway operation, there are many inherent assumptions which can cause significant variations in the results. The more detailed indicator of roadway operations are the intersection analyses which were previously addressed. If the major intersections are operating at acceptable levels, then generally the roadway segments would also be operating at an acceptable level. This hierarchy of analyses (intersection versus street segments) should be kept in mind when reviewing the findings of this report and evaluating relative project impacts and actual improvement needs.

PROJECT CONDITIONS

The proposed project was analyzed for both short term and long range time frames. As described earlier, the short term evaluation consists of evaluating the project impacts assuming 60 percent of the project developed for the interim condition. This level of project development was combined with model information for the interim baseline condition. The long range study is also based upon traffic model data providing a baseline condition at Buildout (Year 2015), then the project was added to the base model data and reanalyzed for future conditions.

Trip Generation

Due to the size of the project and recommendation from City of Huntington Beach staff, Santa Ana River Area (SARA) model was utilized. The City of Huntington Beach has trip generation rates that are specifically designed to coincide with the model. These rates were provided by the City and utilized in this study. In addition, trip generation rates for uses not found in the SARA Trip Generation Rates were referenced from Trip Generation[4] and provided to staff for their review.

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[4] Trip Generation, Fifth Edition; Institute of Transportation Engineers (ITE); January, 1991.

TABLE 5

COMPARISON OF AVERAGE DAILY TRAFFIC VOLUMES TO ESTIMATED ROADWAY CAPACITY

McDonnell Centre Business Park

ROADWAY SEGMENT	EXISTING				INTERIM WITHOUT PROJECT				INTERIM WITH PROJECT				BUILDOUT WITHOUT PROJECT				BUILDOUT WITH PROJECT			
	LANES/ CAPACITY (LOS E)	ADT	V/C RATIO	LOS	LANES/ CAPACITY (LOS E)	ADT	V/C RATIO	LOS	LANES/ CAPACITY (LOS E)	ADT	V/C RATIO	LOS	LANES/ CAPACITY (LOS E)	ADT	V/C RATIO	LOS	LANES/ CAPACITY (LOS E)	ADT	V/C RATIO	LOS
BOLSA CHICA STREET:																				
*Garden Grove toWestminster**	6D / 61,930	40,000	0.65	B	6D / 61,930	49,000	0.79	C	6D / 61,930	51,400	0.83	D	6D / 61,930	50,000	0 81	D	6D / 61,930	55,000	0 89	D
*Westminster to Rancho**	6D / 61,930	41,000	0.66	B	6D / 61,930	47,000	0.76	C	6D / 61,930	51,200	0 83	D	6D / 61,930	57,000	0.92	E	8D / 82,500	64,000	0.78	C
(Proposed Improvements)													(8D/82,500)	-	(0 69)	(B)				
Rancho to Bolsa	6D / 56,300	42,000	0.75	C	6D / 56,300	49,000	0.87	D	8D / 75,100	54,400	0.72	C	8D / 75,100	61,000	0.81	D**	8D / 75,100	70,000	0.97	E**
(Proposed Improvements)					(8D/75,100)	-	(0.65)	(B)												
Bolsa to McFadden	6D / 56,300	39,000	0.69	B	6D / 56,300	44,000	0.78	C	6D / 56,300	45,200	0 80	C	6D / 56,300	52,000	0.92	E	8D / 75,100	54,000	0 76	C
(Proposed Improvements)													(8D/75,100)	-	(0 69)	(B)				
McFadden to Edinger	6D / 56,300	41,000	0.73	C	6D / 56,300	45,000	0.80	C	6D / 56,300	46,200	0.82	D	8D / 75,100	51,000	0 68	B	8D / 75,100	53,000	0.74	C
(Proposed Improvements)									(8D/75,100)	-	(0 62)	(B)								
Edinger to Heil	6D / 56,300	35,000	0.62	B	6D / 56,300	39,000	0 69	B	6D / 56,300	39,600	0.70	B	6D / 56,300	45,000	0 80	C	6D / 56,300	46,000	0.82	D
(Proposed Improvements)																	(8D/71,500)	-	(0 64)	(B)
GRAHAM STREET:																				
Bolsa to McFadden	4U / 25,500	8,000	0.31	A	4U / 25,500	8,000	0.31	A	4U / 25,500	9,200	0.36	A	4U / 25,500	9,000	0.35	A	4U / 25,500	11,000	0 43	A
McFadden to Edinger	4U / 25,500	10,000	0.39	A	4U / 25,500	11,000	0 43	A	4U / 25,500	11,000	0 43	A	4U / 25,500	13,000	0.51	A	4U / 25,500	13,000	0 51	A
Edinger to Heil	4U / 25,500	5,000	0.20	A	4U / 25,500	5,000	0.20	A	4U / 25,500	5,600	0.22	A	4U / 25,500	6,000	0.24	A	4U / 25,500	7,000	0.27	A
SPRINGDALE STREET:																				
I-405 Fwy. to Westminster	4D / 37,500	24,000	0.64	B	4D / 37,500	25,000	0 67	B	4D / 37,500	25,000	0 67	B	4D / 37,500	26,000	0 69	B	4D / 37,500	26,000	0 69	B
Westminster to Bolsa	4D / 37,500	23,000	0 61	B	4D / 37,500	24,000	0.64	B	4D / 37,500	25,200	0.67	B	4D / 37,500	25,000	0 67	B	4D / 37,500	27,000	0 72	C
Bolsa to McFadden	4D / 37,500	21,000	0.56	A	4D / 37,500	22,000	0.59	A	4D / 37,500	22,000	0.59	A	4D / 37,500	23,000	0 61	B	4D / 37,500	23,000	0 61	B
McFadden to Edinger	4D / 37,500	20,000	0.53	A	4D / 37,500	21,000	0 56	A	4D / 37,500	21,000	0.56	A	4D / 37,500	22,000	0.59	A	4D / 37,500	22,000	0 59	A
Edinger to Heil	4D / 37,500	24,000	0.64	B	4D / 37,500	25,000	0.67	B	4D / 37,500	25,000	0 67	B	4D / 37,500	26,000	0 69	B	4D / 37,500	26,000	0 69	B
EDWARDS STREET:																				
Westminster to I-405 Fwy.	4D / 37,500	17,000	0.45	A	4D / 37,500	20,000	0 53	A	4D / 37,500	19,400	0 52	A	4D / 37,500	24,000	0.64	B	4D / 37,500	23,000	0 61	B
I-405 Fwy. to Bolsa	4D / 37,500	13,000	0.35	A	4D / 37,500	15,000	0.40	A	4D / 37,500	14,400	0 38	A	4D / 37,500	19,000	0.51	A	4D / 37,500	18,000	0.48	A
Bolsa to McFadden	4D / 37,500	25,000	0.67	B	4D / 37,500	29,000	0.77	C	4D / 37,500	29,000	0.77	C	4D / 37,500	36,000	0.96	E	6D / 56,300	36,000	0 64	B
(Proposed Improvements)													(6D/56,300)	-	(0 64)	(B)				
McFadden to Edinger	4D / 37,500	19,000	0.51	A	4D / 37,500	22,000	0.59	A	4D / 37,500	22,000	0.59	A	4D / 37,500	27,000	0 72	C	4D / 37,500	27,000	0.72	C
GOLDEN WEST STREET:																				
*I-405 Fwy. to Bolsa**	6D / 61,930	51,000	0.82	D	6D / 61,930	53,000	0 86	D	6D / 61,930	53,000	0 86	D	6D / 61,930	56,000	0 90	D	6D / 61,930	56,000	0 90	D
Bolsa to McFadden	6D / 56,300	45,000	0.80	C	6D / 56,300	48,000	0.85	D	8D / 75,100	49,200	0.66	B	8D / 75,100	52,000	0.69	B	8D / 75,100	54,000	0 72	C
(Proposed Improvements)					(8D/75,100)	-	(0 64)	(B)												

TABLE 5 (Cont.)
COMPARISON OF AVERAGE DAILY TRAFFIC VOLUMES TO ESTIMATED ROADWAY CAPACITY
McDonnell Centre Business Park

ROADWAY SEGMENT	*EXISTING*				*INTERIM WITHOUT PROJECT*				*INTERIM WITH PROJECT*				*BUILDOUT WITHOUT PROJECT*				*BUILDOUT WITH PROJECT*			
	LANES/ CAPACITY (LOS E)	*ADT*	*V/C RATIO*	*LOS*	*LANES/ CAPACITY (LOS E)*	*ADT*	*V/C RATIO*	*LOS*	*LANES/ CAPACITY (LOS E)*	*ADT*	*V/C RATIO*	*LOS*	*LANES/ CAPACITY (LOS E)*	*ADT*	*V/C RATIO*	*LOS*	*LANES/ CAPACITY (LOS E)*	*ADT*	*V/C RATIO*	*LOS*
WESTMINSTER BLVD.:																				
*Bolsa Chica to Rancho**	4D / 41,250	16,000	0.39	A	4D / 41,250	21,000	0.51	A	4D / 41,250	20,400	0 49	A	4D / 41,250	30,000	0.73	C	4D / 41,250	29,000	0.70	B
*Rancho to Springdale**	4D / 41,250	24,000	0.58	A	4D / 41,250	31,000	0.75	C	4D / 41,250	32,200	0.78	C	**4D / 41,250**	**42,000**	**1.02**	**F**	6D / 61,930	44,000	0 71	C
(Proposed Improvements)													(6D/61,930)	-	(0.68)	(B)				
*Springdale to I-405 Fwy.**	4D / 41,250	28,000	0.68	B	**4D / 41,250**	**40,000**	**0.96**	**E**	6D / 61,930	41,800	0 67	B	6D / 61,930	46,000	0.74	C	6D / 61,930	49,000	0.79	C
(Proposed Improvements)					(6D/61,930)	-	(0.65)	(B)												
*I-405 Fwy to Edwards**	4D / 41,250	29,000	0.70	B	4D / 41,250	33,000	0.80	C	4D / 41,250	34,800	0.84	D	**4D / 41,250**	**40,000**	**0.97**	**E**	6D / 61,930	43,000	0 69	B
(Proposed Improvements)													(6D/61,930)	-	(0 65)	(B)				
*Edwards to Golden West**	4D / 41,250	27,000	0.65	B	4D / 41,250	29,000	0.70	B	4D / 41,250	30,200	0.73	C	4D / 41,250	33,000	0 80	C	4D / 41,250	34,000	0 82	D
RANCHO RD.:																				
Bolsa Chica to Westminster	2U / 12,500	6,000	0.48	A	2U / 12,500	8,000	0 64	B	**2U / 12,500**	**11,000**	**0.88**	**D**	4U / 25,500	11,000	0.43	A	4U / 25,500	16,000	0.63	B
(Proposed Improvements)									(4U/25,500)	-	(0.43)	(A)								
BOLSA AVENUE:																				
Bolsa Chica to Graham	6D / 56,300	12,000	0 21	A	6D / 56,300	14,000	0.25	A	6D / 56,300	20,000	0.36	A	6D / 56,300	18,000	0 32	A	6D / 56,300	28,000	0 50	A
Graham to Springdale	6D / 56,300	18,000	0.32	A	6D / 56,300	21,000	0.37	A	6D / 56,300	24,600	0 44	A	6D / 56,300	25,000	0 44	A	6D / 56,300	31,000	0.55	A
Springdale to Edwards	6D / 56,300	19,000	0.34	A	6D / 56,300	23,000	0 41	A		26,600	0 47	A	6D / 56,300	29,000	0 52	A	6D / 56,300	35,000	0 62	B
Edwards to Golden West	6D / 56,300	23,000	0.41	A	6D / 56,300	27,000	0.48	A	6D / 56,300	28,200	0 50	A	6D / 56,300	33,000	0.59	A	6D / 56,300	35,000	0 62	B
									6D / 56,300											
MCFADDEN AVENUE:																				
Bolsa Chica to Graham	2U / 12,500	6,000	0.48	A	2U / 12,500	7,000	0.56	A	2U / 12,500	7,000	0.56	A	2U / 12,500	9,000	0.72	C	2U / 12,500	9,000	0 72	C
Graham to Springdale	4U / 25,500	13,000	0.51	A	4U / 25,500	14,000	0.55	A	4U / 25,500	14,000	0.55	A	4U / 25,500	15,000	0 59	A	4U / 25,500	15,000	0.59	A
Springdale to Edwards	4U / 25,500	17,000	0.67	B	4U / 25,500	18,000	0.71	C	4U / 25,500	18,600	0.73	C	4U / 25,500	19,000	0 75	C	4U / 25,500	20,000	0 78	C
Edwards to Golden West	4U / 25,500	13,000	0.51	A	4U / 25,500	14,000	0.55	A	4U / 25,500	15,200	0 60	A	4U / 25,500	16,000	0 63	B	4U / 25,500	18,000	0.71	C
EDINGER AVENUE:																				
Bolsa Chica to Graham	4D / 37,500	14,000	0.37	A	4D / 37,500	14,000	0.37	A	4D / 37,500	14,000	0.37	A	4D / 37,500	15,000	0 40	A	4D / 37,500	15,000	0 40	A
Graham to Springdale	4D / 37,500	17,000	0.45	A	4D / 37,500	18,000	0 48	A	4D / 37,500	18,000	0.48	A	4D / 37,500	19,000	0 51	A	4D / 37,500	19,000	0 51	A
Springdale to Edwards	6D / 56,300	21,000	0.37	A	6D / 56,300	22,000	0 39	A	6D / 56,300	22,000	0 39	A	6D / 56,300	23,000	0 41	A	6D / 56,300	23,000	0 41	A

- ADT = Average Daily Trip
- V/C = Volume to Capacity
- LOS = Level of Service

- Acceptable LOS for Road Segments: City of Huntington Beach - LOS C City of Westminster - LOS D
- Italicized Road Segments are located in the City of Westminster
- Road Segments that are operating at an unacceptable LOS are highlighted.

* Signal Coordination in place per City of Westminster Engineering Department.

** Additional improvements are determined to be infeasible.

Table 6 lists the proposed project by planning area, land use assumption, and the daily trip generation rates utilized within the model. The appropriate rates were applied to the proposed land uses resulting in the project trip generation of 56,445 daily trip ends. The total site traffic, which also includes existing and entitled land uses, is addressed later in the *Analyses* section, as Table 6 focuses on the current project.

It should be noted that the preferred modeling procedure is to calculate daily volumes (as shown in Table 6) for the proposed project, then peak hour volumes for the project were calculated through the modeling process. Table 6 lists the daily trip ends generated for the proposed project by planning area, which was also useful in the modeling procedures.

Trip Distribution

As mentioned previously, the model generates the peak hour volumes for the proposed project and distributes these trips onto the street system based upon the SARA Traffic Analysis Zone (TAZ) structure, traffic loading points, existing and proposed street system. The trip distribution is also a function of the project land use assumptions which were specifically input into the model and are representative of the proposed project. In addition, the model consultant visited the project site, examined the access opportunities and revised the project site loadings to best represent proposed project conditions. Given these efforts, the traffic model was utilized to distribute and assign project traffic to the surrounding street system.

Trip Generation - Interim Analyses

The short term analyses are important to determine if any "immediate" improvements are needed in order to accommodate the proposed project. The need for improvements could be the result of background traffic growth and/or the proposed project traffic. The potential impacts of the proposed interim project are evaluated below which would allow a portion of the project to be developed based upon some interim level of proposed improvements.

TABLE 6

PROJECT TRIP GENERATION

McDonnell Centre Business Park

PLANNING AREA / LAND USE	*SIZE*	*DAILY TRIP RATE* [a]	*DAILY TRIP GENERATION*
PLANNING AREA 1:			
Manufacturing	253,312 SF	3.85 per TSF [b]	975
Warehouse	76,472 SF	5 per TSF	380
Office / Office Park	148,164 SF	15 per TSF	2,220
SUBTOTAL	**477,948 SF**	-----	**3,575**
PLANNING AREA 1A:			
Office / Office Park	261,360 SF	15 per TSF	3,920
R & D	261,360 SF	7.7 per TSF [b]	2,010
SUBTOTAL	**522,720 SF**	-----	**5,930**
PLANNING AREA 2:			
Light Industrial	298,309 SF	13 per TSF	3,880
Warehouse	149,154 SF	5 per TSF	750
Office / Office Park	149,154 SF	15 per TSF	2,240
Hotel	96,000 SF/ 120 Rooms	10 per Room	1,200
Restaurant	4,000 SF	350 per TSF	1,400
SUBTOTAL	**696,617 SF**	-----	**9,470**
PLANNING AREA 3:			
Light Industrial	470,448 SF	13 per TSF	6,120
Warehouse	235,224 SF	5 per TSF	1,180
Office / Office Park	235,224 SF	15 per TSF	3,530
SUBTOTAL	**940,896 SF**	-----	**10,830**

TABLE 6 (cont.)

PROJECT TRIP GENERATION

McDonnell Centre Business Park

PLANNING AREA / LAND USE	*SIZE*	*DAILY TRIP RATE* (a)	*DAILY TRIP GENERATION*
PLANNING AREA 4:			
Light Industrial	457,380 SF	13 per TSF	5,950
Warehouse	228,690 SF	5 per TSF	1,140
Office / Office Park	228,690 SF	15 per TSF	3,430
SUBTOTAL	**914,760 SF**	-----	**10,520**
PLANNING AREA 5:			
Light Industrial	98,450 SF	13 per TSF	1,280
Office / Office Park	134,169 SF	15 per TSF	2,010
R & D	107,399 SF	7.7 per TSF (b)	830
Hotel	120,000 SF/ 150 Rooms	10 per Room	1,500
Retail	150,000 SF	70 per TSF	10,500
SUBTOTAL	**610,018 SF**	-----	**16,120**
TOTAL			**56,445**

(a) TRIP RATE SOURCE: SARA Traffic Model
(b) ITE *Trip Generation, Fifth Edition* Rates; January, 1991.

Within the interim analyses only 60 percent of each land use in each planning area of the proposed project is assumed to be built. Table 7 lists the interim project daily trip generation at 60 percent development for each planning area. If specific land use information is desired, Table 6 can be referenced.

As mentioned earlier in this study currently there are existing and entitled uses on the proposed site, which would need to be considered to show the entire development potential for the site. The existing and entitled information was also taken into account within the model runs. Table 7 documents the existing and entitled trip generation assumptions for the proposed site that were incorporated in the modeling. The following analyses serve to provide a project development trip "budget" at the interim level. The interim *daily* trip generation budget for the McDonnell Centre site would encompass the proposed project, existing and entitled uses for each of the Planning Areas as outlined in Table 7, subject to the proposed improvement requirements imposed as conditions of the project.

INTERIM YEAR - WITHOUT PROJECT

As mentioned earlier in the study by the Year 2000, 60 percent of the proposed project is assumed to be built under an aggressive "worst case" scenario. Therefore, in order to analyze the project during the interim year, a baseline condition was developed. An interim baseline condition, without the project, was developed by the modeling consultant utilizing the City's transportation model (SARA Model). This baseline condition illustrates traffic operations prior to consideration of the proposed project traffic and required roadway improvements can also be identified.

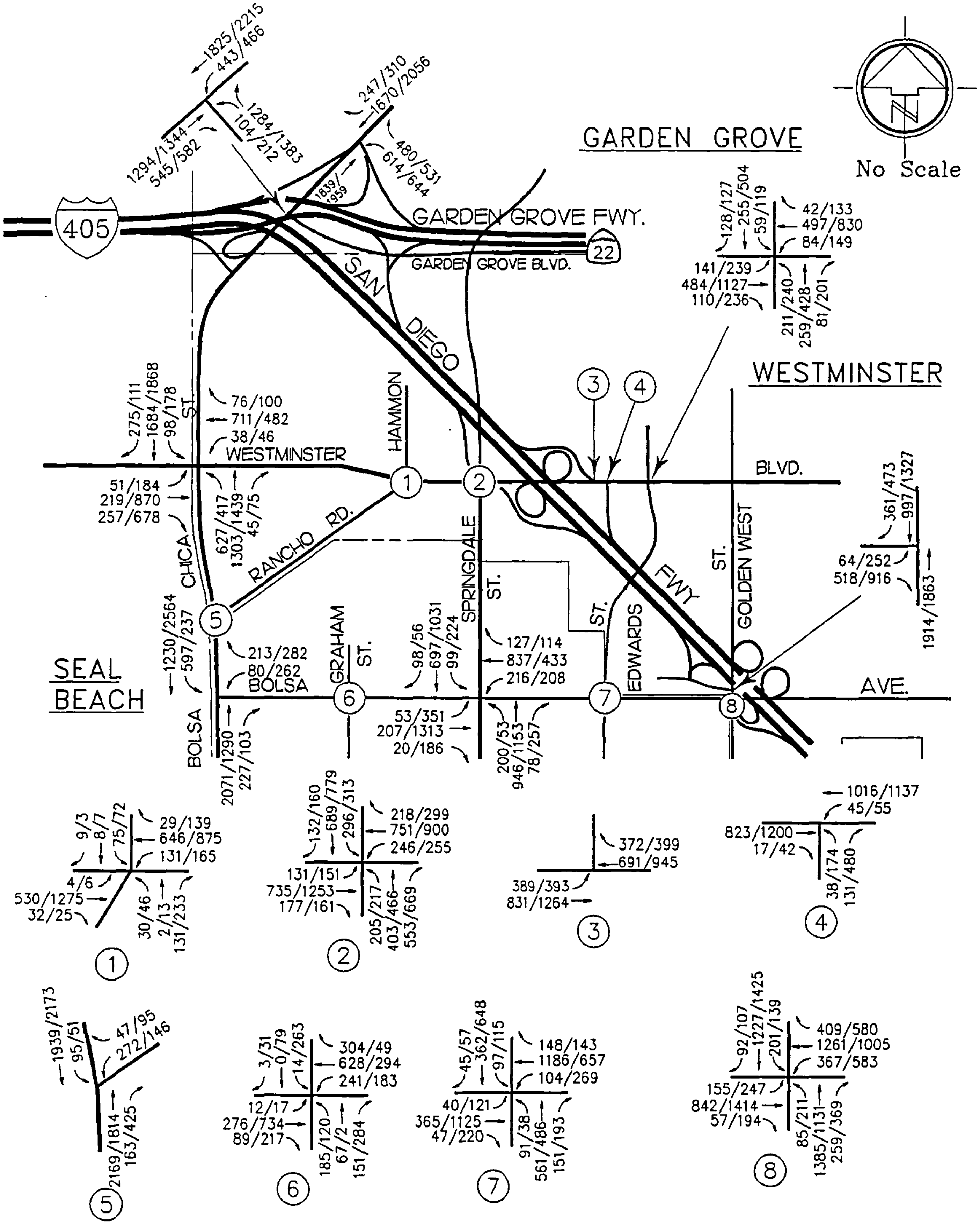
Study Intersection Analyses

Intersection analyses were performed at all 22 study intersections based upon the model generated turning movement forecasts, which are presented in Figure 7, and assuming Level 1 improvements. Table 8 lists the intersection analyses results under interim conditions without the project. Under the ICU analyses, two of the 22 study intersections were operating at an unacceptable Level of Service. Additional HCM analyses needed to be completed for intersections with a LOS D or worse based on

TABLE 7
INTERIM PROJECT TRIP GENERATION
DEVELOPMENT TRIP "BUDGET"
McDonnell Centre Business Park

PLANNING AREA	*SIZE*	*DAILY TRIP GENERATION "BUDGET"*
	PLANNING AREA 1:	
Proposed Project*	286,769 SF	2,145
Existing	2,789,053 SF	20,890
SUBTOTAL	**3,075,822 SF**	**23,035**
	PLANNING AREA 1A:	
Proposed Project*	313,632 SF	3,558
Vacant	-	-
SUBTOTAL	**313,632 SF**	**3,558**
	PLANNING AREA 2:	
Proposed Project*	417,970 SF	5,682
Existing	120,000 SF	600
Entitled	699,271 SF	4,350
SUBTOTAL	**1,237,241 SF**	**10,632**
	PLANNING AREA 3:	
Proposed Project*	564,538 SF	6,498
Vacant	-	-
SUBTOTAL	**564,538 SF**	**6,498**
	PLANNING AREA 4:	
Proposed Project*	548,856 SF	6,312
Vacant	-	-
SUBTOTAL	**548,856 SF**	**6,312**
	PLANNING AREA 5:	
Proposed Project*	366,011 SF	9,672
Existing	235,831 SF	3,540
Entitled	369,151 SF	10,470
SUBTOTAL	**970,993 SF**	**23,682**
TOTAL		**73,717**

* The proposed interim project represents 60% of the proposed project buildout.
For specific land use assumptions the Buildout trip generation (Table 6) can be referenced.



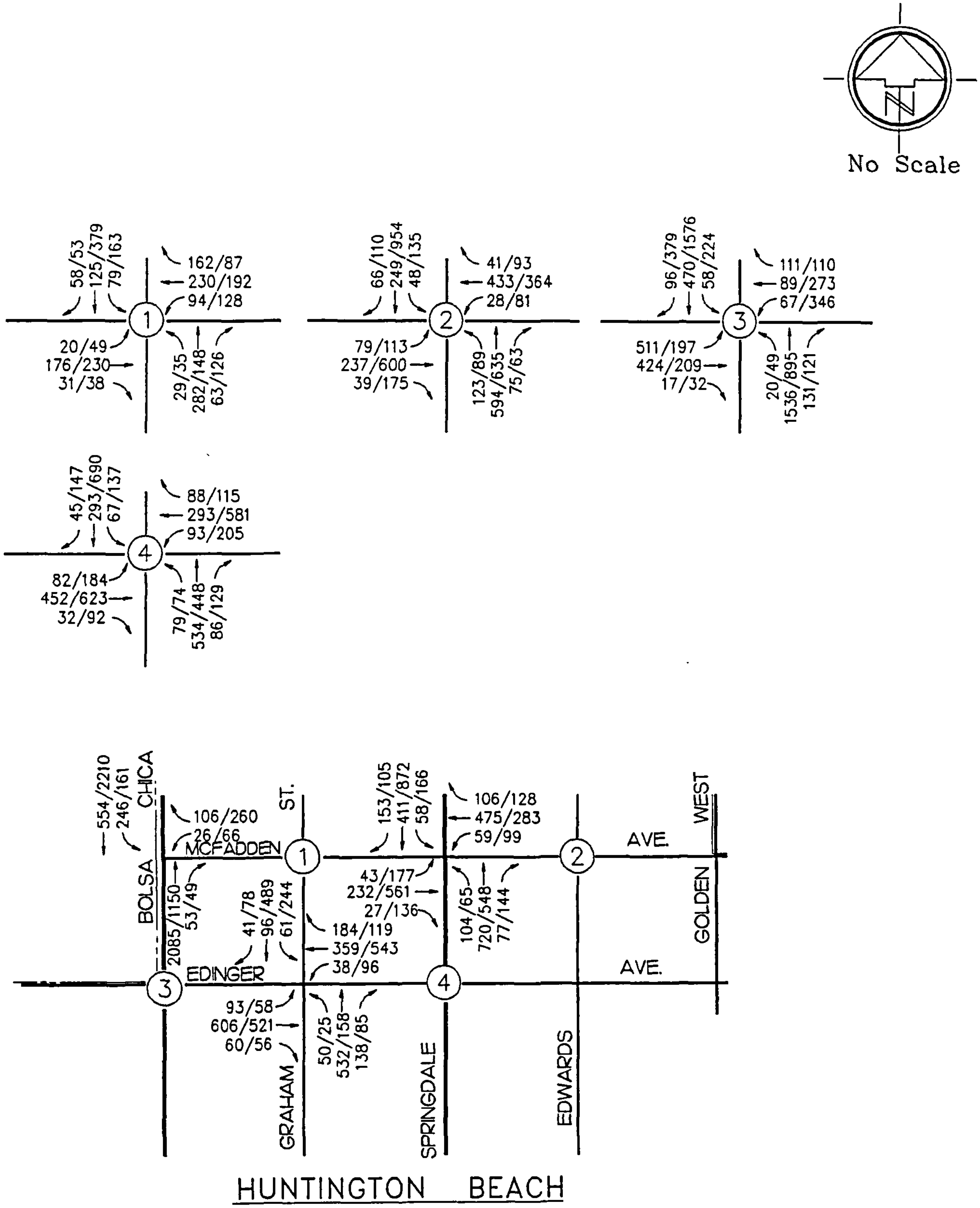
LEGEND:

31/116 = AM/PM PEAK HOUR

INTERIM YEAR WITHOUT PROJECT
PEAK HOUR TRAFFIC VOLUMES

WPA TRAFFIC ENGINEERING, INC.

FIGURE 7A



LEGEND:

31/116 =AM/PM PEAK HOUR

950404

WPA TRAFFIC ENGINEERING, INC.

INTERIM YEAR WITHOUT PROJECT

PEAK HOUR TRAFFIC VOLUMES

FIGURE 7B

TABLE 8
INTERSECTION ANALYSES SUMMARY - INTERIM CONDITIONS
McDonnell Centre Business Park

INTERSECTION	*INTERSECTION CAPACITY UTILIZATION (ICU) / LEVEL OF SERVICE (LOS)*							
	INTERIM CONDITIONS WITHOUT PROJECT		*INTERIM CONDITION WITHOUT PROJECT WITH IMPROVEMENTS (LEVEL 2)*		*INTERIM CONDITION WITH PROJECT (60% DEVELOPMENT)*		*INTERIM CONDITION WITH PROJECT WITH IMPROVEMENTS (LEVEL 3)*	
	AM PK HR	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*
Garden Grove Fwy (S.R. 22) & Valley View St. (HCM Analyses)[1]	0.75/C (18.2/C)	0.88/D (24.6/C)	-	-	0.77/C (19.0/C)	0.89/D (24.8/C)	-	-
Valley View St. & Garden Grove Blvd. (HCM Analyses)[1]	0.81/D (25.6/D)	0.86/D (29.8/D)	-	-	0.81/D (26.2/D)	0.90/D (29.8/D)	-	-
Westminster Blvd. & Bolsa Chica Rd. (HCM Analyses)[1]	0.80/C (36.6/D)	0.98/E (*/F)	0.80/C (36.4/D)	0.83/D (38.1/D)	0.83/D (35.8/D)	0.86/D (39.8/D)	-	-
Westminster Blvd. & Rancho Rd.-Hammon Ave. (HCM Analyses)[1]	0.40/A (24.8/C)	0.70/B (*/F)	- (24.5/C)	- (30.9/D)	0.49/A (30.4/D)	0.85/D (*/F)	- (30.6/D)	- (32.2/D)
Westminster Blvd. & Springdale St.	0.59/A	0.72/C	-	-	0.62/B	0.73/C	-	-
Westminster Blvd. & I-405 NB On Ramp	0.48/A	0.56/A	-	-	0.51/A	0.56/A	-	-
Westminster Blvd. & I-405 NB Off Ramp	0.43/A	0.71/C	-	-	0.44/A	0.74/C	-	-
Westminster Blvd. & Edwards St.	0.44/A	0.80/C	-	-	0.46/A	0.80/C	-	-

TABLE 8 (Cont.)
INTERSECTION ANALYSES SUMMARY - INTERIM CONDITIONS
McDonnell Centre Business Park

INTERSECTION	*INTERSECTION CAPACITY UTILIZATION (ICU) / LEVEL OF SERVICE (LOS)*							
	INTERIM CONDITION WITHOUT PROJECT		*INTERIM CONDITION WITHOUT PROJECT WITH IMPROVEMENTS (LEVEL 2)*		*INTERIM CONDITION WITH PROJECT (60% DEVELOPMENT)*		*INTERIM CONDITION WITH PROJECT WITH IMPROVEMENTS (LEVEL 3)*	
	AM PK HR	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*
Bolsa Chica St. & Rancho Rd.	0.67/B	0.57/A	-	-	0.73/C	0.64/B	-	-
Bolsa Chica St. & Bolsa Ave.	0.74/C	0.63/B	-	-	0.76/C	0.65/B	-	-
Bolsa Chica St. & McFadden Ave.	0.67/B	0.63/B	-	-	0.70/B	0.64/B	-	-
Bolsa Chica St. & Edinger Ave.	0.64/B	0.75/C	-	-	0.65/B	0.77/C	-	-
Bolsa Ave. & Graham St.	0.34/A	0.50/A	-	-	0.39/A	0.60/A	-	-
Bolsa Ave. & Springdale St. (HCM Analyses)(1)	0.67/B (26.4/D)	0.93/E (43.7/E)	0.60/A (26.3/D)	0.82/D (34.8/D)	0.67/B (29.1/D)	0.89/D (*/F)	- (29.1/D)	- (35.6/D)
Bolsa Ave. & Edwards St.	0.57/A	0.74/C	-	-	0.61/B	0.77/C	-	-
Bolsa Ave. & Golden West St. (HCM Analyses)(1)	0.74/C (30.9/D)	0.86/D (*/F)	- (30.5/D)	- (38.4/D)	0.76/C (31.0/D)	0.88/D (42.7/E)†	-	-
Golden West St. & I-405 SB Off Ramp	0.58/A	0.71/C	-	-	0.58/A	0.71/C	-	-
McFadden Ave. & Graham St.	0.38/A	0.47/A	-	-	0.39/A	0.47/A	-	-
McFadden Ave. & Springdale St.	0.49/A	0.62/B	-	-	0.53/A	0.67/B	-	-
McFadden Ave. & Edwards St.	0.47/A	0.69/B	-	-	0.47/A	0.73/C	-	-
Edinger Ave. & Graham St.	0.51/A	0.49/A	-	-	0.50/A	0.50/A	-	-
Edinger Ave. & Springdale St.	0.41/A	0.58/A	-	-	0.44/A	0.60/A	-	-

(1) 94HCM Analyses based upon delay. (Delay/LOS)

† Based upon the City of Huntington Beach TIA guidelines, the proposed improvements utilized for Bolsa/Golden West have not only mitigated any project impacts but also mitigated impacts made by other area project and a portion of the existing problems as well.

the City of Huntington Beach thresholds. With the additional analyses, all of the study intersections would have an acceptable (LOS D or better) operation, except for the study intersections of Westminster/Bolsa Chica, Westminster/Rancho-Hammon, Bolsa/Springdale, and Bolsa/Golden West during the PM peak hour. The ICU/HCM worksheets for all the study intersections can be referenced in Appendix B.

Proposed Improvements - Intersection Analyses

Table 4 identifies the proposed improvements required for Interim Conditions without the interim project. These are the intersection improvements that would be required prior to consideration of the McDonnell Centre project and are described as "Level 2" improvements. As shown in Table 4, there are four intersections that need improvements and they are listed below.

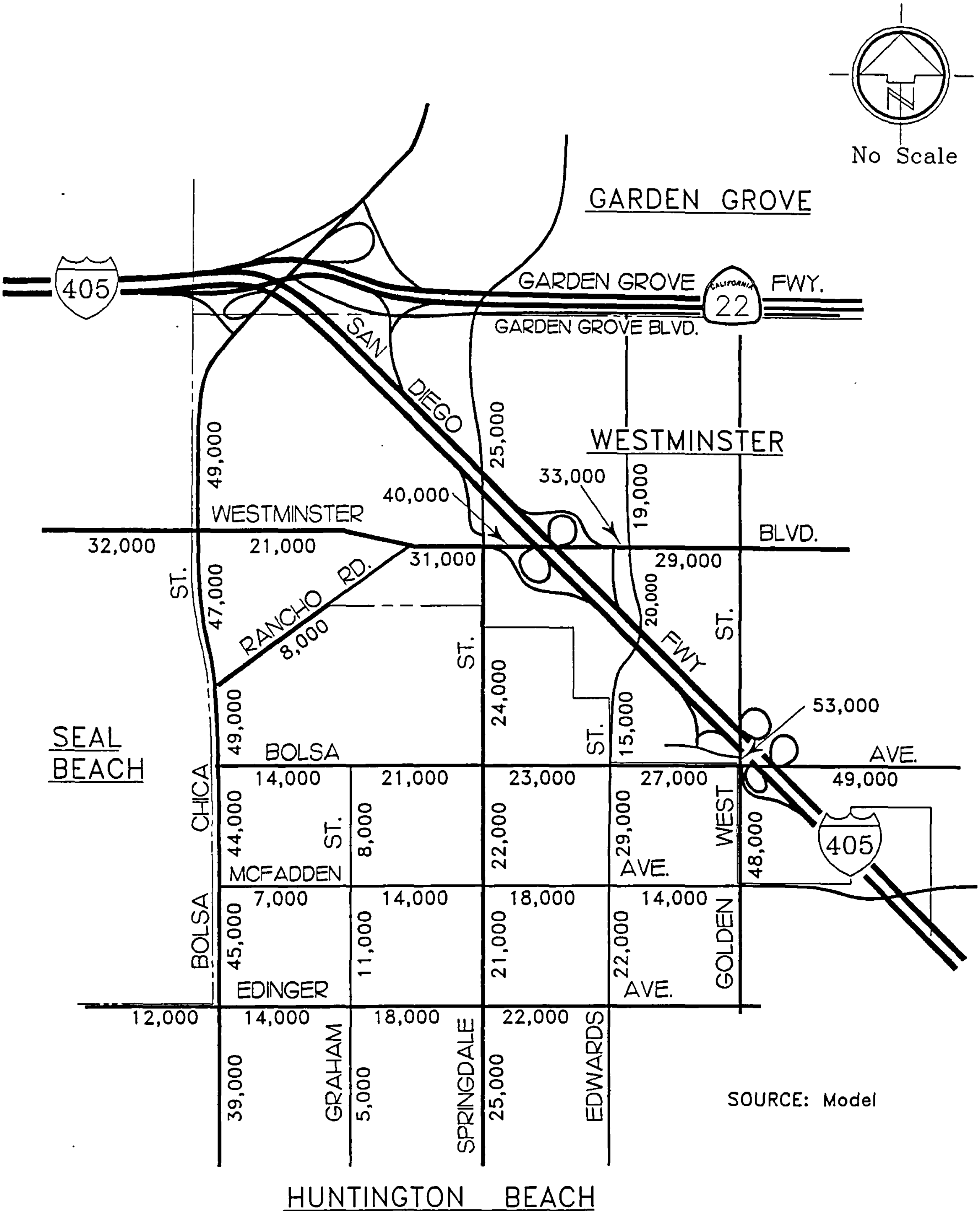
- ❒ *Westminster/Bolsa Chica Road* - Construct an eastbound FREE right turn lane; Add a third eastbound through lane
- ❒ *Westminster/Rancho-Hammon* - Add a northbound right turn lane
- ❒ *Bolsa Avenue/Springdale Street* - Add a second southbound left turn lane
- ❒ *Bolsa/Golden West* - Add a southbound right turn lane

With these improvements, the study intersections would operate at acceptable Levels of Service during both the AM and PM peak hours.

Road Segment Analysis

The average daily traffic (ADT) volumes for the surrounding street system under interim conditions were also obtained through the model data. The interim Year 2000 ADT volumes, without the project, utilized in this study are shown on Figure 8.

Road segment analyses were performed utilizing these ADT volumes. Table 5 shows a comparison of the interim daily traffic volumes, without the project, to the estimated roadway capacity. As shown in Table 5, the following road segment links are operating at an unacceptable level.



INTERIM YEAR WITHOUT PROJECT
DAILY TRAFFIC VOLUMES

FIGURE 8

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- Bolsa Chica Street: Rancho Rd. to Bolsa Ave. - (LOS D)
- Golden West Street: Bolsa Ave. to McFadden - (LOS D)
- Westminster Blvd.: Springdale St. to I-405 - (LOS E)

Proposed Improvements - Road Segment Analyses

Table 5, presented earlier, identifies the proposed improvements required for Interim Conditions without the interim project. These are the road segment improvements that would be required prior to

consideration of the McDonnell Centre project. The improvements for the three road segments which are operating at unacceptable Levels of Service are as follows:

Bolsa Chica Street: Rancho to Bolsa -	Currently 6 lanes divided improved to 8 lanes divided. (LOS B)
Golden West Street: Bolsa to McFadden -	Currently 6 lanes divided improved to 8 lanes divided. (LOS B)
Westminster Blvd.: Springdale to I-405 -	Currently 4 lanes divided improved to 6 lanes divided. (LOS B)

Acceptable operations on the road segments would be achieved with the improvements shown above.

INTERIM YEAR - WITH PROJECT

In the Year 2000, a "worst case" assumption is that a maximum of 60 percent of the proposed project would be built. Therefore, the proposed interim project represents 60 percent of the trip generation totals for the proposed project buildout which defines a "trip budget" for these interim conditions. Table 7, which was presented earlier in this study, lists the daily trip ends generated by the interim project, existing uses and entitled development. In order to determine the project impacts to the interim year baseline conditions, the model runs for Buildout conditions both with and without the project were examined. Based upon discussions with the modeling consultant and our review of the results, interim project traffic assumptions were developed.

A comparison between the model run for Buildout conditions without the project and Buildout conditions with the project at each of the study intersections enabled us to determine the total project impact at each intersection assuming full project development. For purposes of this study it is assumed that the interim project impacts would be generally proportional to the full project impacts at each of the study intersections and road segments. The project volume impacts for interim conditions were assumed to be 60 percent of buildout and were added to the interim baseline conditions without the project. These volumes can be found on Figure 9. The number of project generated trip ends added to each of the study intersections are also documented on the ICU/HCM worksheets contained in Appendix B.

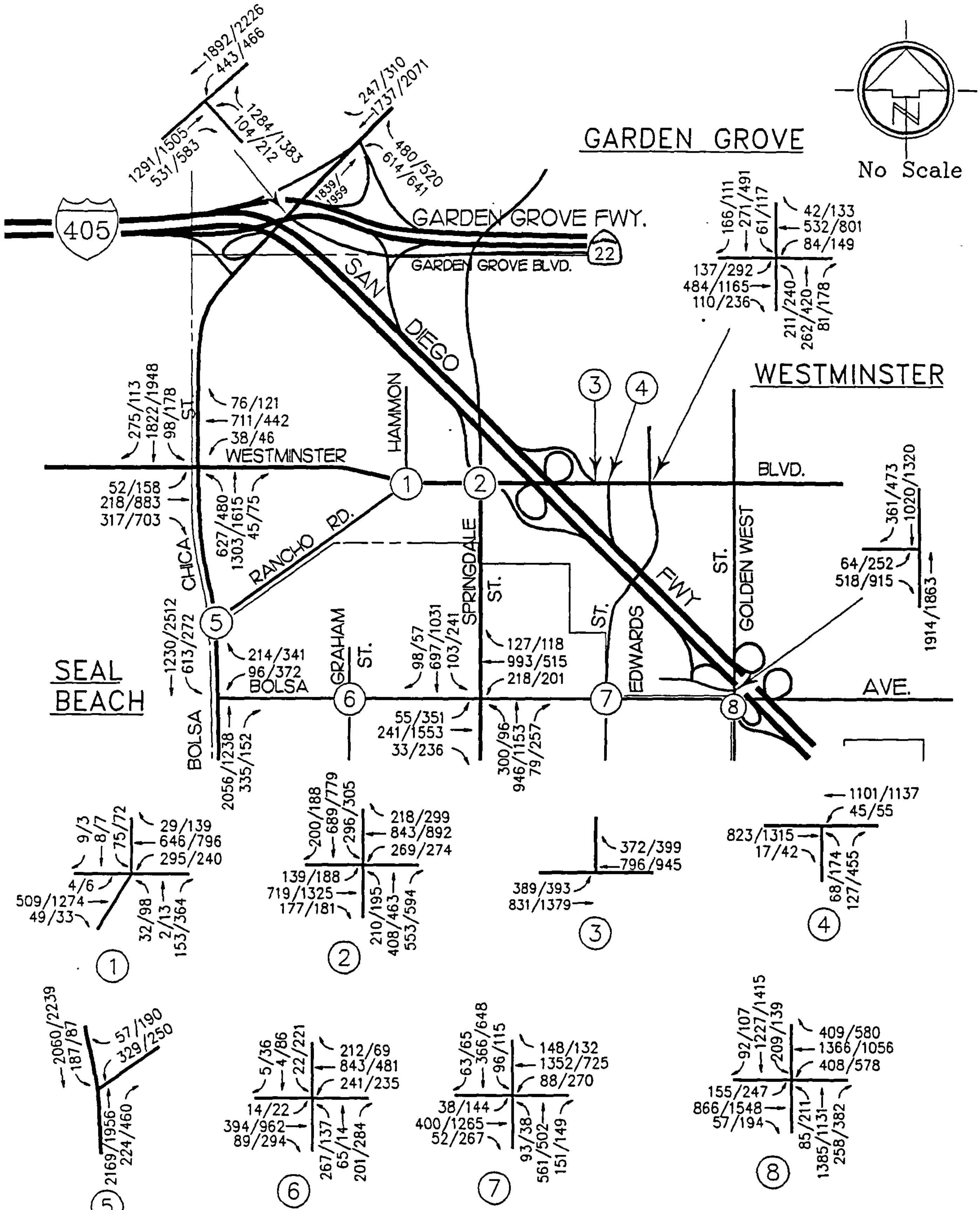
Study Intersection Analyses

Intersection analyses were again performed at all 22 study intersections based upon the model generated turning movements for the baseline interim condition, the trip ends generated by the project at 60 percent development and assumed Level 2 improvements. Table 8 lists the intersection analyses results under interim conditions with the project. Under the ICU intersection analyses methodology, all of the study intersections have acceptable (LOS D or better) operations. However, utilizing the City's guidelines, the HCM methodology of intersection analyses was applied to all intersections with a LOS of D or worse. Under the HCM methodology, three study intersections would operate at unacceptable Levels of Service during the PM peak hour. These intersections include Westminster/Ranch-Hammon, Bolsa/Springdale and Bolsa/Golden West. The ICU/HCM worksheets for all the study intersections can be referenced in Appendix B.

Proposed Improvements - Intersection Analyses

Table 4 identifies the proposed improvements required for Interim Conditions with the interim project. These are the intersection improvements that would be required with 60 percent of the McDonnell Centre project development and are described as "Level 3" improvements. As shown in Table 4, two of the three study intersections which have improvements are listed below.

- *Westminster/Rancho-Hammon* - Add a northbound right turn overlap phase and restrict southbound U-turns
- *Bolsa Avenue/Springdale Street* - Add an eastbound right turn lane



LEGEND:

31/116 =AM/PM PEAK HOUR

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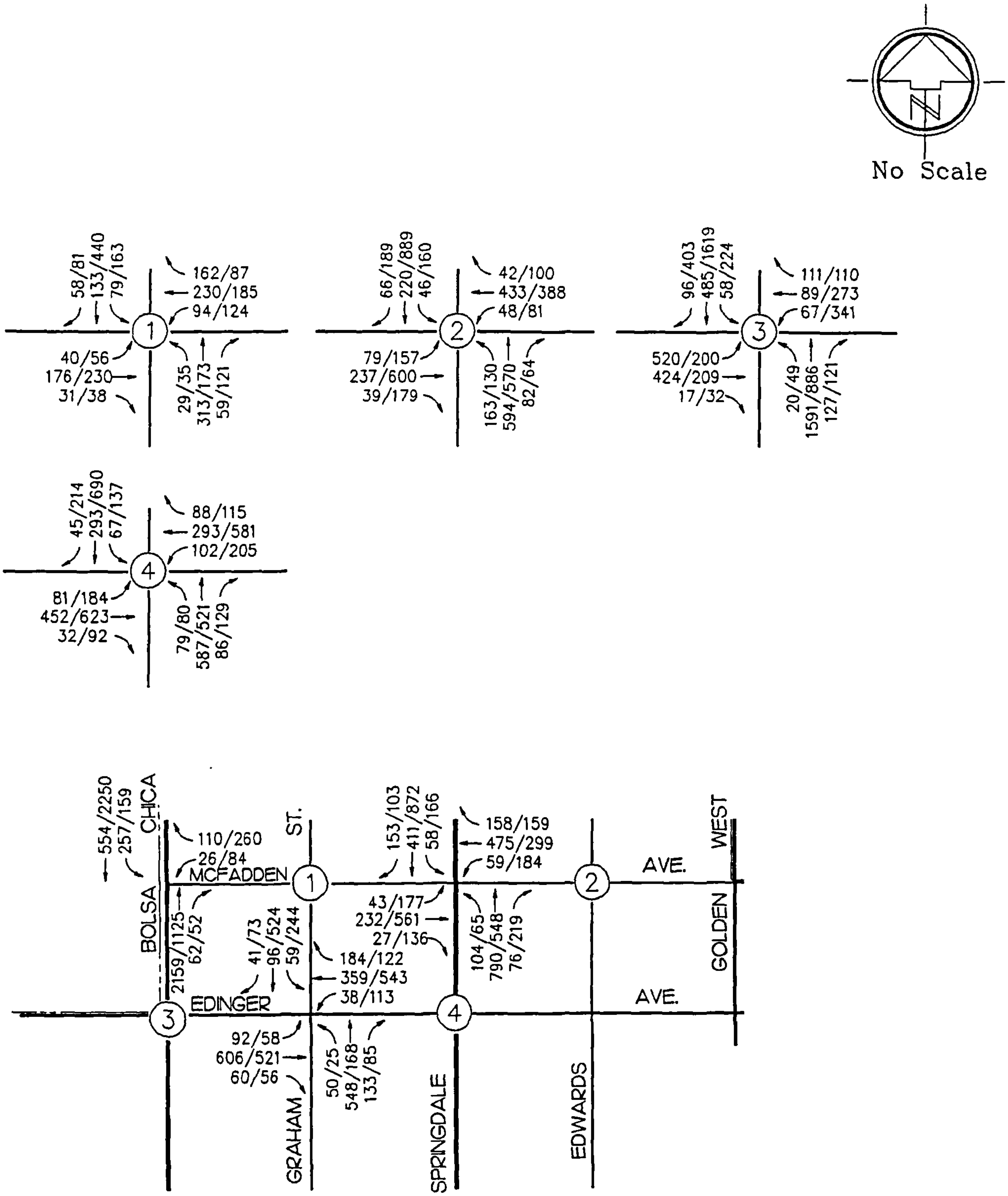
INTERIM YEAR WITH PROJECT

PEAK HOUR TRAFFIC VOLUMES

FIGURE 9A



HUNTINGTON BEACH

LEGEND:

31/116 =AM/PM PEAK HOUR

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INTERIM YEAR WITH PROJECT

PEAK HOUR TRAFFIC VOLUMES

FIGURE 9B

With these improvements, the two study intersections of Westminster/Rancho-Hammon and Bolsa/Springdale would operate at acceptable Levels of Service during both the AM and PM peak hours. The study intersection of Bolsa/Golden West would operate at a LOS D during the AM peak hour and a LOS E during the PM peak hour. Although LOS E is an unacceptable Level of Service, under existing conditions the study intersection of Bolsa/Golden West is currently operating at a LOS F during the PM peak hour. Based upon the City of Huntington Beach TIA guidelines, the proposed improvements for Bolsa/Golden West have not only mitigated any project impacts but also mitigated impacts made by other area projects and some of the existing problems as well.

In order to address the project responsibility related to the Levels 1-3 intersection improvements, there will ultimately be conditions of approval (if approved) associated with this project, which will include traffic related requirements. These conditions could serve to mitigate any project related impacts and would allow project development up to the interim "trip budget" of 60 percent of the project buildout traffic and/or there could be findings of overriding considerations relative to the project. The following is information that may be useful in formulating the conditions of approval.

Westminster & Bolsa Chica (Westminster) - This improvement is part of the City of Westminster General Plan and their Traffic Improvement Fee program.

Westminster & Rancho (Westminster) - The City of Westminster General Plan indicates Rancho to be a four-lane undivided roadway, but the potential widening was not included in the Citywide Fee.

Westminster & I-405 NB On Ramp (Westminster) - The analyses do not show this as an "impacted" location; however, it was found to meet traffic signal warrant guidelines. This location was addressed in the City of Westminster Citywide Fee analyses.

Bolsa & Springdale (Huntington Beach) - The Huntington Beach General Plan indicates that Springdale is planned to be improved to a six-lane facility in the vicinity of this intersection. Levels 1 and 2 improvements were previously identified in past studies, but Level 3 is a "new" improvement.

<u>*Bolsa & Golden West (Huntington Beach & Westminster)*</u> - A "fair share" contribution toward improvements at this location was proposed in the Negative Declaration for the Westminster Mall project. There does not appear to be feasible improvements available to fully mitigate existing / interim cumulative / project traffic impacts.

<u>*Golden West & I-405 SB Off Ramp (Westminster)*</u> - This improvement is anticipated to primarily involve restriping. This location was addressed in the City of Westminster Citywide Fee analyses.

<u>*McFadden & Graham (Huntington Beach)*</u> - The improvements involves the implementation of a traffic signal at this location, which is indicated as warranted for existing conditions. This provides acceptable operations for interim and buildout conditions.

<u>*Road Segment Analysis*</u>

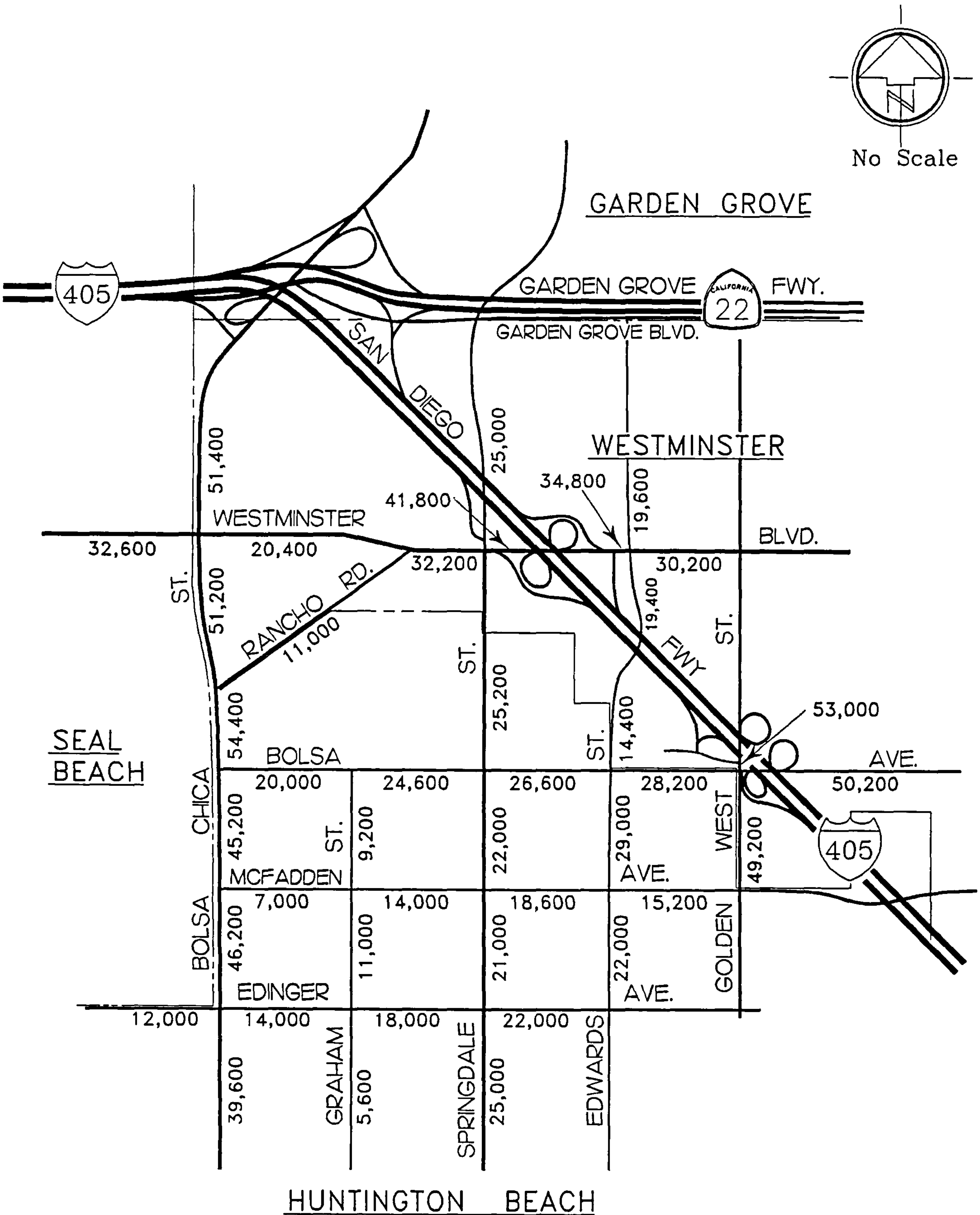
The daily traffic volumes for the interim project were added to the baseline interim conditions so the road segment analysis could be updated. The interim ADT volumes, with the project, utilized in this study are shown on Figure 10. Table 5 shows a comparison of the interim daily traffic volumes, with the project, to the estimated roadway capacity at Level of Service E. As shown in Table 5, the following road segment links are operating at an unacceptable level.

- Bolsa Chica Street: McFadden Ave. to Edinger Ave. - (LOS D)
- Rancho Road: Bolsa Chica to Westminster Blvd. - (LOS D)

<u>*Proposed Improvements - Road Segment Analyses*</u>

Table 5 identifies the proposed improvements required for Interim Conditions with the interim project and the results are summarized below. Acceptable operations on the road segments would be achieved with the improvements shown here.

- <u>*Bolsa Chica Street:*</u> *McFadden to Edi*nger - Currently 6 lanes divided improved to 8 lanes divided. (LOS B)
- <u>*Rancho Road:*</u> *Bolsa Chica to Westminster* - Currently 2 lanes undivided improved to 4 lanes undivided. (LOS A)



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INTERIM YEAR WITH PROJECT

DAILY TRAFFIC VOLUMES

FIGURE 10

PROJECT BUILDOUT (YEAR 2015)

As mentioned earlier in this study, a yearly monitoring program for the project site will be established and maintained by the City of Huntington Beach. When the interim project "trip budget" (60% of the project development) threshold is met, then a second study will be completed to verify assumed buildout conditions. It is very possible that due to the fact that traffic modeling generally contains "worst case" land use development assumptions, Level of Service and proposed improvements obtain for buildout conditions may be overstated which could be addressed through this verification study.

The findings in the following sections for Buildout Conditions could potentially change given the information provided above.

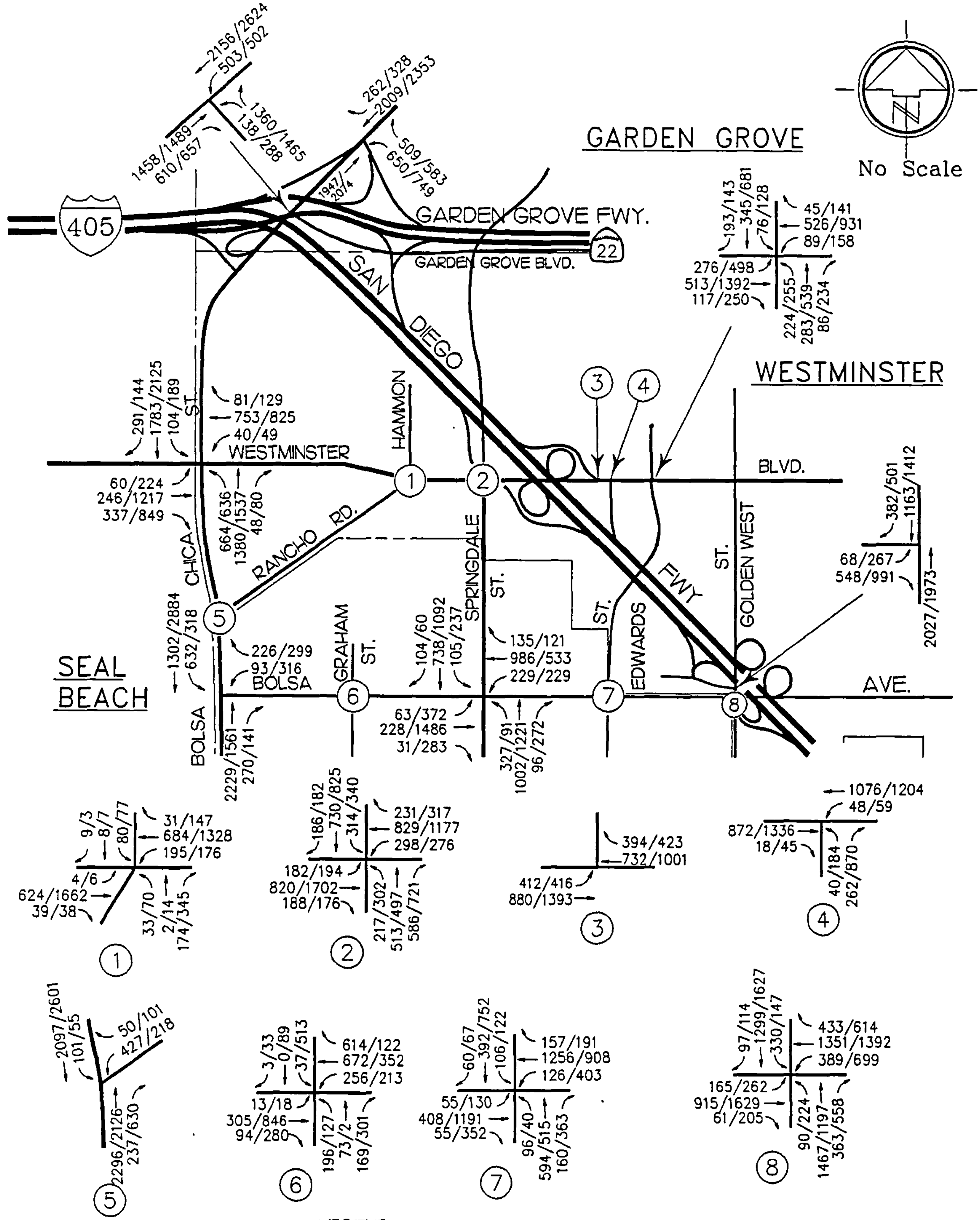
BUILDOUT (YEAR 2015) - WITHOUT PROJECT

The Buildout baseline condition or no project condition, was developed utilizing the City's transportation model (SARA Model). These projections account for traffic growth throughout the City of Huntington Beach as well as the surrounding regional area. Some specific cumulative projects were provided by City staff to assure they were addressed in the analyses. The list of projects was reviewed by WPA and the modeling consultant. It was determined that the listed projects have been submitted for enough years to be included in the model, were relatively small, were not in close proximity to the study area and/or were specifically addressed through past studies/modeling efforts.

Overall, the amount of traffic included in the modeling is not only expected to address the impacts of the listed project, it should provide analyses of other unspecified traffic growth as well. The Buildout baseline condition SARA model run was used to prepare both Buildout conditions ADT forecasts and turning movement forecasts for conditions with and without the project.

Study Intersection Analyses

Intersection analyses were performed at all 22 study intersections based upon the model generated turning movement forecasts, which can be found in Figure 11, and Levels 1, 2 and 3 improvements.



LEGEND:

31/116 =AM/PM PEAK HOUR

BUILDOUT WITHOUT PROJECT

PEAK HOUR TRAFFIC VOLUMES

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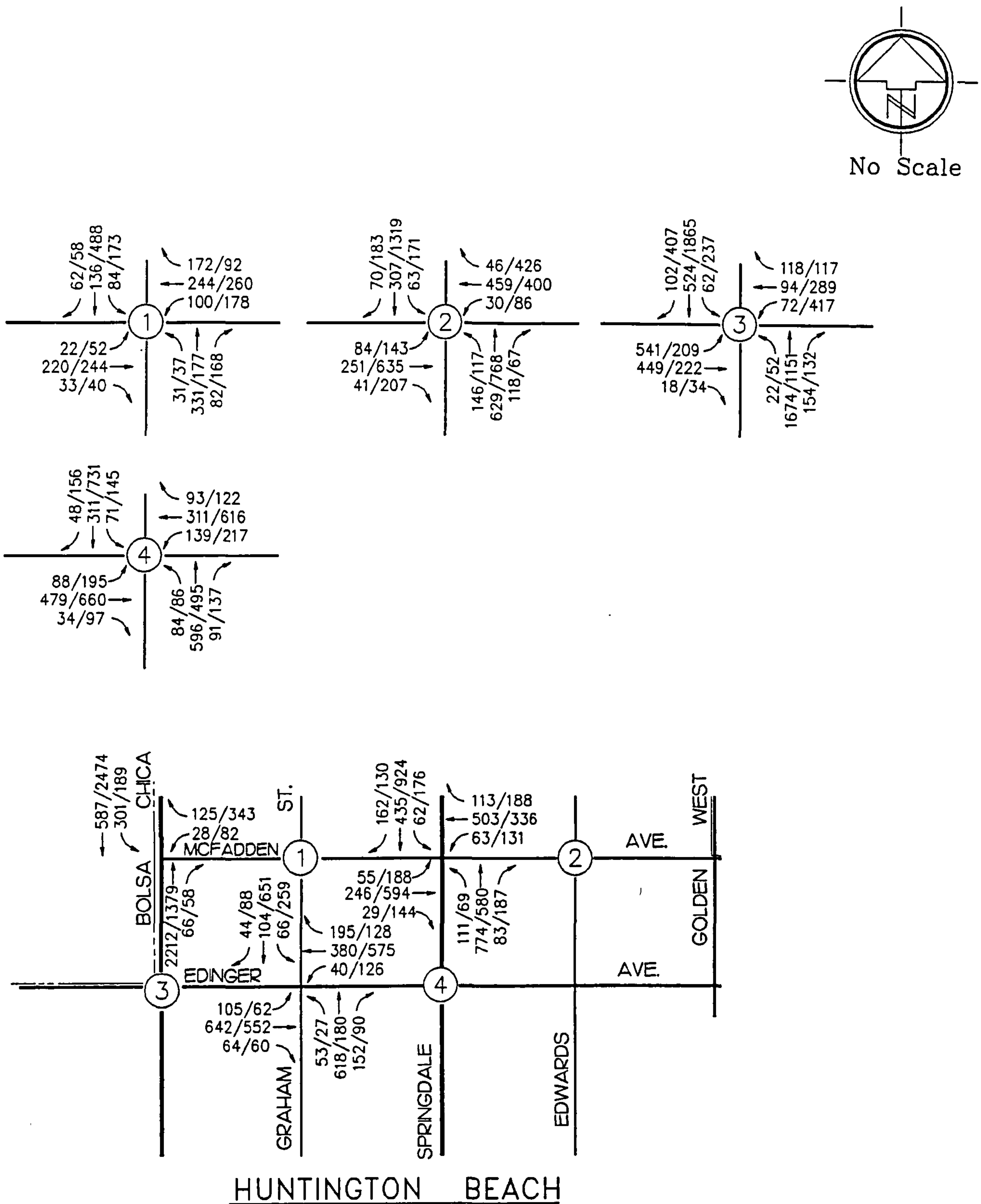
FIGURE 11A



LEGEND:

31/116 =AM/PM PEAK HOUR

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BUILDOUT WITHOUT PROJECT

PEAK HOUR TRAFFIC VOLUMES

FIGURE 11B

Table 9 lists the intersection analyses results under Buildout conditions without the project. Of the 22 study intersections, 12 intersections have acceptable (LOS D or better) operations during both the AM and PM peak hours. The ICU/HCM worksheets for all the study intersections can be referenced in Appendix B.

Proposed Improvements - Intersection Analyses

Table 4 identifies the proposed improvements required under Buildout (without project) baseline conditions - Level 4. As shown in Table 4, there are nine study intersections where proposed improvements are listed.

Improvements for the nine impacted study intersections operating at unacceptable Levels of Service for buildout, without project conditions, are listed below.

❒ *Valley View/S.R. 22 Freeway* -	Convert the southbound "Freeway Only" lane to through/right option
❒ *Valley View/Garden Grove* -	Add a third northbound through lane Add a third southbound through lane
❒ *Westminster/Bolsa Chica Road* -	Add a third westbound through lane
❒ *Westminster/Springdale Street* -	Add an eastbound right turn lane
❒ *Westminster/I-405 NB Off Ramp* -	Convert northbound left turn lane to a left/right combination lane
❒ *Westminster/Edwards Street* -	Add a second eastbound left turn lane Add an eastbound right turn lane Add a third eastbound through lane
❒ *Bolsa Avenue/Edinger* -	Add a northbound right turn lane Add a southbound right turn lane Restripe westbound through to a left/through combination lane
❒ *Bolsa Avenue/Edwards Street* -	Add an eastbound right turn lane
❒ *Edwards Street/McFadden Ave.* -	Add a southbound right turn lane

With these improvements, the nine study intersections above would operate at acceptable Levels of Service during both the AM and PM peak hours, except for the intersection of Westminster/Bolsa Chica where no added improvements were found to be feasible. The intersection of Bolsa/Golden West also has impacts which cannot be fully mitigated, as identified earlier.

TABLE 9
INTERSECTION ANALYSES SUMMARY - BUILDOUT CONDITIONS
McDonnell Centre Business Park

INTERSECTION	INTERSECTION CAPACITY UTILIZATION (ICU) / LEVEL OF SERVICE (LOS)							
	BUILDOUT CONDITIONS WITHOUT PROJECT		BUILDOUT CONDITIONS WITHOUT PROJECT WITH IMPROVEMENTS (LEVEL 4)		BUILDOUT CONDITIONS WITH PROJECT		BUILDOUT CONDITIONS WITH PROJECT WITH IMPROVEMENTS (LEVEL 5)	
	AM PK HR	PM PK HR	AM PK HR	PM PK HR	AM PK HR	PM PK HR	AM PK HR	PM PK HR
Garden Grove Fwy (S.R. 22) & Valley View St. (HCM Analyses)[1]	0.87/D (25.4/D)	1.00/E (*/F)	0.73/C (17.0/C)	0.84/D (21.4/C)	0.75/C (17.2/C)	0.84/D (21.2/C)	-	-
Valley View St. & Garden Grove Blvd. (HCM Analyses)[1]	0.88/D (*/F)	0.99/E (*/F)	0.74/C (20.8/C)	0.77/C (19.7/C)	0.73/C (20.8/C)	0.82/D (20.4/C)	-	-
Westminster Blvd. & Bolsa Chica Rd. (HCM Analyses)[1]	0.86/D (37.1/D)	1.05/F (*/F)	0.80/C (33.3/D)	0.98/E (*/F)†	0.84/D (*/F)	1.00/E (*/F)	†	†
Westminster Blvd. & Rancho Rd.-Hammon Ave. (HCM Analyses)[1]	0.48/A (25.7D)	0.90/D (39.2/D)	-	-	0.58/A (33.7/D)	0.88/D (*/F)	- (30.0/D)	- (36.3/D)
Westminster Blvd. & Springdale St. (HCM Analyses)[1]	0.65/B (30.0/D)	0.84/D (*/F)	- (29.7/D)	- (34.6/D)	0.71/C (31.2/D)	0.90/D (39.9/D)	-	-
Westminster Blvd. & I-405 NB On Ramp	0.51/A	0.58/A	-	-	0.56/A	0.58/A	-	-
Westminster Blvd. & I-405 NB Off Ramp (HCM Analyses)[1]	0.52/A (14.4/B)	0.98/E (*/F)	0.46/A (14.2/B)	0.78/C (23.7/C)	0.51/A (14.5/B)	0.83/D (28.1/D)	-	-

TABLE 9 (Cont.)
INTERSECTION ANALYSES SUMMARY - BUILDOUT CONDITIONS
McDonnell Centre Business Park

INTERSECTION	*INTERSECTION CAPACITY UTILIZATION (ICU) / LEVEL OF SERVICE (LOS)*							
	BUILDOUT CONDITIONS WITHOUT PROJECT		*BUILDOUT CONDITIONS WITHOUT PROJECT WITH IMPROVEMENTS (LEVEL 4)*		*BUILDOUT CONDITIONS WITH PROJECT*		*BUILDOUT CONDITIONS WITH PROJECT WITH IMPROVEMENTS (LEVEL 5)*	
	AM PK HR	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*
Westminster Blvd. & Edwards St. (HCM Analyses)(1)	0.55/A (29.6/D)	0.94/E (*/F)	0.48/A (27.3/D)	0.87/D (35.3/D)	0.50/A (28.4/D)	0.91/E (37.7/D)	0.50/A (-)	0.87/D (-)
Bolsa Chica St. & Rancho Rd. (HCM Analyses)(1)	0.78/C	0.69/B	-	-	0.88/D (23.8/C)	0.81/D (25.1/D)	-	-
Bolsa Chica St. & Bolsa Ave. (HCM Analyses)(1)	0.80/C	0.71/C	-	-	0.83/D (30.3/D)	0.75/C (16.5/C)	-	-
Bolsa Chica St. & McFadden Ave.	0.75/C	0.74/C	-	-	0.79/C	0.75/C	-	-
Bolsa Chica St. & Edinger Ave. (HCM Analyses)(1)	0.69/B (34.2/D)	0.87/D (*/F)	- (32.1/D)	- (39.3/D)	0.71/C (33.7/D)	0.88/D (38.8/D)	-	-
Bolsa Ave. & Graham St.	0.41/A	0.60/A	-	-	0.47/A	0.75/C	-	-
Bolsa Ave. & Springdale St. (HCM Analyses)(1)	0.70/B (30.7/D)	0.91/E (35.5/D)	0.70/B (-)	0.88/D (-)	0.83/D (31.1/D)	0.99/E (*/F)	0.78/C (38.6/D)	0.87/D (38.6/D)
Bolsa Ave. & Edwards St. (HCM Analyses)(1)	0.61/B (27.8/D)	0.92/E (*/F)	0.61/B (27.7/D)	0.85/D (39.7/D)	0.66/B (30.1/D)	0.88/D (40.0/D)	-	-
Bolsa Ave. & Golden West St. (HCM Analyses)(1)	0.84/D (*/F)	0.99/E (*/F)	0.84/D (†)	0.97/E† (†)	0.89/D (*/F)	1.00/E† (*/F)	- (†)	† (†)

TABLE 9 (Cont.)
INTERSECTION ANALYSES SUMMARY - BUILDOUT CONDITIONS
McDonnell Centre Business Park

INTERSECTION	*INTERSECTION CAPACITY UTILIZATION (ICU) / LEVEL OF SERVICE (LOS)*							
	BUILDOUT CONDITIONS WITHOUT PROJECT		*BUILDOUT CONDITIONS WITHOUT PROJECT WITH IMPROVEMENTS (LEVEL 4)*		*BUILDOUT CONDITIONS WITH PROJECT*		*BUILDOUT CONDITIONS WITH PROJECT WITH IMPROVEMENTS (LEVEL 5)*	
	AM PK HR	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*	*AM PK HR*	*PM PK HR*
Golden West St. & I-405 SB Off Ramp	0.55/A	0.76/C	-	-	0.56/A	0.75/C	-	-
McFadden Ave. & Graham St.	0.43/A	0.52/A	-	-	0.44/A	0.54/A	-	-
McFadden Ave. & Springdale St.	0.53/A	0.66/B	-	-	0.59/A	0.74/C	-	-
McFadden Ave. & Edwards St. (HCM Analyses)(1)	0.51/A (26.7/D)	0.86/D (*/F)	- (26.7/D)	- (36.4/D)	0.51/A (29.0/D)	0.91/E (39.6/D)	0.51/A (-)	0.82/D (-)
Edinger Ave. & Graham St.	0.55/A	0.54/A	-	-	0.55/A	0.57/A	-	-
Edinger Ave. & Springdale St.	0.47/A	0.62/B	-	-	0.51/A	0.65/B	-	-

(1) 94HCM Analyses based upon delay. (Delay/LOS)

† There is the potential that these intersections under buildout conditions may operate at an unacceptable LOS. There may be existing / cumulative / project traffic impacts that remain.

Road Segment Analysis

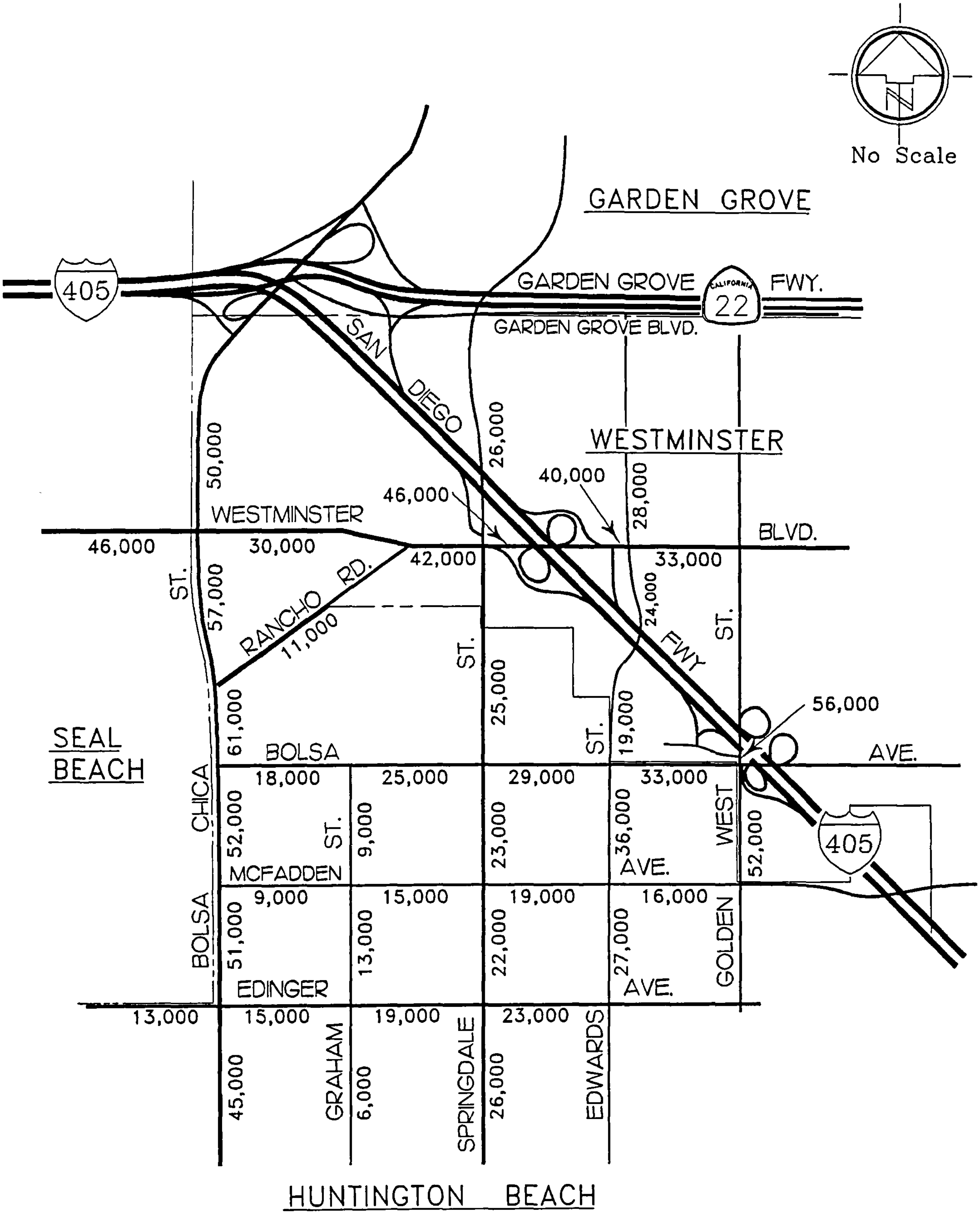
The daily traffic volumes for the Buildout conditions were referenced from the SARA model data and are shown on Figure 12. Table 5 shows a comparison of the Buildout baseline daily traffic volumes, to the estimated roadway capacity at Level of Service E. The General Plan's for the cities of Huntington Beach and Westminster were referenced to obtain any improvements to the road system to be completed for the Buildout conditions. As shown in Table 5, the following road segment links are operating at an unacceptable level.

- Bolsa Chica Street: Westminster Blvd. to Rancho Rd. - (LOS E)
- Bolsa Chica Street: Rancho Rd. to Bolsa Ave. - (LOS D)
- Bolsa Chica Street: Bolsa Ave. to McFadden Ave. - (LOS E)
- Edwards Street: Bolsa Ave. to McFadden Ave. - (LOS E)
- Westminster Blvd.: Rancho Rd. to Springdale St. - (LOS F)
- Westminster Blvd.: I-405 to Edwards St. - (LOS E)

Proposed Improvements - Road Segment Analyses

Table 5 identifies the proposed improvements required for Buildout conditions without the project. The following proposed improvements achieved acceptable Levels of Service for all road segments, except for Bolsa Chica Street between Rancho Road and Bolsa Avenue where an unacceptable LOS D is maintained. Additional proposed improvements beyond 8 lanes on this segment of Bolsa Chica Street would not be considered feasible and there would be remaining significant impacts.

Bolsa Chica Street: Westminster to Rancho -	Currently 6 lanes divided improved to 8 lanes divided. (LOS B)
Bolsa Chica Street: Bolsa to McFadden -	Currently 6 lanes divided improved to 8 lanes divided. (LOS B)
Edwards Street: Bolsa to McFadden -	Currently 4 lanes divided improved to 6 lanes divided. (LOS B)
Westminster Blvd: Rancho to Springdale -	Currently 4 lanes divided improved to 6 lanes divided. (LOS B)
Westminster Blvd: I-405 Fwy. to Edwards -	Currently 4 lanes divided improved to 6 lanes divided. (LOS B)



BUILDOUT WITHOUT PROJECT

DAILY TRAFFIC VOLUMES

FIGURE 12

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BUILDOUT (YEAR 2015) - WITH PROJECT

Buildout conditions were also completed for the with proposed project conditions based on traffic model data. The project traffic volumes were added to the baseline volumes, within the model, and the intersection volumes and daily volumes were provided to us. As mentioned earlier in this study, the project buildout assumptions can be found in Table 6. The buildout trip generation for the site which includes existing site plus projects which are already entitled and the proposed project is shown on Table 10. Intersection and road segment analyses were completed so the proposed project's long term impacts could be evaluated.

Study Intersection Analyses

Intersection analyses were performed at all 22 study intersections based upon the model generated turning movement forecasts, which can be found in Figure 13, and Level 4 improvements. Table 9, which was presented earlier, lists the intersection analyses results under Buildout plus project conditions. All of the study intersections operate at an acceptable (LOS D or better) Level of Service during both the AM and PM peak hours, except for the four study intersections of Westminster/Bolsa Chica, Westminster/Ranch-Hammon, Bolsa/Springdale, and Bolsa/Golden West. The ICU/HCM worksheets for all the study intersections can be referenced in Appendix B.

Proposed Improvements - Intersection Analyses

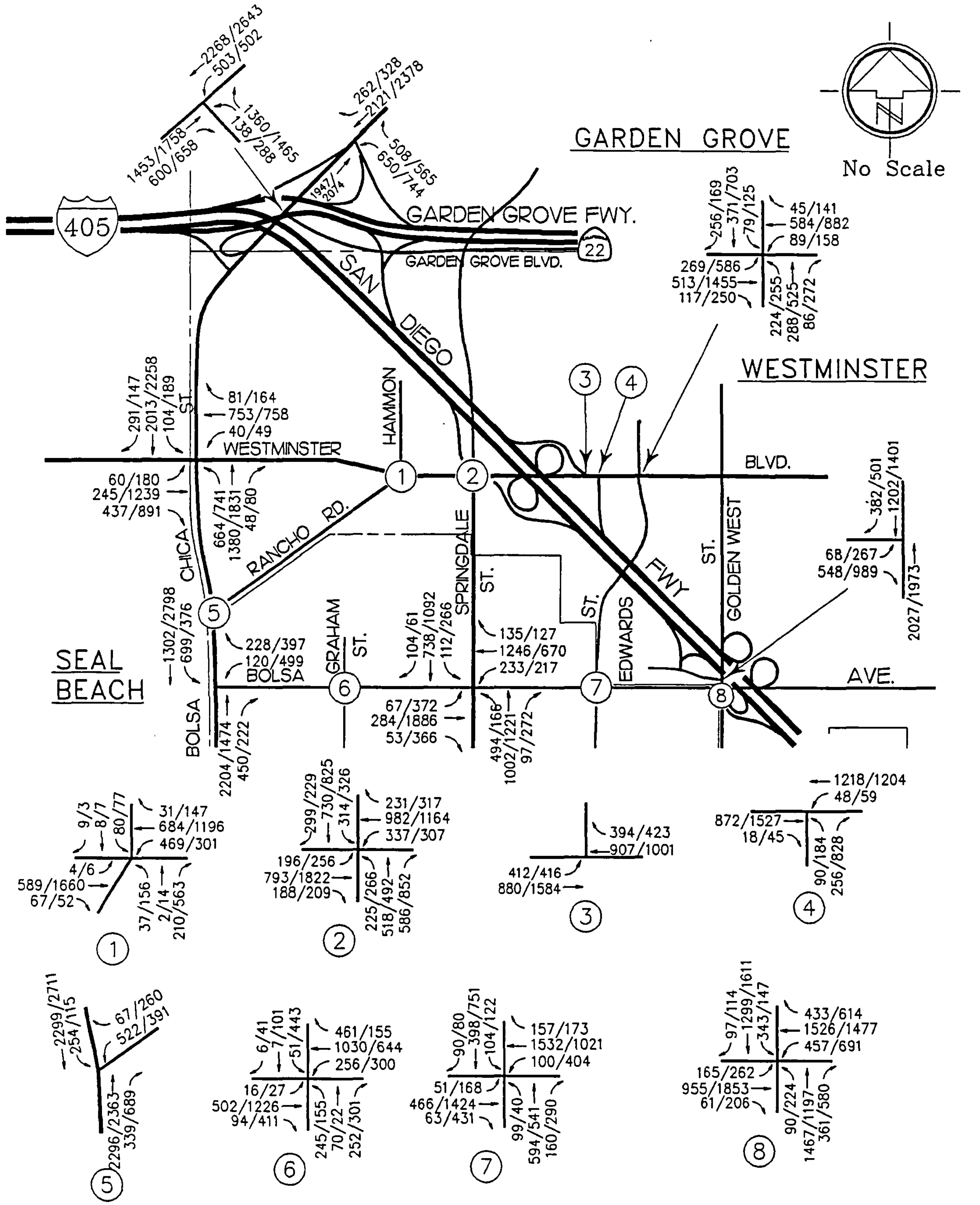
Table 4 identifies the proposed improvements required under Buildout plus project conditions - Level 5. As shown in Table 4, there is one study intersection where proposed improvements are listed. The two intersections of Westminster/Bolsa Chica and Bolsa Avenue/Golden West cannot be fully mitigated with feasible improvements; therefore, some significant traffic impacts remain for Buildout conditions. Improvements for the two study intersections operating at unacceptable Levels of Service, where proposed improvements are possible, are listed below.

- *Bolsa Avenue/Springdale Street* - Add a third southbound through lane and take out southbound right turn lane
- *Westminster/Rancho-Hammon* - Add a third eastbound and westbound through lane

TABLE 10
BUILDOUT TRIP GENERATION
(Existing Plus Entitled Plus Project)
McDonnell Centre Business Park

PLANNING AREA	SIZE	DAILY TRIP GENERATION
PLANNING AREA 1:		
Proposed Project	477,948 SF	3,575
Existing	2,789,053 SF	20,890
SUBTOTAL	3,267,001 SF	24,465
PLANNING AREA 1A:		
Proposed Project	522,720 SF	5,930
Vacant	-	-
SUBTOTAL	522,720 SF	5,930
PLANNING AREA 2:		
Proposed Project	696,617 SF	9,470
Existing	120,000 SF	600
Entitled	699,271 SF	4,350
SUBTOTAL	1,515,888 SF	14,420
PLANNING AREA 3:		
Proposed Project	940,896 SF	10,830
Vacant	-	-
SUBTOTAL	940,896 SF	10,830
PLANNING AREA 4:		
Proposed Project	914,760 SF	10,520
Vacant	-	-
SUBTOTAL	914,760 SF	10,520
PLANNING AREA 5:		
Proposed Project	610,018 SF	16,120
Existing	235,831 SF	3,540
Entitled	369,151 SF	10,470
SUBTOTAL	1,215,000 SF	30,130
TOTAL		96,295

For specific land use assumptions for the proposed project (Table 6) can be referenced.



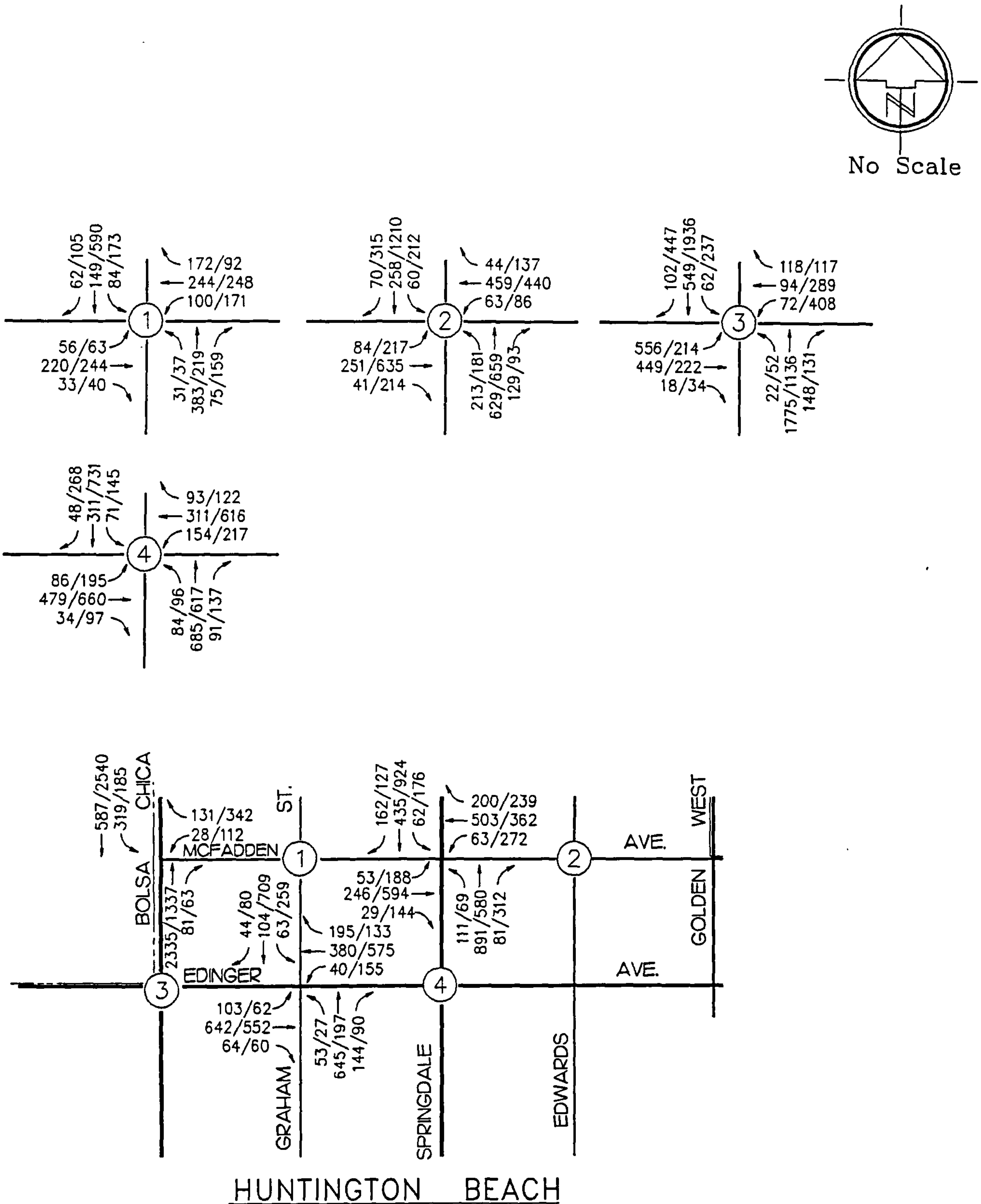
BUILDOUT WITH PROJECT

PEAK HOUR TRAFFIC VOLUMES

950404

WPA TRAFFIC ENGINEERING, INC.

FIGURE 13A



950404
WPA TRAFFIC ENGINEERING, INC.

BUILDOUT WITH PROJECT
PEAK HOUR TRAFFIC VOLUMES

FIGURE 13B

With these improvements, the study intersections of Bolsa/Springdale and Westminster/Rancho-Hammon would operate at an acceptable Levels of Service during both the AM and PM peak hours.

Specific project conditions were identified earlier that would be associated with the interim project/60 percent of the proposed project trip generation totals. Therefore, the project contribution toward any Level 4 or Level 5 improvements would begin after the 60 percent trip budget is exceeded and subsequent to a study to verify the traffic assumptions utilized in this study would still be applicable. It should be noted that the revised traffic impact analysis will not relieve the developer of any obligations for payment of City of Huntington Beach traffic fees.

__Road Segment Analysis__

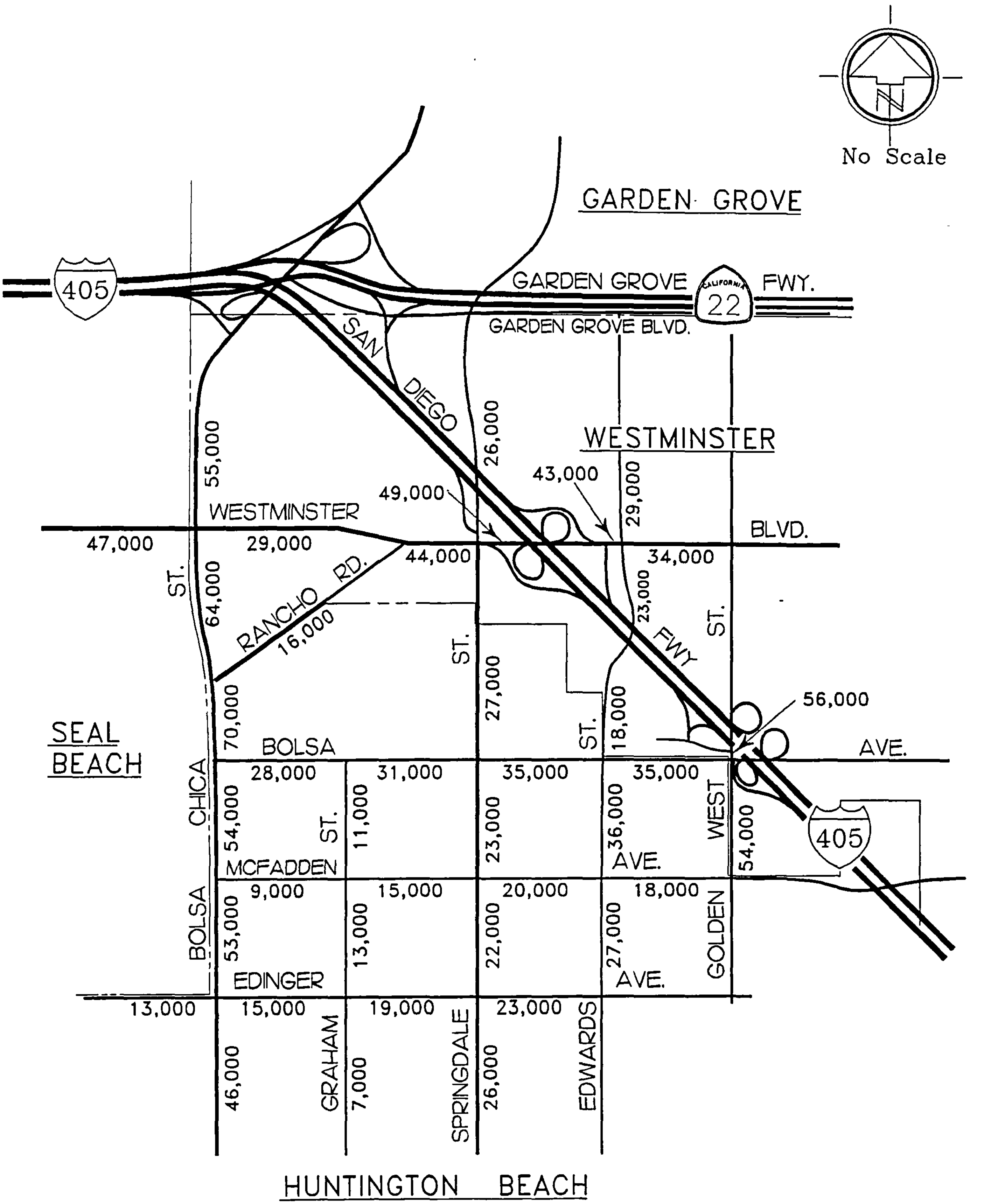
The daily traffic volumes for the Buildout conditions with the project were referenced from the SARA model data and are shown on Figure 14. Table 5 shows a comparison of the Buildout plus project daily traffic volumes, to the estimated roadway capacity at Level of Service E. As shown in Table 5, the following road segment links are operating at an unacceptable level.

- ❒ Bolsa Chica Street: Rancho Rd. to Bolsa Ave. - (LOS E)
- ❒ Bolsa Chica Street: Edinger Ave. to Heil Ave. - (LOS D)

__Proposed Improvements - Road Segment Analyses__

Table 5 identifies the proposed improvements required for Buildout conditions with the project. The following proposed improvements achieved acceptable Levels of Service for the road segment of Edinger to Heil along Bolsa Chica Street. The road segment of Rancho to Bolsa along Bolsa Chica Street would remain at an unacceptable LOS E. Additional proposed improvements beyond 8 lanes divided on this segment of Bolsa Chica Street would not be considered feasible, which would result in some remaining significant impacts at this location.

- ❒ *__Bolsa Chica Street:__ Edinger to Heil* - Currently 6 lanes divided improved to 8 lanes divided. (LOS B)



BUILDOUT WITH PROJECT

DAILY TRAFFIC VOLUMES

FIGURE 14

950403

WPA TRAFFIC ENGINEERING, INC.

PROPOSED CONDITIONS OF APPROVAL

The following are the primary traffic related, proposed conditions of approval. These proposed conditions were developed with input from City of Huntington Beach Traffic Engineering staff as well as representatives from McDonnell Douglas, and are based on the analyses and findings contained within this traffic study.

- The Cit of Huntington Beach shall collect its traffic impact fee as "interim" levels of development occur. These fees will relieve the developer of traffic improvement obligations (as detailed for Levels 1, 2 & 3 as shown in Table 4 of the Traffic Impact Assessment) resulting from the interim levels of development.

- An updated Traffic Impact Assessment (TIA) shall be prepared at the expense of McDonnell Douglas as the interim trip budget is reached. This updated TIA shall be commenced when 90% of the interim trip budget is built or has approved development applications (entitled) and no further development shall be entitled or constructed (beyond that development that generates 100% of trips for the interim trip budget) until the updated TIA and required improvements are reviewed and approved by the City. The purpose of the updated TIA is to determine the required traffic proposed improvements for the remaining buildout of the McDonnell Center Specific Plan Area (currently estimated in Levels 4 & 5 as shown in Table 4 of the TIA). This revised TIA shall not relieve the developer of any obligation to pay any traffic impact fees (should the present or any other traffic impact fee program be in place) or provide for proposed improvements for future development at the time of future developments.

- The City will maintain and update an annual trip budget monitoring report to determine the status of the constructed and approved development applications (entitled) development and resulting expected trips within the McDonnell Center

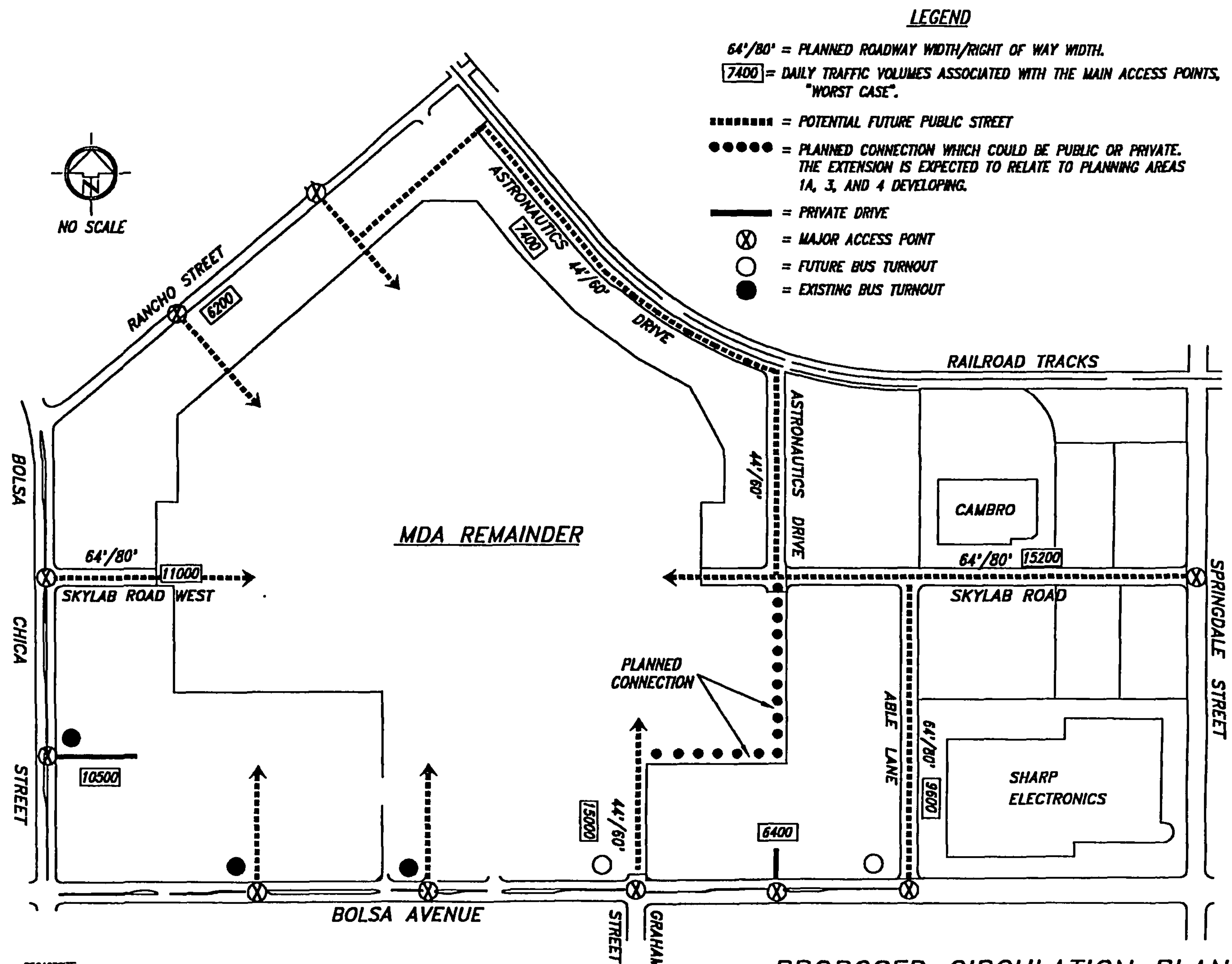
Specific Plan area. This annual trip budget monitoring report shall be based upon building permits issued and (entitled) development within the McDonnell Center. The trip budget monitoring report shall include gross and usable square footages of the constructed and/or entitled usages, a description of the land usage, and the trip generation rates used for the land usage proposed. The trip rates used in the monitoring report shall be those rates contained in the latest *Trip Generation* manual published by the Institute of Transportation Engineers (currently the 5th edition and 5th edition update) or another reliable source as approved by the City Traffic Engineer.

- The interim trip budget is agreed to be calculated upon the cumulative development within the McDonnell Center Specific Plan Area.

ACCESS AND ON-SITE CIRCULATION

The potential access and on-site circulation were reviewed with respect to conditions assuming buildout of the proposed project. These analyses also relate to assumptions utilized in the development of a Specific Plan for the McDonnell Centre site. The Specific Plan is being prepared concurrently with this document, so efforts have been made to maintain a consistency between the traffic assumptions utilized in each study. The access and on-site circulation analyses also include input from the City of Huntington Beach and representatives of McDonnell Douglas Realty.

Figure 15 illustrates the overall McDonnell Centre site, the location of the major access points, and the planned internal connections. This plan was developed based on analyses performed by WPA Traffic Engineering, Inc., then modified by City Staff and McDonnell Douglas representatives in order to provide acceptable results. The analyses included consideration of the trip generation projections for the site, review of the modeling information, collection and analyses of street plans for the adjacent roadways, received input regarding internal roadway configurations, etc.



PROPOSED CIRCULATION PLAN

FIGURE 15

9504035ITE

WPA TRAFFIC ENGINEERING, INC.

TRAFFIC AND TRANSPORTATION ENGINEERING

The projected daily traffic volumes associated with each of the major accesses are also shown on Figure 15. These volumes represent portions of the total on-site traffic, which includes generation from existing developments, entitled projects, and proposed land uses. The volumes shown are actually totals that would access at or near these main access points, since some of these vehicles would actually use right turn driveways near these main accesses.

The projected traffic volumes are anticipated to be adequately served by the proposed main accesses and other secondary right turn only driveways. There is a significant amount of traffic expected to utilize the entries / exits; however, provision of added main driveways did not appear feasible given existing street geometrics, existing / proposed developments, anticipated traffic signal spacings, etc.

These access and internal circulation analyses are at a general level, since the magnitude of the project is large and the specific added uses are not well defined (i.e. Planning Area 5 could contain significant retail, but market conditions may dictate employment type uses as more viable). It is also possible that actual projects that are developed may not result in the maximum trip generations that could occur. This appears to be the current trend based on some recent projects in Planning Areas 2 and 3.

Overall, some of the primary findings and recommendations relative to the access and on-site circulation are listed below.

- ❖ The main access points are anticipated to be signalized, if they presently are not. The future project traffic would warrant signalization; however, the timing would depend on the types of projects developed. Signal warrants should be reviewed as specific projects are identified.

- ❖ Left turn ingress should also be reviewed as specific projects are proposed to assure adequate storage. The locations of the main accesses, however, consider the existing median locations / access needs and should allow provision of adequate storage to serve the proposed projects.

It is possible that some locations may require dual left turn lanes, depending on the development levels and types that eventually occur.

- The capacity of the internal roadways is expected to be adequate to serve the maximum buildout potential of the proposed project.

- Some of the planned internal roadway widths and right-of-ways are designed to conform to City standards, so they can be more easily dedicated to the City as public streets.

- Any added driveways (primarily right turn only) would need to be reviewed and approved by Traffic Engineering / Public Works. This is expected to occur on a case-by-case basis in conjunction with specific proposed developments.

- There are three potential locations for the westerly main access at Bolsa Avenue to occur. Any one of the three locations should provide acceptable operations; the location would likely be dictated by the future development plans in this area.

- The proposed Circulation Plan is anticipated to provide adequate access and on-site circulation to serve the proposed project.

PRELIMINARY "FAIR SHARE" ESTIMATE

***PEAK HOUR*:**

"*Fair Share*" Percentage = Project Volume / [(Future With Project) - Existing]

INTERIM = 186 / [3,045 - 2,217] = **22%**

BUILDOUT = 310 / [4,182 - 2,217] = **16%**

IMPROVEMENT COSTS = $157,630.00

- Estimate Attached
- For Improvements Levels 1 - 5

***FAIR SHARE ESTIMATE*:**

$$\frac{22\% + 16\%}{2} = 19\%$$

$157,630.00 X 19% = **$29,950.00** = **Project's "*Fair Share*" Toward Levels 1 - 5 Improvements**

NOTE: These estimates are subject to City of Huntington Beach Staff review.

#950403.fsc

COST ESTIMATE

REVISED 6-20-97

LOCATION: RANCHO & WESTMINSTER

DATE: 6-19-97

JOB:

BY: WPA

ITEM	QUANTITY	UNIT COST	EXTENSION
REMOVE CURB & GUTTER	295 LF	3.50	1035
REMOVE SIDEWALK	805 SF	1.35	1085
REM. AC PAVEMENT	115 SY	4	460
CONST. C&G	610 LF	3.50	2135
CONST. SIDEWALK	825 SF	3.50	2890
AC PAVEMENT	60 TON	40	2400
ROADWAY EARTHWORK	5 CY	20	100
REMOVE DRAIN INLET	2 EA	1500	3000
CONST. DRAIN INLETS	2 EA	3500	7000
ADJUST M.H. TO GRADE	1 EA	500	500
SIGNAL MODIFICATIONS		LS	95000
STRIPING & SIGNING		LS	3000
OFFSITE IMPROVEMENTS (R&R SIGN, PARKING LOT LIGHT, WHEEL STOPS)	REVISION	LS	7500

SUBTOTAL 126,105

Contingencies 25%

TOTAL 157,630

Weston Pringle & Associates

APPENDIX C

MARCH 1997 PARKING ANALYSIS

PAUL E. COOK AND ASSOCIATES
TRAFFIC AND TRANSPORTATION ENGINEERING

RECEIVED
- 3 1997

March 12, 1997

Ms. Jane Madera
Assistant Planner
Department of Community Development
City of Huntington Beach
2000 Main Street
Huntington Beach, CA 92648

Subject: Parking Analysis, McDonnell Douglas Aerospace Facility

Dear Ms. Madera,

I have been retained by McDonnell Douglas Realty Company to conduct an analysis of the parking requirements by City code for the McDonnell Douglas Aerospace (MDA) facility in the City of Huntington Beach and the space available on the property to construct additional parking in the future if necessary. This study is being requested by the City because of proposed development on vacant property adjacent to the MDA facility.

The Exhibits included in this analysis were prepared by McDonnell Douglas Realty Company and were verified as accurate by Paul E. Cook and Associates.

REQUIRED PARKING

Exhibit I provides a summary of all the existing MDA buildings within Planning Area 1 (see Exhibit IV) with the primary use, gross square footage and associated required parking by City code. The total gross square footage for all of the buildings, including temporary trailers, is 2,490,877 square feet. The total required parking by City code is 6,815 spaces.

AVAILABLE PARKING

Exhibit II shows the total parking spaces currently available and in use by the MDA buildings within Planning Area 1. At the current MDA employment level, there is an abundance of unused parking spaces. The number of parking spaces is broken down by specific parking lot. There are currently a total of 5,944 parking spaces available on-site. Exhibit II also includes a tabulation of potential additional surface parking spaces on MDA property that can be developed if future demand should require. Assuming 125 spaces per acre, a total of 1,990 additional parking spaces can be developed on the 15.9 acres which comprise the five potential future surface parking areas shown on Exhibit III.

Exhibit III is a site plan of the entire 307 acre McDonnell Centre Business Park. It shows the following:

1. Existing parking lots listed in Exhibit II which currently provide 5,944 parking spaces.

2. Five potential future surface parking areas which can provide 1,990 additional parking spaces.

3. Four potential locations for parking structures in parking lots C, E/F, K and U. The total number of parking spaces that can be developed in these parking structures far exceed future demand in any feasable scenario. For example, a five level parking structure in Lot C would provide 2,500 additional parking spaces. A five level parking structure in Lot E/F would provide 2,900 additional parking spaces.

CONCLUSIONS

The required parking for the MDA facility by City code is 6,815 spaces. There are currently 5,944 parking spaces available on-site for MDA parking. There are 1,990 parking spaces that can be developed on five potential future surface parking areas on-site which could result in excess parking of 1,119 spaces over that required by City code. In addition, there are several thousand new parking spaces that can be developed in five potential future parking structures in the proposed McDonnell Centre Business Park that can be made available to MDA or other future developments.

Parking spaces lost by development of Airtech represent excess capacity for current and foreseeable MDA needs and are not included as available parking in Exhibit II. Lot J shown on Exhibit III is considered excess capacity and is not included as available parking in Exhibit II.

Ms. Jane Madera
March 12, 1997
Page 3

Also, Exhibit II does not include available parking for the two existing office buildings in Planning Area 5. The on-site parking for these buildings currently meets City code.

There is no need to construct any of the potential parking spaces at this time.

Please contact me at (714)960-8298 if you have any questions or would like to discuss this parking analysis.

Sincerely,

Paul E. Cook
President

HUNTINGTON BEACH

CODE REQ'D PARKING FOR AEROSPACE FACILITY-AREA#1

Bldg #	Primary Use	Gross Sq. Ft.	Office	Mfg	Lab	Wrhse	Parking Req'd
10	Office	193,494	x				774
10A-D	Office Interchange	14,786	x				60
11thru14	Office 4@180,000	720,000	x				2880
16	Cafeteria*	22,016					20
21	Office & Mfg	158,980	x	x			436
22	R & D Labs	132,503			x		265
22A	Storage	592				x	1
22B	Storage	3,099				x	3
30	Structures Lab	36,782			x		74
31	Mech/Prop/Sim Labs	38,406			x		78
32	Pneumatic Test Lab	588			x		2
33	Storage	23,704				x	24
36	Storage	15,159				x	15
37	Garage	4,119				x	4
38	Water reservoir	10,577					0
39	Storage	37,981				x	38
39A	Storage	96				x	0
39B	Storage	800				x	1
39C	Storage	380				x	1
40	Tool Fabrication	23,152		x			47
41	Metrology Lab	23,750			x		48
42	Mfg Test Lab	30,935			x		62
43	Vibration Lab	8,218			x		17
44	Tool Fabrication	9,903		x			20
44A	Storage	1,473				x	2
45	Manufacturing	278,368		x			557
45A	Welding	20,991		x			42
45B	Tool Fabrication	9,911		x			20
45C	Steam Clean	1,512		x			3
45D	Prod. Stockroom	12,476				x	13
46C	Assembly/Mfg	30,613		x			61
46N	Manufacturing	215,377		x			431
46S	Electronics Mfg	168,904		x			338
49	Fabrication	187,210.		x			375
49A	Mfg/Autoclave	1,500		x			3
49B	Engr Lab Autoclave	400			x		1
M1thruM8	Storage	13,540				x	14
M10	Titan Assembly	9,000		x			18
Trailers	Storage	17,788				x	18
T35	Transp. Office	700	x				3
T44	Lab Office	2,879	x				12
T50	Office	4,109	x				17
T54	Office	4,106	x				17
		2,490,877					6815
	*Employees only						
	Parking Ratios		4/1000	2/1000	2/1000	1/1000	

EXHIBIT I

Rev #1 2-27-97

HUNTINGTON BEACH

1. CURRENT AVAILABLE PARKING IN SUPPORT OF AREA 1

Parking Lot	Stalls	Parking Lot	Stalls
A	130	H	367
B2	134	Skylab Rd	24
B3	40	R	361
C	1017	U	623
D	876	V	125
E	471	W	272
F	764	X	97
G1	309	Y	90
G2	93	Z	151
		TOTAL	5944

2. POTENTIAL FUTURE SURFACE PARKING

Area	Stalls
1	322
2	780
3	688
4	144
5	56
TOTAL	1990

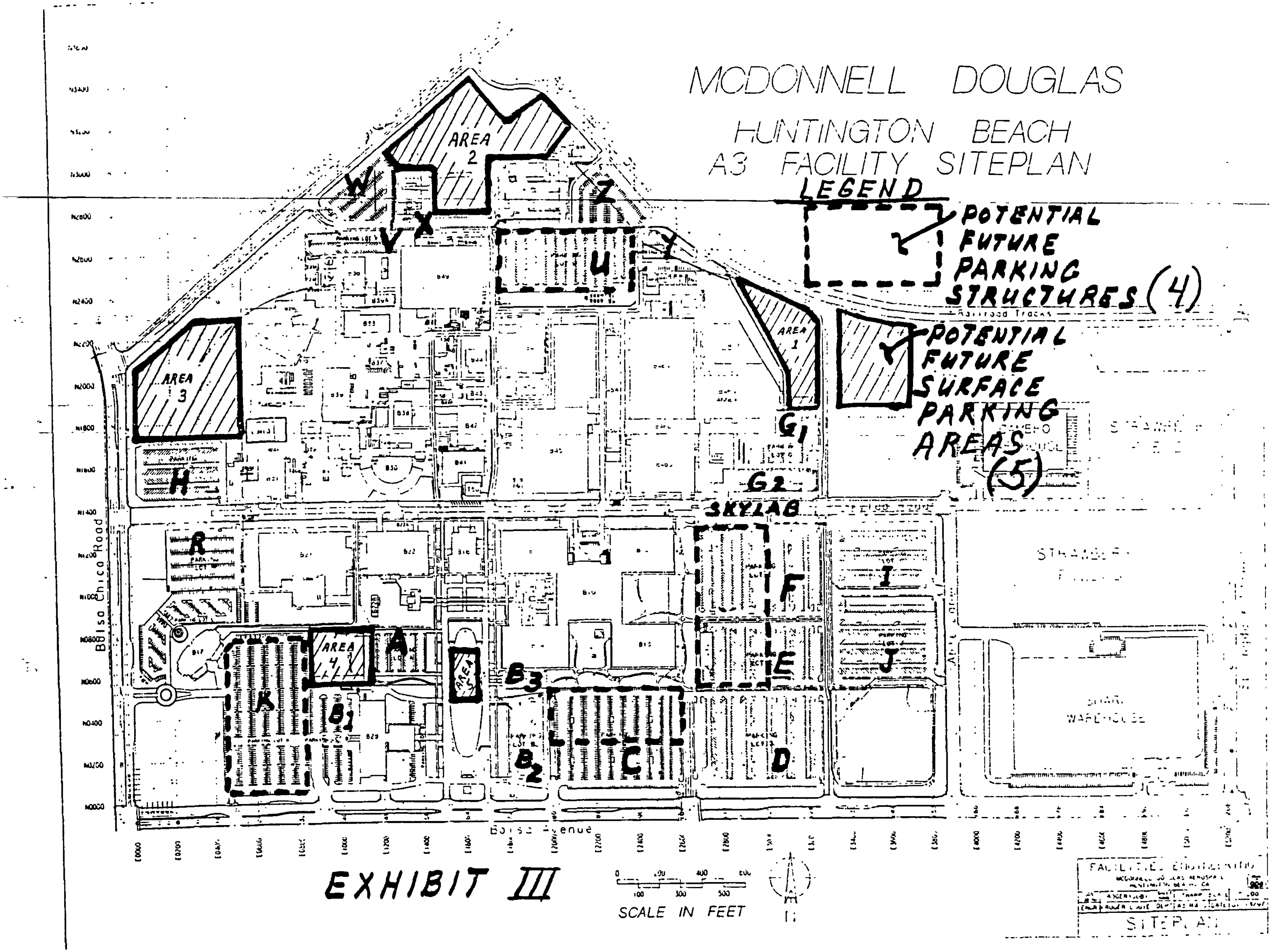
This assumes surface parking at 125 stalls per acre.

3. SUMMARY

Required parking per City code	6815
Parking currently available	5944
Theoretical shortage	871
Additional potential surface parking	<1990>
Potential excess stalls available	<1119>

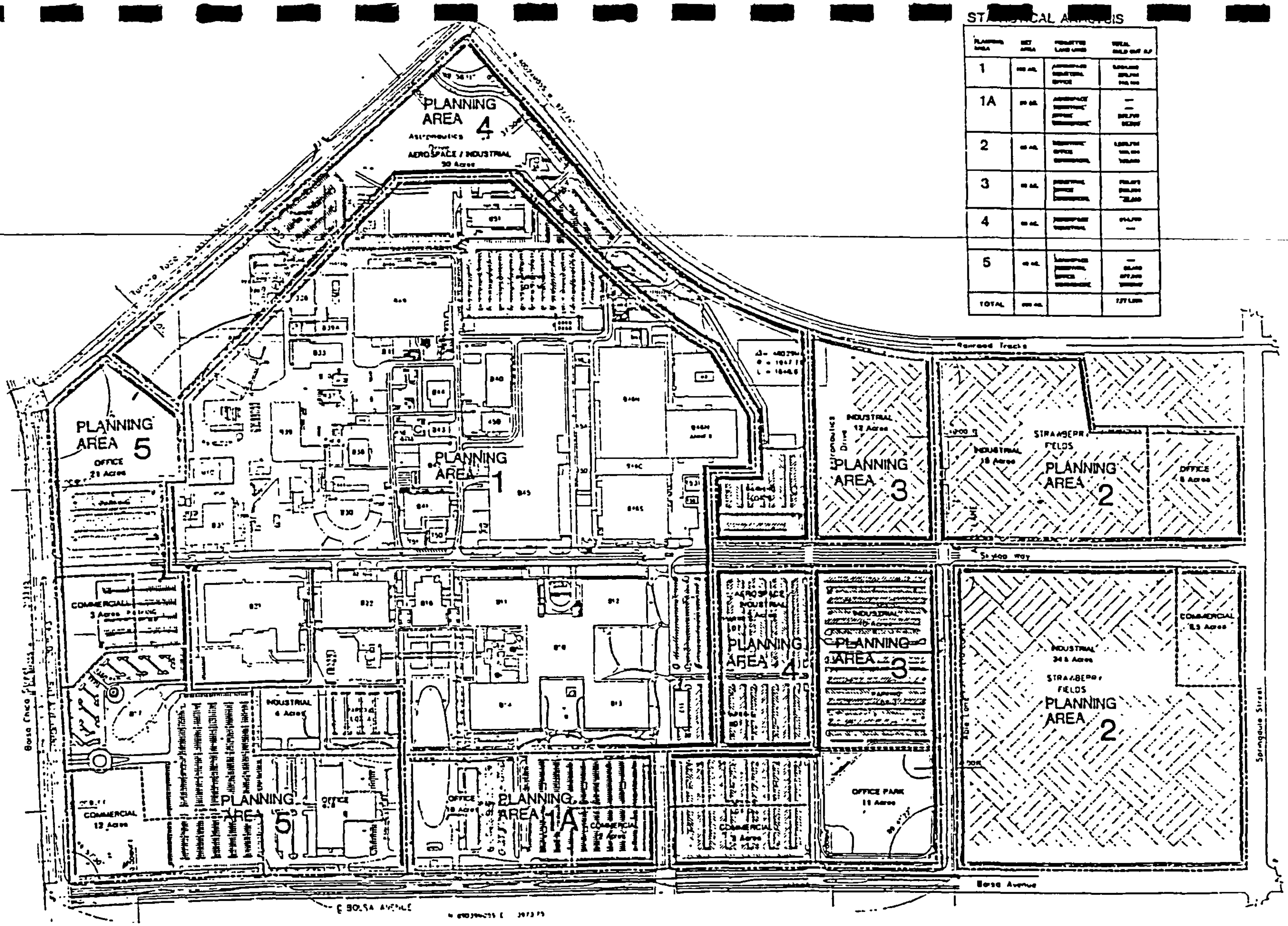
REVISION #1 2-27-97

EXHIBIT II



MCDONNELL DOUGLAS
HUNTINGTON BEACH
A3 FACILITY SITEPLAN
LEGEND
POTENTIAL FUTURE PARKING STRUCTURES (4)
POTENTIAL FUTURE SURFACE PARKING AREAS (5)
AREA 1
AREA 2
AREA 3
AREA 4
AREA 5
SKYLAB
Railroad Tracks
Bolsa Chica Road
Bolsa Avenue
SCALE IN FEET
FACILITIES ENGINEERING
SITEPLAN

EXHIBIT III



Land Use Plan

Exhibit 5

EXHIBIT IV

APPENDIX D

EDAW AIR MODELING

PROJECT NAME: McDonnell Centre EIR **Date: 03-22-1997**
Project Area 1

Project Area: South Coast (LA Region)
Analysis Year: 2015 Temperature (F): 75 Season: Summer
EMFAC Version: Emfac7f1.1(12/93)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Tot Trips
Office/Office Park	15.0/1000 Sqft	148	2220
Warehouse	5.0/1000 Sqft	76	380
Manufacturing	3.9/1000 Sqft	253	987

Vehicle Assumptions:
Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Duty Autos	72.3	0.0	100.0	0.0
Light Duty Trucks	16.3	0.0	100.0	0.0
Medium Duty Trucks	5.4	0.0	100.0	0.0
Heavy Duty Trucks	2.4	11.0	89.0	N/A
Heavy Duty Trucks	0.8	N/A	N/A	100.0
Motorcycles	2.8	100.0	N/A	N/A

Travel Conditions:

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Trip Length	8.8	3.2	5.2	8.1	5.5
% Started Cold	88.7	40.5	59.0	78.0	27.8
Trip Speed	25	25	25	25	25
Percent Trip	27.3	21.2	51.5		

Project Emissions Report in Lb/Day:

Unit Type	TOG	CO	NOx
Office/Office Park	11.14	108.12	17.25
Warehouse	1.92	18.68	2.97
Manufacturing	5.64	55.34	8.57
TOTALS	18.71	182.14	28.79

Project Emissions Report in Lb/Day (Continued):

Unit Type	FUEL (Gal.)	PM10	SOx
Office/Office Park	699.9	3.33	2.25
Warehouse	120.7	0.57	0.39
Manufacturing	349.4	1.66	1.12
TOTALS	1170.0	5.56	3.76

PROJECT NAME: McDonnell Centre EIR **Date: 03-22-1997**
Planning Area 1a

Project Area: South Coast (LA Region)
Analysis Year: 2015 Temperature (F): 75 Season: Summer
EMFAC Version: Emfac7f1.1(12/93)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Tot Trips
Office/Office Park	15.0/1000 Sqft	261	3915
R & D	7.7/1000 Sqft	261	2010

Vehicle Assumptions:
Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Duty Autos	72.3	0.0	100.0	0.0
Light Duty Trucks	16.3	0.0	100.0	0.0
Medium Duty Trucks	5.4	0.0	100.0	0.0
Heavy Duty Trucks	2.4	11.0	89.0	N/A
Heavy Duty Trucks	0.8	N/A	N/A	100.0
Motorcycles	2.8	100.0	N/A	N/A

Travel Conditions:

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Trip Length	8.8	3.2	5.2	8.1	5.5
% Started Cold	88.7	40.5	59.0	78.0	27.8
Trip Speed	25	25	25	25	25
Percent Trip	27.3	21.2	51.5		

Project Emissions Report in Lb/Day:

Unit Type	TOG	CO	NOx
Office/Office Park	19.65	190.67	30.41
R & D	10.17	98.81	15.73
TOTALS	29.82	289.48	46.14

Project Emissions Report in Lb/Day (Continued):

Unit Type	FUEL (Gal.)	PM10	SOx
Office/Office Park	1234.2	5.86	3.97
R & D	638.5	3.03	2.05
TOTALS	1872.7	8.90	6.02

PROJECT NAME: **McDonnell Centre EIR** **Date: 03-22-1997**
Planning Area 2

Project Area: South Coast (LA Region)
Analysis Year: 2015 Temperature (F): 75 Season: Summer
EMFAC Version: Emfac7f1.1(12/93)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Tot Trips
Office/Office Park	15.0/1000 Sqft	149	2235
Warehouse	5.0/1000 Sqft	149	745
Light Industrial	13.0/1000 Sqft	298	3874
Restaurant	350.0/1000 Sqft	4	1400
Hotel	10.0/Unit	120	1200

Vehicle Assumptions:
Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Duty Autos	72.3	0.0	100.0	0.0
Light Duty Trucks	16.3	0.0	100.0	0.0
Medium Duty Trucks	5.4	0.0	100.0	0.0
Heavy Duty Trucks	2.4	11.0	89.0	N/A
Heavy Duty Trucks	0.8	N/A	N/A	100.0
Motorcycles	2.8	100.0	N/A	N/A

Travel Conditions:

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Trip Length	8.8	3.2	5.2	8.1	5.5
% Started Cold	88.7	40.5	59.0	78.0	27.8
Trip Speed	25	25	25	25	25
Percent Trip	27.3	21.2	51.5		

Project Emissions Report in Lb/Day:

Unit Type	TOG	CO	NOx
Office/Office Park	11.22	108.85	17.36
Warehouse	3.77	36.63	5.83
Light Industrial	19.61	190.46	30.32
Restaurant	5.71	54.30	9.16
Hotel	4.89	46.54	7.85
TOTALS	45.20	436.79	70.51

Project Emissions Report in Lb/Day (Continued):

Unit Type	FUEL (Gal.)	PM10	SOx
Office/Office Park	704.6	3.35	2.26
Warehouse	236.7	1.12	0.76
Light Industrial	1230.7	5.85	3.96
Restaurant	368.2	1.75	1.18
Hotel	315.6	1.50	1.01
TOTALS	2855.9	13.57	9.18

PROJECT NAME: McDonnell Centre EIR **Date: 03-22-1997**
Project Area 3

Project Area: South Coast (LA Region)
Analysis Year: 2015 Temperature (F): 75 Season: Summer
EMFAC Version: Emfac7f1.1(12/93)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Tot Trips
Office/Office Park	15.0/1000 Sqft	235	3525
Warehouse	5.0/1000 Sqft	235	1175
Light Industrial	13.0/1000 Sqft	470	6110

Vehicle Assumptions:
Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Duty Autos	72.3	0.0	100.0	0.0
Light Duty Trucks	16.3	0.0	100.0	0.0
Medium Duty Trucks	5.4	0.0	100.0	0.0
Heavy Duty Trucks	2.4	11.0	89.0	N/A
Heavy Duty Trucks	0.8	N/A	N/A	100.0
Motorcycles	2.8	100.0	N/A	N/A

Travel Conditions:

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Trip Length	8.8	3.2	5.2	8.1	5.5
% Started Cold	88.7	40.5	59.0	78.0	27.8
Trip Speed	25	25	25	25	25
Percent Trip	27.3	21.2	51.5		

Project Emissions Report in Lb/Day:

Unit Type	TOG	CO	NOx
Office/Office Park	17.69	171.68	27.38
Warehouse	5.95	57.77	9.19
Light Industrial	30.93	300.40	47.81
TOTALS	54.57	529.84	84.39

Project Emissions Report in Lb/Day (Continued):

Unit Type	FUEL (Gal.)	PM10	SOx
Office/Office Park	1111.3	5.28	3.57
Warehouse	373.3	1.77	1.20
Light Industrial	1941.1	9.22	6.24
TOTALS	3425.7	16.28	11.01

PROJECT NAME: McDonnell Centre EIR **Date: 03-22-1997**
Project Area 4

Project Area: South Coast (LA Region)
Analysis Year: 2015 Temperature (F): 75 Season: Summer
EMFAC Version: Emfac7f1.1(12/93)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Tot Trips
Office/Office Park	15.0/1000 Sqft	228	3420
Warehouse	5.0/1000 Sqft	229	1145
Light Industrial	13.0/1000 Sqft	457	5941

Vehicle Assumptions:
Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Duty Autos	72.3	0.0	100.0	0.0
Light Duty Trucks	16.3	0.0	100.0	0.0
Medium Duty Trucks	5.4	0.0	100.0	0.0
Heavy Duty Trucks	2.4	11.0	89.0	N/A
Heavy Duty Trucks	0.8	N/A	N/A	100.0
Motorcycles	2.8	100.0	N/A	N/A

Travel Conditions:

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Trip Length	8.8	3.2	5.2	8.1	5.5
% Started Cold	88.7	40.5	59.0	78.0	27.8
Trip Speed	25	25	25	25	25
Percent Trip	27.3	21.2	51.5		

Project Emissions Report in Lb/Day:

Unit Type	TOG	CO	NOx
Office/Office Park	17.16	166.57	26.57
Warehouse	5.80	56.29	8.96
Light Industrial	30.07	292.09	46.49
TOTALS	53.03	514.95	82.02

Project Emissions Report in Lb/Day (Continued):

Unit Type	FUEL (Gal.)	PM10	SOx
Office/Office Park	1078.2	5.12	3.47
Warehouse	363.8	1.73	1.17
Light Industrial	1887.4	8.97	6.07
TOTALS	3329.3	15.82	10.70

PROJECT NAME: McDonnell Centre EIR **Date: 03-22-1997**
Project Area 5

Project Area:	South Coast (LA Region)
Analysis Year:	2015 Temperature (F): 75 Season: Summer
EMFAC Version:	Emfac7f1.1(12/93)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Tot Trips
Office/Office Park	15.0/1000 Sqft	134	2010
Light Industrial	13.0/1000 Sqft	98	1274
Hotel	10.0/Unit	150	1500
Retail	70.0/1000 Sqft	150	10500
R & D	7.7/1000 Sqft	107	824

Vehicle Assumptions:
Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Duty Autos	72.3	0.0	100.0	0.0
Light Duty Trucks	16.3	0.0	100.0	0.0
Medium Duty Trucks	5.4	0.0	100.0	0.0
Heavy Duty Trucks	2.4	11.0	89.0	N/A
Heavy Duty Trucks	0.8	N/A	N/A	100.0
Motorcycles	2.8	100.0	N/A	N/A

Travel Conditions:

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Trip Length	8.8	3.2	5.2	8.1	5.5
% Started Cold	88.7	40.5	59.0	78.0	27.8
Trip Speed	25	25	25	25	25
Percent Trip	27.3	21.2	51.5		

Project Emissions Report in Lb/Day:

Unit Type	TOG	CO	NOx
Office/Office Park	10.09	97.89	15.61
Light Industrial	6.45	62.64	9.97
Hotel	6.12	58.18	9.81
Retail	42.13	399.99	67.78
R & D	4.17	40.51	6.45
TOTALS	68.95	659.20	109.62

Project Emissions Report in Lb/Day (Continued):

Unit Type	FUEL (Gal.)	PM10	SOx
Office/Office Park	633.7	3.01	2.04
Light Industrial	404.7	1.92	1.30
Hotel	394.5	1.87	1.27
Retail	2723.5	12.94	8.75
R & D	261.7	1.24	0.84
TOTALS	4418.2	20.99	14.20

AIR EMISSION SUMMARY

Project: McDonnell Douglas Centre EIR *Study Year: 2015*

VEHICULAR EMISSIONS (From URBEMIS5)

Contaminant	CO	NOx	SOx	Particulates	TOG
Emis. (Lb/Dy)	2,612.40	421.40	54.90	81.20	267.30
Emis. (Tn/Dy)	1.3062	0.2107	0.0275	0.0406	0.1337

ONSITE EMISSIONS DUE TO NATURAL GAS COMBUSTION (stationary) Gas Use

Unit Type	Ft3/DU/Mo	DU or Ft2		(Ft3/Dy)
Single Fam.	6,665	0		0
Mult. Fam. <=4	4,105	0		0
Mult. Fam. >=5	3,918	0		0
	Ft3/Ft2/Mo		Subtotal Res.	0
Office/Other	2	1,160,765		76,116
Shopping Center	2.9	150,000		14,262
Hotel	4.8	216,000		33,993
Industrial	3.3	2,636,198		285,228
			Subtotal Comm.	409,599
			Total	409,599

Contaminant	CO	NOx	SOx	Particulates	TOG
Factor (lbs/10^6 ft3)	20	80/120	0	0.15	5.3
Emis. (Lb/Dy)	8.19	49.15	0.00	0.06	2.17

Useage Factor Source: So. Cal. Gas Co. Emission Factor Source: SCAQMD

OFFSITE EMISSIONS DUE TO ELECTRICAL GENERATION (stationary) Elect. Use

Unit Type	KWH/Yr/DU	No. DUorFt2		(KWH/Dy)
Residential	6081	0		0
	KWH/Ft2/Yr			
Office/Mixed Use	8.8	1,156,765		27,889
Restaurant	47.3	4,000		518
Retail	11.8	150,000		4,849
Food Service	51.4	0		0
Industrial	3.4	2,636,198		24,556
School	6.3	0		0
College	11.6	0		0
Hospital	17.9	0		0
Hotel/Motel	6.8	216,000		4,024
Miscellaneous	12.2	0		0
			Total	61,837

AIR EMISSION SUMMARY

Project: McDonnell Douglas Centre EIR *Study Year: 2015*

Contaminant	CO	NOx	SOx	Particulates	TOG
Factor (lbs/1000KWH)	0.2	1.15	0.12	0.04	0.01
Emis. (Lb/Dy)	12.37	71.11	7.42	2.47	0.62

Useage Factor Source: So. Cal. Edison Emission Factor Source: SCAQMD

SUBTOTAL STATIONARY EMISSIONS

Emis. (Lb/Dy)	20.6	120.3	7.4	2.5	2.8
Emis. (Tn/Dy)	0.01	0.06	0.00	0.00	0.00

TOTAL EMISSIONS

Contaminant	**CO**	**NOx**	**SOx**	**Particulates**	**TOG**
Emis. (Lb/Dy)	2,633.0	541.7	62.3	83.7	270.1
Emis. (Tn/Dy)	1.3165	0.2708	0.0312	0.0419	0.1350
Threshold	550	55	150	150	55
Exceedence	379%	885%	n/a	n/a	391%

SOx= Sulfur Oxides CO=Carbon Monoxide
NOx=Nitrogen Oxides TOG=Total Organic Gases/Hydrocarbons

APPENDIX E

EDAW NOISE MODELING

TABLE 1A
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: SPRINGDALE
NOTES: EXISTING

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 23000   SPEED (MPH): 45   GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33.25   SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.45

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
75.0	215.0	672.5	2124.2

TABLE 1B
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: SPRINGDALE
NOTES: FUTURE W/O PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 25000 SPEED (MPH): 45 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33.25 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.81

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
80.2	233.3	730.9	2308.9

TABLE 1C
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: SPRINGDALE
NOTES: FUTURE W/ PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 27000 SPEED (MPH): 45 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33.25 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.14

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
85.6	251.6	789.2	2493.5

TABLE 2A
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: BOLSA CHICA S/O RANCHO
NOTES: EXISTING

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 42000   SPEED (MPH): 45   GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 44.5   SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.68

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
130.5	390.5	1227.4	3878.7

TABLE 2B
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: BOLSA CHICA S/O RANCHO
NOTES: FUTURE W/O PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 61000 SPEED (MPH): 45 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS			
	75.51	12.57	9.34
M-TRUCKS			
	1.56	0.09	0.19
H-TRUCKS			
	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 44.5 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.30

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
183.6	565.1	1782.0	5633.0

TABLE 2C
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: BOLSA CHICA S/O RANCHO
NOTES: FUTURE W/ PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 70000   SPEED (MPH): 45   GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 44.5   SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.90

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
209.2	648.0	2044.7	6464.0

TABLE 3A
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: RANCHO
NOTES: EXISTING

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6000 SPEED (MPH): 40 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 16 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 63.10

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	131.8	413.9

TABLE 3B
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: RANCHO
NOTES: FUTURE W/O PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 11000 SPEED (MPH): 40 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 16 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.74

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	77.5	240.3	758.3

TABLE 3C
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: RANCHO
NOTES: EXISTING W/ PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 16000 SPEED (MPH): 40 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 16 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.36

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	111.4	349.1	1102.9

TABLE 4A
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: BOLSA CHICA N/O RANCHO
NOTES: EXISTING

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 41000 SPEED (MPH): 45 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 44.5 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.57

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
127.8	381.3	1198.2	3786.3

TABLE 4B
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: BOLSA CHICA N/O RANCHO
NOTES: FUTURE W/O PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 57000 SPEED (MPH): 45 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 44.5 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
172.3	528.3	1665.2	5263.7

TABLE 4C
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: BOLSA CHICA N/O RANCHO
NOTES: FUTURE W/ PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 64000 SPEED (MPH): 45 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 44.5 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.51

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
192.2	592.8	1869.6	5910.0

TABLE 5A
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: WESTMINSTER W/O RANCHO
NOTES: EXISTING

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 16000 SPEED (MPH): 45 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33.5 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.86

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	151.5	468.5	1478.0

TABLE 5B
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: WESTMINSTER W/O RANCHO
NOTES: FUTURE W/O PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 30000 SPEED (MPH): 45 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33.5 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.59

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
93.8	279.1	876.8	2770.5

TABLE 5C
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: WESTMINSTER W/O RANCHO
NOTES: FUTURE W/ PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 29000 SPEED (MPH): 45 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33.5 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.44

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
91.1	269.9	847.6	2678.2

TABLE 6A
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: WESTMINSTER E/O RANCHO
NOTES: EXISTING

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 24000   SPEED (MPH): 40   GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33.5   SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.35

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
62.1	168.8	524.1	1654.3

TABLE 6B
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: WESTMINSTER E/O RANCHO
NOTES: FUTURE W/O PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 42000 SPEED (MPH): 40 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33.5 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.78

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
97.5	291.4	916.0	2894.6

TABLE 6C
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3-20-97
ROADWAY SEGMENT: WESTMINSTER E/O RANCHO
NOTES: FUTURE W/ PROJECT

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 44000 SPEED (MPH): 40 GRADE: 0

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33.5 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.98

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
101.6	305.1	959.5	3032.4

APPENDIX F

ADAMS-STREETER UTILITIES MASTER PLAN AND CORRESPONDENCE RELATED TO DRAINAGE/HYDROLOGY ANALYSIS

JN961097

TECHNICAL APPENDIX TO EIR NO.
INFRASTUCTURE MASTER PLAN
FOR
McDONNELL DOUGLAS AEROSPACE

HUNTINGTON BEACH, CALIFORNIA

PREPARED FOR

McDONNELL DOUGLAS REALTY COMPANY

4060 LAKEWOOD BLVD., 6th FLOOR
LONG BEACH, CA 90808

PREPARED BY

ADAMS-STREETER CIVIL ENGINEERS INC.

15 CORPORATE PARK
IRVINE, CA 92714

NOVEMBER 18, 1996
REVISED FEBRUARY, 1997
REVISED MARCH, 1997

FILE F:\961097\HYDRO\1097MUST.DOC

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-Sanitary sewer flow calculations

-Sanitary sewer flows (table I)
-Sewer system model, existing conditions (table II)
-Sewer system model, proposed conditions (table III)

-Sanitary sewer exhibits

-Existing and proposed sewer (exhibit 6)
-Proposed sewer (exhibit sw-2, folded)
-Existing sewer (exhibit sw-1, folded)

3. Water system

-water system network analysis

- water system exhibits

- existing and proposed water system (exhibit 5)

INTRODUCTION

1. <u>Existing and Proposed Drainage Facilities</u>

The entire drainage system for this project is shown in Exhibit 7 and Exhibit SD-1, existing storm drain system. There are three existing storm drain systems surrounding the project area: The south-east corner of the area draining southerly and easterly into the Orange County Flood Control District (O.C.F.C.D.) C-4 Westminster Channel; and the area to the south draining westerly into the O.C.F.C.D. C-2 Bolsa Chica channel; the areas on the north draining to the O.C.F.C.D. Bolsa Chica Channel C-2 and to the C-3 Anaheim Barber City Channel, respectively. Through the approximate center of the property (Skylab West), drainage is piped westerly to the O.C.F.C.D. C-2 Bolsa Chica Channel (designated as area "C" in exhibits SD-1 & SD-2). This piped system is at its maximum capacity, serving the existing McDonnell Douglas Aerospace facilities which is in a complete, developed condition with either buildings or paved parking areas onsite. As a result any changes to MDC facility (i.e. new building) would not impact the drainage system, since the replacement would already be on currently developed property. In the event that the MDA facility would no longer remain, and this 100-acre area became available for new development, The Master Plan Drainage Study proposes to provide a new piped drainage facility paralleling the existing (or replacing the existing entirely), draining to the C-2 Bolsa Chica Channel. Preliminary pipe sizes required to convey calculated 100-year flows are shown in exhibit SD-2.

The areas proposed at the project's northerly boundary will drain westerly and northerly into the O.C.F.C.D. C-3 Anaheim Barber City Channel. The existing mainline storm drain (48") shall provide enough capacity for ultimate conditions. However, some improvements will be required for future developments upstream of the existing 48" storm drain as shown on exhibit SD-2 for area "D".

The project's most easterly and southerly areas are currently tabled to drain into the newly constructed storm drain system adjacent to Bolsa Avenue, This system was approved by the O.C.F.C.D. and the City of Huntington Beach Master plan and constructed in fall of 1995. This system is designed for ultimate conditions as per approved "Hydrology study and hydraulic analysis for proposed storm drain system north of Bolsa Ave." dated august 1, 1995.

No detention basins will be required to serve the existing and proposed ultimate development. The residential drainage areas northerly of the project area have their own area drainage facilities, and do not affect the proposed property. The storm drain systems as shown on Exhibit 7 and Exhibit SD-2 are considered to be Reinforced Concrete Pipe (RCP) with the minimum pipe size of 18 inches. The proposed pipe sizes are estimated for planning purposes only and are subject to refinement in the final design of the project.

The existing and proposed storm drains lie within existing private streets or within easements to allow for maintenance of the completed system. All drainage is onsite, and only the termination of the tributary facilities, as they are proposed to enter into

the O.C.F.C.D. channels, will require any jurisdiction permission for public right-of-way construction. Drainage from the proposed ultimate development will have a negligible impact on the existing, downstream facilities since difference between existing and ultimate flows is very small as shown in the table below and the overall discharge from the project site is negligible as compared to the flows in Bolsa Chica channel. However, flood studies may be required to demonstrate the minimum impacts of flooding conditions (e.g. 100-year discharges) in Bolsa Chica channel which is beyond the scope of this study.
Table below shows a summary of areas and flows for pre and post developed conditions.

SUBAREA	ACRES	PRE DEVELOPED Q100 (cfs)	POST DEVELOPED Q100 (cfs)	FLOW INCREASE(cfs)
A-1 TO A-14	65.74	139.7	187.4	47.7
B	70.14	169.0	159.1	****
A-16.1 TO A-31	41.03	70.1	70.1	0.0
C	140.50	360.1	371.6	11.5
D	12.20	27.7	36.9	9.2
TOTAL	**329.61**	**766.6**	**825.1**	58.5

Note:
Sub-areas are shown on exhibit SD-1 and SD-2
- A (1) represents areas A-1 to A-4
- A (2) represents areas A16.1 to A-31

Advanced Engineering Software "AES" is utilized for estimation of the flows for 100-year return frequency. The results of this calculations are enclosed in this report under sections "100-year Hydrology" for existing and ultimate conditions. Water Surface Hydraulic Gradient "WSPG" is used for hydraulic calculations and the results and an explanation of methodology is included in the section under title "Hydraulic Calculations".

Exhibits at the end of section include exhibit 7 (11x14) which shows the overall storm drain system for existing and ultimate conditions and two hydrology maps at 1"=200' (folded) which delineate the drainage area boundaries and node numbers as depicted in the calculations for existing and ultimate conditions.

It should be noted that approved hydrology studies for "Proposed Storm Drain System North of Bolsa Ave. and in Able Lane And Skylab Drive" and "Preliminary Hydrology Study for Proposed Development at North -West Corner of Bolsa Ave. And Springdale St." are used as references for this study.

1.1 Existing County and City Water Quality Programs and Regulations

Water quality in California is regulated by the U.S. Environmental Protection Agency's National Pollution Discharge Elimination System (NPDES), which controls the discharge of pollutants to water bodies from point and non-point sources. A NPDES permit will be required for construction sites that disturb areas larger than five acres.

Prior to issuance of any grading, the developer shall submit a "Notice of Intent" (NOI), along with the required fee to the State Water Resources Control Board to be covered under the State NPDES General Construction permit and provide the City with a copy of the written reply containing the discharger's identification number.

It is premature now for actual NPDES report/data to be prepared for the project. However, the NPDES permit process does require that a permit application contain a project drainage report, along with the submittal of the Storm Water Pollution Prevention Plan (SWPPP) worksheet. Both the report and the worksheet identify any watercourses affected by construction activity, and a comprehensive listing of drainage Best Management Practice (BMP) mitigation that must be provided.

Through the NPDES Permit process, the city currently requires contributors to non-point runoff pollution to establish Best Management Practices (BMPs) to minimize the potential for pollution. Under this program, the developer is responsible for identification and implementation of a program of BMPs which can include special scheduling of project activities, prohibitions of certain practices, establishment of certain maintenance procedures, and other management practices to prevent or reduce the pollution of downstream waters. Typical elements of such a BMP program would include addressing the use of oil and grease traps, detention basins, vegetated filter strips, and other common techniques in order to preclude discharge of pollutants to local storm drains and channels.

2. Sanitary Sewer

Sewer service is provided by the City of Huntington Beach and by the County Sanitation Districts of Orange County. The City of Huntington Beach system ultimately is collected by the sanitation district via their trunk and distribution lines to convey sewage to their plant. The O.C.S.D #5 is located at 10844 Ellis Avenue in Fountain Valley, and Plant #2 is easterly of the City of Huntington Beach and is approximately 12 miles from this property. The District boundary encompasses 471 square miles and serves 23 cities including the City of Huntington Beach. Treatment Plant #2 has the design capacity of 343.7 million gallons per day (MGD). The average daily flow for 1995-96 was 157.7 MGD, which leaves a remaining capacity of 186 MGD. The District and this plant have addressed all known growth including the subject property and have not identified a need to expand the plant beyond the design capacity as stated. Sewerage from the subject property is collected at two points.

One is at the intersection of Bolsa Avenue and Graham Road then via a 24-inch line southerly to the Sanitation District trunk line in Edinger Avenue, and then continuing to the District plant #2. This system also collects the sewerage flows from the residential area northerly of the property, as shown on Exhibit 6. The second collection point is at the intersection of Bolsa Avenue and Bolsa Chica Road then via a 12-inch line southerly to the Sanitation District's trunk line in Edinger Avenue. Exhibit B shows these two collection points and trunk lines serving the property. The existing McDonnell Douglas Aerospace facility sewer system will not be connected to the proposed peripheral sewer systems, and will remain isolated from this new system, and will remain so as long as the aerospace programs remain onsite. The existing MDA sewer system has sufficient capacity as a stand alone system. The developer's engineers have evaluated the sewer system downstream of these collection points to determine the adequacy of the systems to accept flows anticipated to be generated by this project. Calculations show that the existing facilities will adequately carry the projected flows. All sewer lines within the property will be contained in public or private roads or in easements that will ultimately be dedicated to the City of Huntington Beach. Due to the existing flat, natural grade within the property, pipe sizes will be in the range of 8" minimum to 15" maximum with the need to incorporate a lift station and 6" force main at Bolsa Chica/Skylab. Also, the sewer system will be designed to the City of Huntington Beach sewer standards for future public acceptance and maintenance. The proposed sanitary sewer system is shown on Exhibit 6 and Exhibit SW-2.

Total sewer flows from the subject area, under existing conditions comes from three sub-areas. First sub-area is located on the south west corner of the project site and includes the existing high rise office building (approximately 18.1 acres) and draining through an eight (8") sewer line and a double 6" siphon, southerly to a 12" line in Bolsa avenue and from there westerly to a 12" O.C.F.C.D. sewer line in Bolsa Chica which drains southerly to the Sanitation Districts trunk line in Edinger Avenue.

Second sub-area comprises of McDonnell Douglas aerospace (MDA) plant area. Sewer flows from this area are collected through a system of pipes as shown on exhibit sw-1 and directed to a pump station located north of Bolsa Ave. and east of Graham. This flows are then pumped through an 18" pipe to the existing 24" sewer pipe where it confluence with sewer from sub-area 3.

The third sub-area includes the residential area north of railroad tracks, Cambro Manufacturing located at the north west corner of Skylab and Able Lane and Sharp Electronics at north west corner of Bolsa and Able. A 12" sewer line flowing southerly in Able and westerly in Bolsa conveys these flows to 24" sewer line in Graham where it confluence with flows from MDA plant. Other areas along Graham are added to this line also as it flows southerly. Table I of the enclosed sewer calculations shows the flow quantity calculations and table II shows the results of pipe capacity calculations for existing conditions for main line pipes. Exhibit SW-1 shows the existing sewer system for the subject area.

Sub-areas for ultimate conditions are shown in exhibit SW-2. Sewer flows for areas L-1 and L-2 which drain through the existing 8" sewer line includes the future motel, restaurant and a second office building as well as the existing office high rise. As indicated in table III this line has the capacity to carry the proposed calculated flows. Proposed planning areas on the westerly and northerly periphery of the project site (areas A through K as shown on exhibit SW-2) are proposed to drain through a system of pipes to a future pump station in the north west corner of Skylab and Bolsa Chica. A forced main will convey this flow southerly to the existing 12" main in Bolsa Chica. As shown in table III this line will have the capacity to carry the proposed calculated flows in ultimate conditions.

MDA plant area sewer will remain isolated and will continue to drain via existing pump station. New sewer lines are proposed for the planning areas north of Bolsa (areas M, N and O) to drain separately to the existing 24" Graham sewer line.

A new line is proposed in Skylab West and astronautics to convey the sewer flows from the existing residential area and the areas north of Skylab and areas adjacent to and west of Able lane to plus the areas along astronautics drive to the existing 24" sewer line in Graham. All the areas east of Able lane except Cambro Manufacturing will drain to the existing 12" sewer in Able and Bolsa and will drain to the Graham 24" sewer.

As shown in table III diversion of flows through the proposed sewer lines and reduction of flows in existing 12" line in Able and Bolsa will keep these lines within acceptable limits for calculated flows for ultimate conditions.

As an alternative sewer flows for areas M, N, O and P could drain directly to the existing 12" sewer line in Bolsa which drains westerly to O.C.F.C.D. 12" line in Bolsa Chica. Sewer line in Bolsa will have the capacity to carry the calculated flows; however, in order to keep the flows in Bolsa Chica line within the acceptable limits (for ultimate conditions) future development of new office building (area L-2) and some of the proposed industrial areas (areas A through K) should be limited to approximately 20 acres or less.

3. Water System

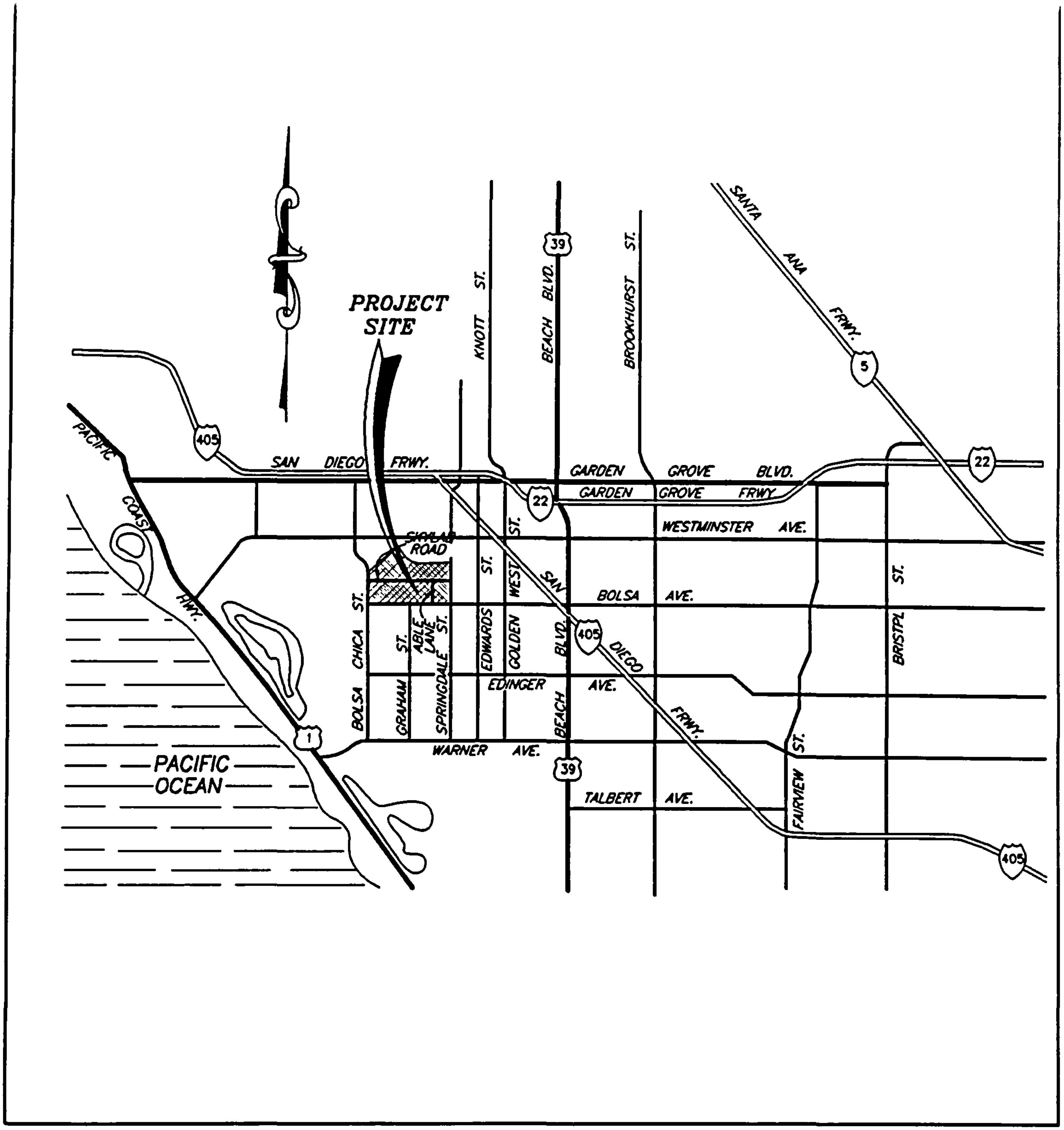
Domestic water for the property will be provided by the Water Division of the City of Huntington Beach. The water division provides water to all of the customers within the City of Huntington Beach. McDonnel Douglas Aerospace site is a part of the City's master plan for service.

The Water Division has use of both underground and imported water sources to service the area. The underground supply comes from 9 existing wells, and imported water is delivered to the City of Huntington Beach by the Metropolitan Water District (MWD) at three locations. MWD is the major wholesale water purveyor to the City of Huntington Beach, which in turn is the retail provider to all water users in the City of Huntington Beach, including the subject property.

The existing and proposed water supply systems are shown on Exhibit 5 and the Schematic Diagram by Sidawi and Associates. With the ultimate development onsite, water lines can connect to the external system at more than one location to provide a second point of service (or loop) to each part of the system. All the onsite lines will be sized to deliver fire flow at adequate quantities and pressures and are 8 to 16 inches in diameter, per Schematic Diagram for hydraulic analysis and the accompanying calculations.

All water improvements will be designed to the City of Huntington Beach water standards for future City acceptance and maintenance. The existing McDonnell Douglas Aerospace water systems facility will not be connected to the proposed water systems, and will remain independent of this new system. Should the MDA facility have any future expansion, adequate water capacity is available within their systems. There are adequate fire flows within the system. Locations of fire hydrants and apparatuses will be reviewed for future ultimate development by the local fire authority and water division of the City of Huntington Beach to ensure adequate fire flow pressure.

A water system analysis for ultimate system is conducted by Sidawi and Associates and is included here in water system section. This study includes the Mcdonnell Douglas Aerospace site and is expanded to include the existing water system network between Bolsa Chica and Springdale and southerly to McFadden Avenue. As stated in the analysis the proposed future ultimate water system will meet the requirements for fire flow and peak hour demand and other design criteria as set by the Water Division of the City of Huntington Beach.



VICINITY MAP

N.T.S.

100-YEAR HYDROLOGY
EXISTING CONDITIONS

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****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              (Reference: 1986 OCEMA HYDROLOGY CRITERION)
       (c) Copyright 1983-96 Advanced Engineering Software (aes)
           Ver. 6.1  Release Date: 01/01/96  License ID 1204

                        Analysis prepared by:

                 ADAMS*STREETER CIVIL ENGINEERS INC.
                          15 CORPORATE PARK
                           IRVINE, CA 92714
                            (714) 474-2330

************************** DESCRIPTION OF STUDY **************************
* ABLE LANE HYDROLOGY, AREAS "A-1" TO "A-14"                               *
* EXISTING CONDITIONS                                                      *
* 100-YEAR FLOWS                                                           *
**************************************************************************

 FILE NAME: J:\961097\HYDRO\97ABLEX.MA
 TIME/DATE OF STUDY: 13: 0   3/ 1/1997
============================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                  --*TIME-OF-CONCENTRATION MODEL*--

 USER SPECIFIED STORM EVENT(YEAR) =  100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
 *DATA BANK RAINFALL USED*
 *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR RATIONAL METHOD*

 *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
    HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
    WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)    (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
 1   32.0     27.0     .020/ .083/ .020    .67    1.50 .03125 .1250 .01500

 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =    .20 FEET
      as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
   2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
 *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
  OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

 UNIT-HYDROGRAPH DATA:
   WATERSHED LAG =  .80 * Tc
   USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
   2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
   FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
   SIERRA MADRE DEPTH-AREA FACTORS USED.
                       AREA-AVERAGED
        DURATION     RAINFALL(INCH)
         5-MINUTES          .52
        30-MINUTES         1.09
         1-HOUR            1.45
         3-HOUR            2.43
         6-HOUR            3.36
        24-HOUR            5.63
 *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR UNIT HYDROGRAPH METHOD*

+--------------------------------------------------------------------------+
```

```
| SUBAREA "A-1"                                                          |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   640.00
 ELEVATION DATA: UPSTREAM(FEET) =     24.70  DOWNSTREAM(FEET) =     21.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.477
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.934
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 PUBLIC PARK                 A        4.32       .40        .85     32   18.48
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .85
 SUBAREA RUNOFF(CFS) =     10.09
 TOTAL AREA(ACRES) =      4.32   PEAK FLOW RATE(CFS) =      10.09

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  5.1
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     21.50  DOWNSTREAM(FEET) =     20.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00   CHANNEL SLOPE =   .0040
 CHANNEL BASE(FEET) =      .00   "Z" FACTOR =   5.000
 MANNING'S FACTOR =  .020   MAXIMUM DEPTH(FEET) =   1.50
 CHANNEL FLOW THRU SUBAREA(CFS) =     10.09
 FLOW VELOCITY(FEET/SEC) =   2.65   FLOW DEPTH(FEET) =    .87
 TRAVEL TIME(MIN.) =   1.57   Tc(MIN.) =  20.05

+------------------------------------------------------------------------+
| SUBAREA "A-3"                                                          |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  20.05
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.796
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 A        2.80       .40        .85     32
 PUBLIC PARK                 C         .82       .25        .85     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .37
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .85
 SUBAREA AREA(ACRES) =    3.62       SUBAREA RUNOFF(CFS) =     8.10
 EFFECTIVE AREA(ACRES) =     7.94   AREA-AVERAGED Fm(INCH/HR) =   .33
 AREA-AVERAGED Fp(INCH/HR) =    .38   AREA-AVERAGED Ap =   .85
 TOTAL AREA(ACRES) =     7.94        PEAK FLOW RATE(CFS) =     17.65
```

```
+--------------------------------------------------------------------------+
| EXISTING CMP PIPE ACROSS SKYLAB                                          |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    103.30 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     20.50  DOWNSTREAM(FEET) =     20.40
 FLOW LENGTH(FEET) =    80.00   MANNING'S N = .025
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.99
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.65
 PIPE TRAVEL TIME(MIN.) =     .13    Tc(MIN.) =  20.18

****************************************************************************
 FLOW PROCESS FROM NODE    103.30 TO NODE    103.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  20.18
 RAINFALL INTENSITY(INCH/HR) =   2.79
 AREA-AVERAGED Fm(INCH/HR) =    .33
 AREA-AVERAGED Fp(INCH/HR) =    .38
 AREA-AVERAGED Ap =    .85
 EFFECTIVE STREAM AREA(ACRES) =     7.94
 TOTAL STREAM AREA(ACRES) =     7.94
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.65

+--------------------------------------------------------------------------+
| SUBAREA "A-2"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    102.20 TO NODE    102.10 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    580.00
 ELEVATION DATA: UPSTREAM(FEET) =     24.40  DOWNSTREAM(FEET) =     21.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.763
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.997
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap       SCS   Tc
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)    CN  (MIN.)
 PUBLIC PARK                 A        3.61      .40         .85      32   17.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .85
 SUBAREA RUNOFF(CFS) =       8.63
 TOTAL AREA(ACRES) =       3.61   PEAK FLOW RATE(CFS) =       8.63

****************************************************************************
 FLOW PROCESS FROM NODE    102.10 TO NODE    103.30 IS CODE =  5.1
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     21.50  DOWNSTREAM(FEET) =     20.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00   CHANNEL SLOPE =   .0040
  CHANNEL BASE(FEET) =      .00   "Z" FACTOR =   5.000
  MANNING'S FACTOR =  .020   MAXIMUM DEPTH(FEET) =   1.50
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.63
  FLOW VELOCITY(FEET/SEC) =    2.56   FLOW DEPTH(FEET) =    .82
  TRAVEL TIME(MIN.) =   1.63   Tc(MIN.) =  19.39

----------------------------------------------------------------------------+
| SUBAREA "A-4"                                                              |
|                                                                            |
|                                                                            |
----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    103.30 TO NODE    103.30 IS CODE =  8.1
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  19.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.854
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap       SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
  PUBLIC PARK                 A        3.41       .40        .85     32
  PUBLIC PARK                 C         .20       .25        .85     69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .39
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .85
  SUBAREA AREA(ACRES) =    3.61       SUBAREA RUNOFF(CFS) =    8.19
  EFFECTIVE AREA(ACRES) =      7.22   AREA-AVERAGED Fm(INCH/HR) =   .34
  AREA-AVERAGED Fp(INCH/HR) =   .40  AREA-AVERAGED Ap =  .85
  TOTAL AREA(ACRES) =      7.22       PEAK FLOW RATE(CFS) =      16.36

****************************************************************************
  FLOW PROCESS FROM NODE    103.30 TO NODE    103.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.39
  RAINFALL INTENSITY(INCH/HR) =   2.85
  AREA-AVERAGED Fm(INCH/HR) =   .34
  AREA-AVERAGED Fp(INCH/HR) =   .40
  AREA-AVERAGED Ap =  .85
  EFFECTIVE STREAM AREA(ACRES) =    7.22
  TOTAL STREAM AREA(ACRES) =    7.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.36

  ** CONFLUENCE DATA **
   STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
   NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)         (ACRES)     NODE
      1      17.65  20.18    2.786    .38(  .33)  .85      7.9     100.00
      2      16.36  19.39    2.854    .40(  .34)  .85      7.2     102.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
```

```
 NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
    1     33.56  20.18    2.786   .39(  .33)  .85    15.2     100.00
    2     33.78  19.39    2.854   .39(  .33)  .85    14.8     102.20

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      33.78    Tc(MIN.) =     19.39
EFFECTIVE AREA(ACRES) =     14.85   AREA-AVERAGED Fm(INCH/HR) =    .33
AREA-AVERAGED Fp(INCH/HR) =    .39  AREA-AVERAGED Ap =    .85
TOTAL AREA(ACRES) =      15.16
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.30 =   970.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    103.30 TO NODE    105.20 IS CODE =  5.1
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      20.40  DOWNSTREAM(FEET) =     19.50
CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =   .0014
CHANNEL BASE(FEET) =      .00    "Z" FACTOR =   5.000
MANNING'S FACTOR =  .020   MAXIMUM DEPTH(FEET) =   1.50

       ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
           CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
           ALLOWABLE DEPTH).
           AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
           ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

CHANNEL FLOW THRU SUBAREA(CFS) =      33.78
FLOW VELOCITY(FEET/SEC) =   3.00   FLOW DEPTH(FEET) =   1.50
TRAVEL TIME(MIN.) =   3.61   Tc(MIN.) =  23.00

==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH


+--------------------------------------------------------------------------+
|AREA "A-5"                                                                |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    105.20 TO NODE    105.20 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  23.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.580
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
PUBLIC PARK                 A         .23       .40        .85     32
PUBLIC PARK                 C        6.99       .25        .85     69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .85
SUBAREA AREA(ACRES) =     7.22      SUBAREA RUNOFF(CFS) =   15.36
EFFECTIVE AREA(ACRES) =     22.07   AREA-AVERAGED Fm(INCH/HR) =    .29
AREA-AVERAGED Fp(INCH/HR) =    .35  AREA-AVERAGED Ap =    .85
TOTAL AREA(ACRES) =     22.38       PEAK FLOW RATE(CFS) =      45.41

****************************************************************************
FLOW PROCESS FROM NODE    105.20 TO NODE    105.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     14.42  DOWNSTREAM(FEET) =     13.95
  FLOW LENGTH(FEET) =     47.00   MANNING'S N =  .015
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.25
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     45.41
  PIPE TRAVEL TIME(MIN.) =    .08    Tc(MIN.) =  23.08

+------------------------------------------------------------------------------+
| SUBAREA "A-7"                                                                |
|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+

********************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  8.2
--------------------------------------------------------------------------------
  >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
  >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   475.00
  ELEVATION DATA: UPSTREAM(FEET) =     22.40  DOWNSTREAM(FEET) =     21.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.591
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap       SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C         .48        .25         .10     69   13.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
  SUBAREA AREA(ACRES) =      .48   INITIAL SUBAREA RUNOFF(CFS) =    1.50

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN) =  23.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.575
  SUBAREA AREA(ACRES) =      .48      SUBAREA RUNOFF(CFS) =     1.10
  EFFECTIVE AREA(ACRES) =     22.55   AREA-AVERAGED Fm(INCH/HR) =    .29
  AREA-AVERAGED Fp(INCH/HR) =    .35  AREA-AVERAGED Ap =    .83
  TOTAL AREA(ACRES) =     22.86       PEAK FLOW RATE(CFS) =      46.41

********************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  10
--------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

+------------------------------------------------------------------------------+
| SUBAREA "A-8"                                                                |
|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+

********************************************************************************
  FLOW PROCESS FROM NODE    108.20 TO NODE    108.30 IS CODE =  2.1
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   470.00
  ELEVATION DATA: UPSTREAM(FEET) =     22.80  DOWNSTREAM(FEET) =     21.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
```

```
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.400
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.880
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN   (MIN.)
COMMERCIAL                  C        2.26        .25         .10     69   11.40
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA RUNOFF(CFS) =      7.84
TOTAL AREA(ACRES) =      2.26   PEAK FLOW RATE(CFS) =       7.84

---------------------------------------------------------------------------+
SUBAREA "A-9"                                                              |
                                                                           |
                                                                           |
---------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    108.30 TO NODE    108.00 IS CODE =   9
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =      21.40
DOWNSTREAM NODE ELEVATION(FEET) =      18.50
CHANNEL LENGTH THRU SUBAREA(FEET) =    955.00
"V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =   .130
PAVEMENT LIP(FEET) =   .030   MANNING'S N = .0150
PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .02000
MAXIMUM DEPTH(FEET) =   1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.833
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
COMMERCIAL                  C        4.62        .25         .10     69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     13.63
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.94
AVERAGE FLOW DEPTH(FEET) =    .50   FLOOD WIDTH(FEET) =   36.88
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   8.22   Tc(MIN.) =  19.62
SUBAREA AREA(ACRES) =     4.62        SUBAREA RUNOFF(CFS) =   11.68
EFFECTIVE AREA(ACRES) =     6.88      AREA-AVERAGED Fm(INCH/HR) =     .02
AREA-AVERAGED Fp(INCH/HR) =    .25   AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =     6.88         PEAK FLOW RATE(CFS) =      17.39

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =   .54   FLOOD WIDTH(FEET) =   40.65
FLOW VELOCITY(FEET/SEC.) =   2.05   DEPTH*VELOCITY(FT*FT/SEC) =   1.10

+--------------------------------------------------------------------------+
| SUBAREA "A-10"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    108.20 TO NODE    108.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  19.62
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.833
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
```

```
 COMMERCIAL                      C         4.28        .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    4.28      SUBAREA RUNOFF(CFS) =   10.82
 EFFECTIVE AREA(ACRES) =    11.16   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    11.16       PEAK FLOW RATE(CFS) =      28.21

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    107.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     15.00  DOWNSTREAM(FEET) =     14.75
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.75
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     28.21
 PIPE TRAVEL TIME(MIN.) =    .17    Tc(MIN.) =  19.80

----------------------------------------------------------------------------+
 SUBAREA "A-11"                                                             |
                                                                            |
+---------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  8.2
----------------------------------------------------------------------------
 >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
 >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   475.00
 ELEVATION DATA: UPSTREAM(FEET) =     22.40  DOWNSTREAM(FEET) =     21.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.591
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C         .48        .25        .10    69   13.59
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     .48   INITIAL SUBAREA RUNOFF(CFS) =    1.50

 ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
 MAINLINE Tc(MIN) =  19.80
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.818
 SUBAREA AREA(ACRES) =     .48      SUBAREA RUNOFF(CFS) =    1.21
 EFFECTIVE AREA(ACRES) =    11.64   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    11.64       PEAK FLOW RATE(CFS) =      29.26

+---------------------------------------------------------------------------+
| SUBAREA "A-12"                                                            |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  8.2
----------------------------------------------------------------------------
```

```
>>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
==============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   840.00
ELEVATION DATA: UPSTREAM(FEET) =      22.40  DOWNSTREAM(FEET) =      21.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.134
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.876
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
COMMERCIAL                 C         .78       .25         .10     69   19.13
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =      .78   INITIAL SUBAREA RUNOFF(CFS) =    2.00

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN) =  19.80
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.818
SUBAREA AREA(ACRES) =      .78      SUBAREA RUNOFF(CFS) =    1.96
EFFECTIVE AREA(ACRES) =     12.42   AREA-AVERAGED Fm(INCH/HR) =    .02
AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =    12.42        PEAK FLOW RATE(CFS) =      31.22

******************************************************************************
FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =   1
------------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  19.80
RAINFALL INTENSITY(INCH/HR) =   2.82
AREA-AVERAGED Fm(INCH/HR) =   .02
AREA-AVERAGED Fp(INCH/HR) =   .25
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =    12.42
TOTAL STREAM AREA(ACRES) =   12.42
PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.22

+----------------------------------------------------------------------------+
| SUBAREA "A-13.1"                                                           |
|                                                                            |
+----------------------------------------------------------------------------+

******************************************************************************
FLOW PROCESS FROM NODE    106.30 TO NODE    106.20 IS CODE =  2.1
------------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
ELEVATION DATA: UPSTREAM(FEET) =      22.10  DOWNSTREAM(FEET) =      20.60

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.683
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.748
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
PUBLIC PARK                C        6.97       .25         .85     69   20.68
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .85
```

```
  SUBAREA RUNOFF(CFS) =      15.91
  TOTAL AREA(ACRES) =       6.97   PEAK FLOW RATE(CFS) =      15.91

+--------------------------------------------------------------------------+
| SUBAREA "A-13.2"                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    106.20 TO NODE    106.10 IS CODE =  5.1
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     20.60  DOWNSTREAM(FEET) =     18.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =   .0025
  CHANNEL BASE(FEET) =      .00    "Z" FACTOR =   5.000
  MANNING'S FACTOR =  .020   MAXIMUM DEPTH(FEET) =   1.50
  CHANNEL FLOW THRU SUBAREA(CFS) =      15.91
  FLOW VELOCITY(FEET/SEC) =   2.52   FLOW DEPTH(FEET) =   1.12
  TRAVEL TIME(MIN.) =   4.44   Tc(MIN.) =  25.12

****************************************************************************
  FLOW PROCESS FROM NODE    106.20 TO NODE    106.10 IS CODE =  8.1
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  25.12
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.454
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 C        5.17       .25         .85    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .85
  SUBAREA AREA(ACRES) =     5.17       SUBAREA RUNOFF(CFS) =   10.43
  EFFECTIVE AREA(ACRES) =     12.14   AREA-AVERAGED Fm(INCH/HR) =   .21
  AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =   .85
  TOTAL AREA(ACRES) =    12.14        PEAK FLOW RATE(CFS) =      24.49

****************************************************************************
  FLOW PROCESS FROM NODE    106.10 TO NODE    107.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    19.50  DOWNSTREAM(FEET) =    15.00
  FLOW LENGTH(FEET) =   160.00   MANNING'S N =  .025
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.86
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.49
  PIPE TRAVEL TIME(MIN.) =    .19    Tc(MIN.) =  25.31

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  25.31
  RAINFALL INTENSITY(INCH/HR) =   2.44
```

```
AREA-AVERAGED Fm(INCH/HR) =    .21
AREA-AVERAGED Fp(INCH/HR) =    .25
AREA-AVERAGED Ap =    .85
EFFECTIVE STREAM AREA(ACRES) =   12.14
TOTAL STREAM AREA(ACRES) =   12.14
PEAK FLOW RATE(CFS) AT CONFLUENCE =      24.49

** CONFLUENCE DATA **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
    1      31.22  19.80     2.818     .25(  .02)  .10     12.4      108.20
    2      24.49  25.31     2.444     .25(  .21)  .85     12.1      106.30

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
    1      53.58  19.80     2.818     .25(  .11)  .42     21.9      108.20
    2      51.52  25.31     2.444     .25(  .12)  .47     24.6      106.30

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =        53.58     Tc(MIN.) =     19.80
EFFECTIVE AREA(ACRES) =      21.91    AREA-AVERAGED Fm(INCH/HR) =    .11
AREA-AVERAGED Fp(INCH/HR) =    .25    AREA-AVERAGED Ap =    .42
TOTAL AREA(ACRES) =       24.56
LONGEST FLOWPATH FROM NODE     108.20 TO NODE     107.00 =  1485.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    107.00 TO NODE    105.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    14.75  DOWNSTREAM(FEET) =    14.60
FLOW LENGTH(FEET) =     20.00    MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  10.92
GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       53.58
PIPE TRAVEL TIME(MIN.) =     .03     Tc(MIN.) =  19.83

****************************************************************************
FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  11
----------------------------------------------------------------------------
>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

** MAIN STREAM CONFLUENCE DATA **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
    1      53.58  19.83     2.815     .25(  .11)  .42     21.9      108.20
    2      51.52  25.35     2.442     .25(  .12)  .47     24.6      106.30
LONGEST FLOWPATH FROM NODE     108.20 TO NODE     105.00 =  1505.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
    1      46.41  23.08     2.575     .35(  .29)  .83     22.5      102.20
    2      46.03  23.90     2.526     .35(  .29)  .83     22.9      100.00
LONGEST FLOWPATH FROM NODE     100.00 TO NODE     105.00 =  1667.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
```

```
NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
   1      97.63  19.83     2.815    .31(  .19)  .62    41.3      108.20
   2      95.83  25.35     2.442    .31(  .20)  .65    47.4      106.30
   3      98.77  23.08     2.575    .31(  .20)  .64    46.0      102.20
   4      98.09  23.90     2.526    .31(  .20)  .64    46.7      100.00
 TOTAL AREA(ACRES) =       47.42

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =          98.77  Tc(MIN.) =   23.084
EFFECTIVE AREA(ACRES) =        46.02  AREA-AVERAGED Fm(INCH/HR) =    .20
AREA-AVERAGED Fp(INCH/HR) =     .31  AREA-AVERAGED Ap =    .64
TOTAL AREA(ACRES) =      47.42
LONGEST FLOWPATH FROM NODE     100.00 TO NODE    105.00 =  1667.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     105.00 TO NODE    109.70 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     14.18  DOWNSTREAM(FEET) =     11.18
FLOW LENGTH(FEET) =  1058.31   MANNING'S N =  .015
DEPTH OF FLOW IN  63.0 INCH PIPE IS  40.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       98.77
PIPE TRAVEL TIME(MIN.) =   2.61    Tc(MIN.) =  25.70

****************************************************************************
FLOW PROCESS FROM NODE     109.70 TO NODE    109.70 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  25.70
RAINFALL INTENSITY(INCH/HR) =   2.42
AREA-AVERAGED Fm(INCH/HR) =    .20
AREA-AVERAGED Fp(INCH/HR) =    .31
AREA-AVERAGED Ap =    .64
EFFECTIVE STREAM AREA(ACRES) =   46.02
TOTAL STREAM AREA(ACRES) =   47.42
PEAK FLOW RATE(CFS) AT CONFLUENCE =      98.77

+--------------------------------------------------------------------------+
| SUBAREA "A-15.1"                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE     109.60 TO NODE    109.50 IS CODE =  2.1
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   800.00
ELEVATION DATA: UPSTREAM(FEET) =     23.60  DOWNSTREAM(FEET) =      21.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.859
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.464
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS    Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN   (MIN.)
```

```
COMMERCIAL                       A          .49        .40        .10    32   13.86
COMMERCIAL                       C         4.33        .25        .10    69   13.86
COMMERCIAL                       D         2.30        .20        .10    75   13.86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
SUBAREA RUNOFF(CFS) =     22.04
TOTAL AREA(ACRES) =      7.12   PEAK FLOW RATE(CFS) =      22.04

****************************************************************************
FLOW PROCESS FROM NODE    109.50 TO NODE    109.70 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    13.44  DOWNSTREAM(FEET) =    12.93
FLOW LENGTH(FEET) =    51.25   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     22.04
PIPE TRAVEL TIME(MIN.) =    .12    Tc(MIN.) =  13.98

****************************************************************************
FLOW PROCESS FROM NODE    109.70 TO NODE    109.70 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  13.98
RAINFALL INTENSITY(INCH/HR) =   3.45
AREA-AVERAGED Fm(INCH/HR) =   .02
AREA-AVERAGED Fp(INCH/HR) =   .24
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =    7.12
TOTAL STREAM AREA(ACRES) =    7.12
PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.04

** CONFLUENCE DATA **
 STREAM      Q       Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)     NODE
    1      97.63   22.45     2.614    .31(  .19)  .62    41.3      108.20
    1      95.83   27.98     2.309    .31(  .20)  .65    47.4      106.30
    1      98.77   25.70     2.424    .31(  .20)  .64    46.0      102.20
    1      98.09   26.52     2.381    .31(  .20)  .64    46.7      100.00
    2      22.04   13.98     3.447    .24(  .02)  .10     7.1      109.60

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM      Q       Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)     NODE
    1     114.31   22.45     2.614    .31(  .17)  .54    48.4      108.20
    2     114.23   25.70     2.424    .31(  .18)  .57    53.1      102.20
    3     113.27   26.52     2.381    .31(  .18)  .57    53.8      100.00
    4     110.54   27.98     2.309    .31(  .18)  .57    54.5      106.30
    5     103.75   13.98     3.447    .31(  .16)  .50    32.8      109.60

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     114.31    Tc(MIN.) =     22.45
EFFECTIVE AREA(ACRES) =     48.40   AREA-AVERAGED Fm(INCH/HR) =    .17
AREA-AVERAGED Fp(INCH/HR) =    .31  AREA-AVERAGED Ap =    .54
TOTAL AREA(ACRES) =     54.54
```

```
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.70 =  2725.31 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.70 TO NODE    109.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    11.17  DOWNSTREAM(FEET) =    10.47
 FLOW LENGTH(FEET) =   709.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.28
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    114.31
 PIPE TRAVEL TIME(MIN.) =   2.24    Tc(MIN.) =  24.68

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  24.68
 RAINFALL INTENSITY(INCH/HR) =   2.48
 AREA-AVERAGED Fm(INCH/HR) =   .17
 AREA-AVERAGED Fp(INCH/HR) =   .31
 AREA-AVERAGED Ap =   .54
 EFFECTIVE STREAM AREA(ACRES) =   48.40
 TOTAL STREAM AREA(ACRES) =   54.54
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    114.31

+--------------------------------------------------------------------------+
| SUBAREA "A-14.1"                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    109.40 TO NODE    109.30 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   520.00
 ELEVATION DATA: UPSTREAM(FEET) =     20.60  DOWNSTREAM(FEET) =     18.30

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.968
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap       SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 COMMERCIAL                 C        5.35       .25        .10     69   10.97
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  .10
 SUBAREA RUNOFF(CFS) =    18.98
 TOTAL AREA(ACRES) =      5.35   PEAK FLOW RATE(CFS) =     18.98

****************************************************************************
 FLOW PROCESS FROM NODE    109.30 TO NODE    109.10 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =     14.50  DOWNSTREAM(FEET) =     12.90
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.04
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     18.98
 PIPE TRAVEL TIME(MIN.) =    .55    Tc(MIN.) =  11.52

+--------------------------------------------------------------------------+
| SUBAREA "A-14"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    109.20 TO NODE    109.10 IS CODE =  8.2
----------------------------------------------------------------------------
 >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
 >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   500.00
 ELEVATION DATA: UPSTREAM(FEET) =     19.80  DOWNSTREAM(FEET) =     16.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.140
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.172
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap       SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 PUBLIC PARK                C        5.85       .25         .85    69   16.14
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .85
 SUBAREA AREA(ACRES) =    5.85   INITIAL SUBAREA RUNOFF(CFS) =   15.58

 ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
 MAINLINE Tc(MIN) =  11.52
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.856
 SUBAREA AREA(ACRES) =    5.85      SUBAREA RUNOFF(CFS) =   19.18
 EFFECTIVE AREA(ACRES) =    11.20   AREA-AVERAGED Fm(INCH/HR) =   .12
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .49
 TOTAL AREA(ACRES) =    11.20       PEAK FLOW RATE(CFS) =      37.63

****************************************************************************
 FLOW PROCESS FROM NODE    109.10 TO NODE    109.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     12.90  DOWNSTREAM(FEET) =     11.50
 FLOW LENGTH(FEET) =   420.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.32
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     37.63
 PIPE TRAVEL TIME(MIN.) =   1.31    Tc(MIN.) =  12.83

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  12.83
```

```
RAINFALL INTENSITY(INCH/HR) =   3.61
AREA-AVERAGED Fm(INCH/HR) =   .12
AREA-AVERAGED Fp(INCH/HR) =   .25
AREA-AVERAGED Ap =   .49
EFFECTIVE STREAM AREA(ACRES) =   11.20
TOTAL STREAM AREA(ACRES) =   11.20
PEAK FLOW RATE(CFS) AT CONFLUENCE =      37.63

** CONFLUENCE DATA **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)     NODE
    1     114.31  24.68     2.479    .31(  .17)  .54     48.4      108.20
    1     114.23  27.94     2.311    .31(  .18)  .57     53.1      102.20
    1     113.27  28.78     2.274    .31(  .18)  .57     53.8      100.00
    1     110.54  30.29     2.209    .31(  .18)  .57     54.5      106.30
    1     103.75  16.45     3.138    .31(  .16)  .50     32.8      109.60
    2      37.63  12.83     3.612    .25(  .12)  .49     11.2      109.40

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)     NODE
    1     136.27  16.45     3.138    .29(  .15)  .50     44.0      109.60
    2     139.72  24.68     2.479    .30(  .16)  .53     59.6      108.20
    3     137.82  27.94     2.311    .30(  .17)  .55     64.3      102.20
    4     136.47  28.78     2.274    .30(  .17)  .56     65.0      100.00
    5     133.04  30.29     2.209    .30(  .17)  .56     65.7      106.30
    6     131.46  12.83     3.612    .29(  .15)  .50     36.8      109.40

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     139.72    Tc(MIN.) =    24.68
EFFECTIVE AREA(ACRES) =     59.60   AREA-AVERAGED Fm(INCH/HR) =   .16
AREA-AVERAGED Fp(INCH/HR) =   .30   AREA-AVERAGED Ap =   .53
TOTAL AREA(ACRES) =      65.74
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =  3434.31 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    10.46  DOWNSTREAM(FEET) =    10.00
  FLOW LENGTH(FEET) =   365.00   MANNING'S N =  .015
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.45
  GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    139.72
  PIPE TRAVEL TIME(MIN.) =    .94    Tc(MIN.) =  25.63
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =     65.74  TC(MIN.) =      25.63
  EFFECTIVE AREA(ACRES) =     59.60  AREA-AVERAGED Fm(INCH/HR)=   .16
  AREA-AVERAGED Fp(INCH/HR) =   .30  AREA-AVERAGED Ap =   .53
  PEAK FLOW RATE(CFS)     =    139.72

  ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
   NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)     NODE
      1     131.46  13.84     3.468    .29(  .15)  .50     36.8      109.40
      2     136.27  17.41     3.030    .29(  .15)  .50     44.0      109.60
      3     139.72  25.63     2.427    .30(  .16)  .53     59.6      108.20
      4     137.82  28.89     2.269    .30(  .17)  .55     64.3      102.20
```

5	136.47	29.74	2.231	.30(	.17)	.56	65.0	100.00
6	133.04	31.28	2.171	.30(	.17)	.56	65.7	106.30

==

==

END OF RATIONAL METHOD ANALYSIS

```
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              (Reference: 1986 OCEMA HYDROLOGY CRITERION)
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                         Analysis prepared by:

                   ADAMS*STREETER CIVIL ENGINEERS INC.
                           15 CORPORATE PARK
                            IRVINE, CA 92714
                             (714) 474-2330

 ************************** DESCRIPTION OF STUDY **************************
* BOLSA LINE HYDROLOGY, SUBAREAS "A-16.1" TO "A-31"                        *
* EXISTING AND ULTIMATE CONDITIONS                                         *
* 100-YEAR FLOWS                                                           *
 **************************************************************************

  FILE NAME: J:\961097\HYDRO\97BLSEX.MA
  TIME/DATE OF STUDY: 13: 5   3/ 1/1997
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   32.0     27.0     .020/ .020/ .020    .67    2.00 .03125 .1670 .01500
  2   40.0     35.0     .020/ .020/ .020    .67    2.00 .03125 .1670 .01500

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =   .20 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

  UNIT-HYDROGRAPH DATA:
    WATERSHED LAG =  .80 * Tc
    USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
    2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
    FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
    SIERRA MADRE DEPTH-AREA FACTORS USED.
                      AREA-AVERAGED
         DURATION    RAINFALL(INCH)
         5-MINUTES          .52
        30-MINUTES         1.09
         1-HOUR            1.45
         3-HOUR            2.43
         6-HOUR            3.36
        24-HOUR            5.63
 *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR UNIT HYDROGRAPH METHOD*
```

```
+--------------------------------------------------------------------------+
| SUBAREA "A-18"                                                           |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   4800.00 TO NODE   4790.00 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   745.00
 ELEVATION DATA: UPSTREAM(FEET) =     20.80  DOWNSTREAM(FEET) =     19.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.772
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.214
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        .90        .25         .10     69   15.77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =       2.58
 TOTAL AREA(ACRES) =        .90   PEAK FLOW RATE(CFS) =       2.58

+--------------------------------------------------------------------------+
| SUBAREA "A-19"                                                           |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   4790.00 TO NODE   4794.00 IS CODE =  6.2
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   19.70  DOWNSTREAM ELEVATION(FEET) =   18.90
 STREET LENGTH(FEET) =   655.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  27.00
 INSIDE STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =   .020

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.67
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =   .51
   HALFSTREET FLOOD WIDTH(FEET) =   17.63
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.11
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =     .57
 STREET FLOW TRAVEL TIME(MIN.) =   9.81   Tc(MIN.) =  25.58
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.430
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C       1.00        .25         .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =     2.16
```

```
 EFFECTIVE AREA(ACRES) =    1.90    AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    1.90        PEAK FLOW RATE(CFS) =      4.11

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) =  .53   HALFSTREET FLOOD WIDTH(FEET) =  18.47
 FLOW VELOCITY(FEET/SEC.) =  1.14   DEPTH*VELOCITY(FT*FT/SEC.) =    .60

****************************************************************************
 FLOW PROCESS FROM NODE   4794.00 TO NODE   4794.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  25.58
 RAINFALL INTENSITY(INCH/HR) =   2.43
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =    1.90
 TOTAL STREAM AREA(ACRES) =    1.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.11

+--------------------------------------------------------------------------+
| SUBAREA "A-16.1"                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   4794.20 TO NODE   4794.10 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   760.00
 ELEVATION DATA: UPSTREAM(FEET) =     21.00  DOWNSTREAM(FEET) =     19.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.437
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.251
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C         .72       .25         .10    69  15.44
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =      2.09
 TOTAL AREA(ACRES) =        .72   PEAK FLOW RATE(CFS) =      2.09

+--------------------------------------------------------------------------+
| SUBAREA "A-16.2"                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   4794.10 TO NODE   4794.30 IS CODE =  6.2
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   19.70  DOWNSTREAM ELEVATION(FEET) =   18.90
 STREET LENGTH(FEET) =   570.00   CURB HEIGHT(INCHES) =  8.0
```

```
STREET HALFWIDTH(FEET) = 32.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  27.00
INSIDE STREET CROSSFALL(DECIMAL) =   .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =   .020

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        2.71
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =   .46
  HALFSTREET FLOOD WIDTH(FEET) =   15.15
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.09
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =      .50
STREET FLOW TRAVEL TIME(MIN.) =   8.70   Tc(MIN.) =  24.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.512
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
COMMERCIAL                  A          .56        .40         .10    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
SUBAREA AREA(ACRES) =       .56      SUBAREA RUNOFF(CFS) =     1.25
EFFECTIVE AREA(ACRES) =     1.28    AREA-AVERAGED Fm(INCH/HR) =    .03
AREA-AVERAGED Fp(INCH/HR) =    .32  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =     1.28         PEAK FLOW RATE(CFS) =        2.86

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) =   .47   HALFSTREET FLOOD WIDTH(FEET) =  15.52
FLOW VELOCITY(FEET/SEC.) =  1.10   DEPTH*VELOCITY(FT*FT/SEC.) =     .52

+--------------------------------------------------------------------------+
|SUBAREA "A-15.2"                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE   4794.30 TO NODE   4794.30 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  24.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.512
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
COMMERCIAL                  D         2.25        .20         .10    75
COMMERCIAL                  C         1.94        .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
SUBAREA AREA(ACRES) =      4.19      SUBAREA RUNOFF(CFS) =     9.39
EFFECTIVE AREA(ACRES) =      5.47   AREA-AVERAGED Fm(INCH/HR) =    .02
AREA-AVERAGED Fp(INCH/HR) =    .24  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =      5.47        PEAK FLOW RATE(CFS) =       12.25

****************************************************************************
FLOW PROCESS FROM NODE   4794.30 TO NODE   4794.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     14.00  DOWNSTREAM(FEET) =     12.60
FLOW LENGTH(FEET) =    150.00    MANNING'S N =  .015
```

```
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.93
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.25
 PIPE TRAVEL TIME(MIN.) =    .36    Tc(MIN.) =  24.49

****************************************************************************
 FLOW PROCESS FROM NODE   4794.00 TO NODE   4794.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  24.49
 RAINFALL INTENSITY(INCH/HR) =   2.49
 AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .24
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =    5.47
 TOTAL STREAM AREA(ACRES) =    5.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.25

 ** CONFLUENCE DATA **
  STREAM     Q      Tc   Intensity  Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
     1      4.11  25.58    2.430   .25(  .03)  .10      1.9    4800.00
     2     12.25  24.49    2.490   .24(  .02)  .10      5.5    4794.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc   Intensity  Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
     1     16.06  25.58    2.430   .25(  .02)  .10      7.4    4800.00
     2     16.28  24.49    2.490   .25(  .02)  .10      7.3    4794.20

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      16.28    Tc(MIN.) =     24.49
 EFFECTIVE AREA(ACRES) =      7.29   AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =        7.37
 LONGEST FLOWPATH FROM NODE   4794.20 TO NODE   4794.00 =  1480.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4794.00 TO NODE   4390.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     12.53  DOWNSTREAM(FEET) =     10.59
 FLOW LENGTH(FEET) =    450.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.18
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.28
 PIPE TRAVEL TIME(MIN.) =   1.45    Tc(MIN.) =  25.94

+--------------------------------------------------------------------------+
| SUBAREA "A-20"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
```

```
****************************************************************************
FLOW PROCESS FROM NODE    4320.00 TO NODE    4390.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  25.94
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.411
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
COMMERCIAL                  C         .80        .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =      .80     SUBAREA RUNOFF(CFS) =    1.72
EFFECTIVE AREA(ACRES) =      8.09   AREA-AVERAGED Fm(INCH/HR) =    .02
AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =      8.17       PEAK FLOW RATE(CFS) =      17.37

****************************************************************************
FLOW PROCESS FROM NODE    4390.00 TO NODE    3887.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     10.59  DOWNSTREAM(FEET) =      9.62
FLOW LENGTH(FEET) =    473.00   MANNING'S N =  .015
DEPTH OF FLOW IN  42.0 INCH PIPE IS  19.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.90
GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      17.37
PIPE TRAVEL TIME(MIN.) =   2.02    Tc(MIN.) =  27.96

****************************************************************************
FLOW PROCESS FROM NODE    3887.00 TO NODE    3716.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      9.65  DOWNSTREAM(FEET) =      9.33
FLOW LENGTH(FEET) =    171.00   MANNING'S N =  .015
DEPTH OF FLOW IN  48.0 INCH PIPE IS  19.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.75
GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      17.37
PIPE TRAVEL TIME(MIN.) =    .76    Tc(MIN.) =  28.72

+--------------------------------------------------------------------------+
| SUBAREA "A-21"                                                           |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    3716.00 TO NODE    3716.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  28.72
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.276
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
COMMERCIAL                  C        1.24        .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
```

```
 SUBAREA AREA(ACRES) =     1.24      SUBAREA RUNOFF(CFS) =     2.51
 EFFECTIVE AREA(ACRES) =      9.33   AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =     9.41        PEAK FLOW RATE(CFS) =      18.90

+--------------------------------------------------------------------------+
| SUBAREA "A-22"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   3716.00 TO NODE   3716.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  28.72
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.276
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        5.10       .25         .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     5.10      SUBAREA RUNOFF(CFS) =   10.33
 EFFECTIVE AREA(ACRES) =     14.43   AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =    14.51        PEAK FLOW RATE(CFS) =      29.24

****************************************************************************
 FLOW PROCESS FROM NODE   3716.00 TO NODE   3071.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      9.33  DOWNSTREAM(FEET) =      8.24
 FLOW LENGTH(FEET) =    645.00    MANNING'S N =  .015
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  26.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    4.13
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      29.24
 PIPE TRAVEL TIME(MIN.) =   2.61    Tc(MIN.) =  31.33

+--------------------------------------------------------------------------+
| SUBAREA "A-23"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   3071.00 TO NODE   3071.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  31.33
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.169
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        1.23       .25         .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     1.23      SUBAREA RUNOFF(CFS) =     2.37
 EFFECTIVE AREA(ACRES) =     15.66   AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
```

```
 TOTAL AREA(ACRES) =    15.74        PEAK FLOW RATE(CFS) =      30.23

****************************************************************************
 FLOW PROCESS FROM NODE   3071.00 TO NODE   2761.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     8.24  DOWNSTREAM(FEET) =     7.62
 FLOW LENGTH(FEET) =   310.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  23.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
 GIVEN PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     30.23
 PIPE TRAVEL TIME(MIN.) =   1.17    Tc(MIN.) =  32.50

+--------------------------------------------------------------------------+
| SUBAREA "A-24"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   2761.00 TO NODE   2761.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  32.50
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.125
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C         .63        .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =      .63       SUBAREA RUNOFF(CFS) =    1.19
 EFFECTIVE AREA(ACRES) =    16.29   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    16.37       PEAK FLOW RATE(CFS) =      30.79

****************************************************************************
 FLOW PROCESS FROM NODE   2761.00 TO NODE   2565.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     7.62  DOWNSTREAM(FEET) =     6.48
 FLOW LENGTH(FEET) =   196.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  17.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.54
 GIVEN PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     30.79
 PIPE TRAVEL TIME(MIN.) =    .50    Tc(MIN.) =  33.00

+--------------------------------------------------------------------------+
| SUBAREA "A-25"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   2565.00 TO NODE   2565.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
MAINLINE Tc(MIN) =  33.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.106
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C          .44        .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =      .44       SUBAREA RUNOFF(CFS) =       .82
EFFECTIVE AREA(ACRES) =     16.73   AREA-AVERAGED Fm(INCH/HR) =    .02
AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    16.81        PEAK FLOW RATE(CFS) =      31.34

****************************************************************************
FLOW PROCESS FROM NODE   2565.00 TO NODE   2271.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      6.48  DOWNSTREAM(FEET) =      5.91
FLOW LENGTH(FEET) =   294.00   MANNING'S N = .015
DEPTH OF FLOW IN  57.0 INCH PIPE IS  24.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
GIVEN PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     31.34
PIPE TRAVEL TIME(MIN.) =   1.11    Tc(MIN.) =  34.11

+--------------------------------------------------------------------------+
| SUBAREA "A-26"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE   2271.00 TO NODE   2271.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  34.11
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.064
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C          .57        .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =      .57       SUBAREA RUNOFF(CFS) =     1.05
EFFECTIVE AREA(ACRES) =     17.30   AREA-AVERAGED Fm(INCH/HR) =    .02
AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    17.38        PEAK FLOW RATE(CFS) =      31.75

****************************************************************************
FLOW PROCESS FROM NODE   2271.00 TO NODE   2035.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      5.91  DOWNSTREAM(FEET) =      5.29
FLOW LENGTH(FEET) =   236.00   MANNING'S N = .015
DEPTH OF FLOW IN  57.0 INCH PIPE IS  22.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.95
GIVEN PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     31.75
PIPE TRAVEL TIME(MIN.) =    .79    Tc(MIN.) =  34.90
```

```
****************************************************************************
FLOW PROCESS FROM NODE   2035.00 TO NODE   1920.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      5.29  DOWNSTREAM(FEET) =      5.23
FLOW LENGTH(FEET) =   115.00   MANNING'S N =  .015
DEPTH OF FLOW IN  63.0 INCH PIPE IS  33.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   2.71
GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     31.75
PIPE TRAVEL TIME(MIN.) =    .71    Tc(MIN.) =  35.61

+--------------------------------------------------------------------------+
|SUBAREA "A-28"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE   1920.00 TO NODE   1920.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  35.61
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.012
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
COMMERCIAL                 C          .62        .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =      .62       SUBAREA RUNOFF(CFS) =    1.11
EFFECTIVE AREA(ACRES) =    17.92   AREA-AVERAGED Fm(INCH/HR) =   .02
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    18.00       PEAK FLOW RATE(CFS) =     32.04

****************************************************************************
FLOW PROCESS FROM NODE   1920.00 TO NODE   1587.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      5.23  DOWNSTREAM(FEET) =      5.07
FLOW LENGTH(FEET) =   380.00   MANNING'S N =  .015
DEPTH OF FLOW IN  63.0 INCH PIPE IS  36.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   2.50
GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     32.04
PIPE TRAVEL TIME(MIN.) =   2.53    Tc(MIN.) =  38.14

+--------------------------------------------------------------------------+
|SUBAREA "A-29"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE   1587.00 TO NODE   1587.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  38.14
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.936
```

```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        .90       .25         .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =       .90       SUBAREA RUNOFF(CFS) =    1.55
 EFFECTIVE AREA(ACRES) =    18.82   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    18.90       PEAK FLOW RATE(CFS) =      32.37

****************************************************************************
 FLOW PROCESS FROM NODE   1587.00 TO NODE   1034.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     5.07  DOWNSTREAM(FEET) =     4.30
 FLOW LENGTH(FEET) =   500.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  24.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     32.37
 PIPE TRAVEL TIME(MIN.) =   2.05    Tc(MIN.) =  40.19

****************************************************************************
 FLOW PROCESS FROM NODE   1034.00 TO NODE   1034.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  40.19
 RAINFALL INTENSITY(INCH/HR) =   1.88
 AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   18.82
 TOTAL STREAM AREA(ACRES) =   18.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.37

+--------------------------------------------------------------------------+
| SUBAREA "A-27"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   1034.30 TO NODE   1034.20 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
 ELEVATION DATA: UPSTREAM(FEET) =     17.40  DOWNSTREAM(FEET) =     15.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.460
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.024
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 C       7.63       .25         .10     69   17.46
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
```

```
 SUBAREA RUNOFF(CFS) =       20.60
 TOTAL AREA(ACRES) =       7.63   PEAK FLOW RATE(CFS) =      20.60

+--------------------------------------------------------------------------+
| SUBAREA "A-30"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   1034.20 TO NODE   1034.10 IS CODE =  6.2
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   15.80  DOWNSTREAM ELEVATION(FEET) =   13.50
 STREET LENGTH(FEET) =  1555.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 40.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  35.00
 INSIDE STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =   .020

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      32.80
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =   .94
   HALFSTREET FLOOD WIDTH(FEET) =   52.73
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.89
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.78
 STREET FLOW TRAVEL TIME(MIN.) =  13.69    Tc(MIN.) =  31.15
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.176
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C       12.57       .25        .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =   12.57       SUBAREA RUNOFF(CFS) =   24.34
 EFFECTIVE AREA(ACRES) =   20.20     AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =   20.20         PEAK FLOW RATE(CFS) =      39.11

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) =  .96   HALFSTREET FLOOD WIDTH(FEET) =  54.58
 FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.83
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1555.0 FT WITH ELEVATION-DROP =   2.3 FT, IS   30.4 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1034.10

****************************************************************************
 FLOW PROCESS FROM NODE   1034.10 TO NODE   1034.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     6.70  DOWNSTREAM(FEET) =     5.90
 FLOW LENGTH(FEET) =    80.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.45
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     39.11
 PIPE TRAVEL TIME(MIN.) =    .11    Tc(MIN.) =  31.26
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1034.00 TO NODE   1034.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  31.26
  RAINFALL INTENSITY(INCH/HR) =   2.17
  AREA-AVERAGED Fm(INCH/HR) =   .02
  AREA-AVERAGED Fp(INCH/HR) =   .25
  AREA-AVERAGED Ap =   .10
  EFFECTIVE STREAM AREA(ACRES) =   20.20
  TOTAL STREAM AREA(ACRES) =   20.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.11

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap   Ae      HEADWATER
   NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
      1       31.92  41.35     1.849    .25(  .02)  .10     18.9     4800.00
      1       32.37  40.19     1.876    .25(  .02)  .10     18.8     4794.20
      2       39.11  31.26     2.172    .25(  .02)  .10     20.2     1034.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap   Ae      HEADWATER
   NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
      1       66.08  40.19     1.876    .25(  .02)  .10     39.0     4794.20
      2       65.14  41.35     1.849    .25(  .02)  .10     39.1     4800.00
      3       68.32  31.26     2.172    .25(  .02)  .10     34.8     1034.30

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       68.32    Tc(MIN.) =      31.26
  EFFECTIVE AREA(ACRES) =      34.84   AREA-AVERAGED Fm(INCH/HR) =    .02
  AREA-AVERAGED Fp(INCH/HR) =    .25   AREA-AVERAGED Ap =    .10
  TOTAL AREA(ACRES) =      39.10
  LONGEST FLOWPATH FROM NODE   4794.20 TO NODE   1034.00 =  5250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1034.00 TO NODE    884.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =      4.30  DOWNSTREAM(FEET) =      4.22
  FLOW LENGTH(FEET) =    149.00    MANNING'S N =  .015
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  52.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.23
  GIVEN PIPE DIAMETER(INCH) =  69.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      68.32
  PIPE TRAVEL TIME(MIN.) =     .77     Tc(MIN.) =  32.03

+--------------------------------------------------------------------------+
| SUBAREA "A-31"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    884.00 TO NODE    884.00 IS CODE =  8.1
----------------------------------------------------------------------------
```

```
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
 MAINLINE Tc(MIN) =  32.03
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.143
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 COMMERCIAL                 C        1.93       .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    1.93       SUBAREA RUNOFF(CFS) =    3.68
 EFFECTIVE AREA(ACRES) =    36.77   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    41.03        PEAK FLOW RATE(CFS) =      70.09

****************************************************************************
 FLOW PROCESS FROM NODE    884.00 TO NODE    807.76 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      4.22  DOWNSTREAM(FEET) =      4.18
 FLOW LENGTH(FEET) =     79.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  55.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.15
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      70.09
 PIPE TRAVEL TIME(MIN.) =    .42    Tc(MIN.) =  32.44
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)         =      41.03  TC(MIN.) =      32.44
 EFFECTIVE AREA(ACRES) =          36.77  AREA-AVERAGED Fm(INCH/HR)=   .02
 AREA-AVERAGED Fp(INCH/HR) =        .25  AREA-AVERAGED Ap =    .10
 PEAK FLOW RATE(CFS)       =      70.09

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)     NODE
     1      70.09  32.44     2.127    .25(  .02)  .10     36.8    1034.30
     2      67.56  41.37     1.848    .25(  .02)  .10     40.9    4794.20
     3      66.70  42.54     1.822    .25(  .02)  .10     41.0    4800.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
               (Reference: 1986 OCEMA HYDROLOGY CRITERION)
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                          Analysis prepared by:

                     ADAMS*STREETER CIVIL ENGINEERS INC.
                            15 CORPORATE PARK
                             IRVINE, CA 92714
                              (714) 474-2330

 ************************** DESCRIPTION OF STUDY **************************
* HYDROLOGY STUDY FOR AREA "B"                                             *
* EXISTING STORM DRAIN NORTH OF BOLSA                                      *
* 100-YEAR FLOWS                                                           *
 **************************************************************************

  FILE NAME: J:\961097\HYDRO\97BLSWEX.MA
  TIME/DATE OF STUDY: 12: 2   2/ 6/1997
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)    (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  ================= ======  ===== ====== ===== =======
  1   30.0     20.0     .020/ .020/ .020    .50   1.50 .03125 .1250 .01500

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =    .20 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

  UNIT-HYDROGRAPH DATA:
    WATERSHED LAG =  .80 * Tc
    USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
    2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
    FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
    SIERRA MADRE DEPTH-AREA FACTORS USED.
                       AREA-AVERAGED
         DURATION    RAINFALL(INCH)
         5-MINUTES          .52
        30-MINUTES         1.09
         1-HOUR            1.45
         3-HOUR            2.43
         6-HOUR            3.36
```

```
       24-HOUR               5.63
*ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR UNIT HYDROGRAPH METHOD*

+--------------------------------------------------------------------------+
| SUBAREA "B-1.1"                                                          |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    110.40 TO NODE    110.30 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   415.00
 ELEVATION DATA: UPSTREAM(FEET) =     19.20  DOWNSTREAM(FEET) =     17.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.177
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.125
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        4.85       .25        .10    69   10.18
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =      17.89
 TOTAL AREA(ACRES) =       4.85   PEAK FLOW RATE(CFS) =      17.89

****************************************************************************
 FLOW PROCESS FROM NODE    110.30 TO NODE    110.20 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    13.41  DOWNSTREAM(FEET) =    11.26
 FLOW LENGTH(FEET) =   560.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.50
 GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.89
 PIPE TRAVEL TIME(MIN.) =   2.07    Tc(MIN.) =  12.25

+--------------------------------------------------------------------------+
| SUBAREA "B-1.2"                                                          |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    110.20 TO NODE    110.20 IS CODE =  8.2
----------------------------------------------------------------------------
 >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
 >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   485.00
 ELEVATION DATA: UPSTREAM(FEET) =     19.40  DOWNSTREAM(FEET) =     17.20
```

```
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.613
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.037
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                  C       7.27       .25        .10     69   10.61
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    7.27   INITIAL SUBAREA RUNOFF(CFS) =   26.25

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN) =  12.25
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.710
SUBAREA AREA(ACRES) =    7.27      SUBAREA RUNOFF(CFS) =   24.11
EFFECTIVE AREA(ACRES) =    12.12   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    12.12       PEAK FLOW RATE(CFS) =      40.19

****************************************************************************
 FLOW PROCESS FROM NODE    110.20 TO NODE    110.10 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    11.25  DOWNSTREAM(FEET) =    10.22
 FLOW LENGTH(FEET) =    80.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.19
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     40.19
 PIPE TRAVEL TIME(MIN.) =    .16    Tc(MIN.) =  12.41

****************************************************************************
 FLOW PROCESS FROM NODE    110.10 TO NODE    203.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     8.40  DOWNSTREAM(FEET) =     7.75
 FLOW LENGTH(FEET) =   391.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  28.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.44
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     40.19
 PIPE TRAVEL TIME(MIN.) =   1.47    Tc(MIN.) =  13.88

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  13.88
 RAINFALL INTENSITY(INCH/HR) =   3.46
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   12.12
```

```
TOTAL STREAM AREA(ACRES) =   12.12
PEAK FLOW RATE(CFS) AT CONFLUENCE =     40.19

+--------------------------------------------------------------------------+
| SUBAREA "B-1"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  2.1
----------------------------------------------------------------------------

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   360.00
ELEVATION DATA: UPSTREAM(FEET) =     19.80  DOWNSTREAM(FEET) =     19.10

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.159
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.928
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                 C       2.14       .25        .10     69   11.16
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA RUNOFF(CFS) =      7.52
TOTAL AREA(ACRES) =      2.14   PEAK FLOW RATE(CFS) =      7.52

****************************************************************************
FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  4.1
----------------------------------------------------------------------------

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     14.31  DOWNSTREAM(FEET) =     13.55
FLOW LENGTH(FEET) =   370.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      7.52
PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =  12.17

+--------------------------------------------------------------------------+
| SUBAREA "B-2"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  8.1
----------------------------------------------------------------------------

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  12.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.727
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
 COMMERCIAL                      C        3.88        .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
 SUBAREA AREA(ACRES) =     3.88      SUBAREA RUNOFF(CFS) =   12.93
 EFFECTIVE AREA(ACRES) =      6.02   AREA-AVERAGED Fm(INCH/HR) =    .03
 AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =     6.02        PEAK FLOW RATE(CFS) =      20.06

****************************************************************************
 FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    13.55  DOWNSTREAM(FEET) =    10.60
 FLOW LENGTH(FEET) =   155.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.35
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.06
 PIPE TRAVEL TIME(MIN.) =    .23    Tc(MIN.) =  12.39

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  12.39
 RAINFALL INTENSITY(INCH/HR) =   3.68
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =    6.02
 TOTAL STREAM AREA(ACRES) =    6.02
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.06

 ** CONFLUENCE DATA **
  STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)         (ACRES)     NODE
     1      40.19  13.88    3.461    .25(  .03)  .10     12.1      110.40
     2      20.06  12.39    3.681    .25(  .03)  .10      6.0      200.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)         (ACRES)     NODE
     1      59.04  13.88    3.461    .25(  .03)  .10     18.1      110.40
     2      58.24  12.39    3.681    .25(  .03)  .10     16.8      200.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      59.04    Tc(MIN.) =    13.88
 EFFECTIVE AREA(ACRES) =     18.14   AREA-AVERAGED Fm(INCH/HR) =    .03
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =     18.14
 LONGEST FLOWPATH FROM NODE    110.40 TO NODE    203.00 =  1446.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     7.74  DOWNSTREAM(FEET) =     7.45
 FLOW LENGTH(FEET) =   393.00   MANNING'S N = .015
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.47
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      59.04
 PIPE TRAVEL TIME(MIN.) =   1.89    Tc(MIN.) =  15.77

+--------------------------------------------------------------------------+
| SUBAREA "B-3"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.77
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.214
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        3.92       .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     3.92       SUBAREA RUNOFF(CFS) =   11.25
 EFFECTIVE AREA(ACRES) =     22.06   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    22.06       PEAK FLOW RATE(CFS) =      63.31

****************************************************************************
 FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     7.34  DOWNSTREAM(FEET) =     6.96
 FLOW LENGTH(FEET) =   389.00   MANNING'S N = .015
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  38.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.08
 GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      63.31
 PIPE TRAVEL TIME(MIN.) =   1.59    Tc(MIN.) =  17.36

+--------------------------------------------------------------------------+
| SUBAREA "B-4"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  17.36
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.036
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C       12.90       .25        .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =   12.90       SUBAREA RUNOFF(CFS) =   34.96
 EFFECTIVE AREA(ACRES) =    34.96   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    34.96       PEAK FLOW RATE(CFS) =      94.74

 ** PEAK FLOW RATE TABLE **
  STREAM      Q     Tc   Intensity   Fp(Fm)      Ap   Ae     HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
     1      94.74  17.36    3.036    .25(  .03)  .10    35.0     110.40
     2      96.26  15.87    3.202    .25(  .03)  .10    33.7     200.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      96.26  Tc(MIN.) =  15.87
 AREA-AVERAGED Fm(INCH/HR) =   .03  AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10  EFFECTIVE AREA(ACRES) =     33.66

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     6.95  DOWNSTREAM(FEET) =     6.54
 FLOW LENGTH(FEET) =   405.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  50.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.52
 GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     96.26
 PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =  17.37

+--------------------------------------------------------------------------+
| SUBAREA "B-5"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  17.37
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.035
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        6.90       .25        .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
```

```
SUBAREA AREA(ACRES) =    6.90      SUBAREA RUNOFF(CFS) =   18.69
EFFECTIVE AREA(ACRES) =    40.56   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    41.86       PEAK FLOW RATE(CFS) =     109.87

****************************************************************************
FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      6.44  DOWNSTREAM(FEET) =      5.42
FLOW LENGTH(FEET) =   338.00   MANNING'S N =  .015
DEPTH OF FLOW IN  72.0 INCH PIPE IS  38.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.14
GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    109.87
PIPE TRAVEL TIME(MIN.) =    .79    Tc(MIN.) =  18.16

+--------------------------------------------------------------------------+
|SUBAREA "B-6"                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  18.16
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.962
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        8.19       .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    8.19      SUBAREA RUNOFF(CFS) =   21.65
EFFECTIVE AREA(ACRES) =    48.75   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    50.05       PEAK FLOW RATE(CFS) =     128.88

****************************************************************************
FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      5.22  DOWNSTREAM(FEET) =      4.36
FLOW LENGTH(FEET) =   488.00   MANNING'S N =  .015
DEPTH OF FLOW IN  72.0 INCH PIPE IS  51.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.97
GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    128.88
PIPE TRAVEL TIME(MIN.) =   1.36    Tc(MIN.) =  19.52

****************************************************************************
FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  19.52
 RAINFALL INTENSITY(INCH/HR) =   2.84
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   48.75
 TOTAL STREAM AREA(ACRES) =   50.05
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    128.88

--------------------------------------------------------------------------+
| SUBAREA "B-7"                                                           |
|                                                                         |
|                                                                         |
--------------------------------------------------------------------------+

**************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  2.1
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   240.00
 ELEVATION DATA: UPSTREAM(FEET) =     17.70  DOWNSTREAM(FEET) =     15.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.679
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.324
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C       2.40       .25        .10     69    6.68
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     11.44
 TOTAL AREA(ACRES) =       2.40   PEAK FLOW RATE(CFS) =      11.44

**************************************************************************
 FLOW PROCESS FROM NODE    211.00 TO NODE    212.00 IS CODE =  4.1
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     10.22  DOWNSTREAM(FEET) =      9.35
 FLOW LENGTH(FEET) =   220.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.44
 PIPE TRAVEL TIME(MIN.) =    .84    Tc(MIN.) =   7.52

+-------------------------------------------------------------------------+
| SUBAREA "B-8"                                                           |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+
```

```
****************************************************************************
FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =   7.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.894
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        1.50        .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     1.50       SUBAREA RUNOFF(CFS) =    6.57
EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25    AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =     3.90         PEAK FLOW RATE(CFS) =      17.09

****************************************************************************
FLOW PROCESS FROM NODE    212.00 TO NODE    213.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     9.35  DOWNSTREAM(FEET) =     8.35
FLOW LENGTH(FEET) =   250.00   MANNING'S N =  .015
DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.94
GIVEN PIPE DIAMETER(INCH) =  30.00     NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     17.09
PIPE TRAVEL TIME(MIN.) =    .84    Tc(MIN.) =   8.37

+--------------------------------------------------------------------------+
| SUBAREA "B-9"                                                            |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    213.00 TO NODE    213.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =   8.37
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.644
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        2.30        .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     2.30       SUBAREA RUNOFF(CFS) =    9.56
EFFECTIVE AREA(ACRES) =      6.20    AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25    AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =     6.20         PEAK FLOW RATE(CFS) =      25.77

+--------------------------------------------------------------------------+
| SUBAREA "B-10"                                                           |
|                                                                          |
```

```
+-----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    213.00 IS CODE =  8.1
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   8.37
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.644
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap       SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
  COMMERCIAL                  C         .90       .25         .10     69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
  SUBAREA AREA(ACRES) =      .90      SUBAREA RUNOFF(CFS) =    3.74
  EFFECTIVE AREA(ACRES) =      7.10   AREA-AVERAGED Fm(INCH/HR) =   .03
  AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
  TOTAL AREA(ACRES) =     7.10        PEAK FLOW RATE(CFS) =      29.51

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    208.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =      8.35  DOWNSTREAM(FEET) =      5.85
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  .015
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.77
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.51
  PIPE TRAVEL TIME(MIN.) =    .38    Tc(MIN.) =   8.75

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.75
  RAINFALL INTENSITY(INCH/HR) =   4.53
  AREA-AVERAGED Fm(INCH/HR) =   .03
  AREA-AVERAGED Fp(INCH/HR) =   .25
  AREA-AVERAGED Ap =   .10
  EFFECTIVE STREAM AREA(ACRES) =    7.10
  TOTAL STREAM AREA(ACRES) =    7.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      29.51

  ** CONFLUENCE DATA **
   STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1     126.40  21.01     2.723    .25(  .02)  .10     50.0      110.40
      1     128.88  19.52     2.842    .25(  .03)  .10     48.8      200.00
      2      29.51   8.75     4.531    .25(  .03)  .10      7.1      210.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
```

```
** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
    1     147.33  19.52     2.842    .25(  .03)  .10     55.9     200.00
    2     144.07  21.01     2.723    .25(  .02)  .10     57.1     110.40
    3     121.88   8.75     4.531    .25(  .03)  .10     28.9     210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     147.33    Tc(MIN.) =     19.52
EFFECTIVE AREA(ACRES) =     55.85   AREA-AVERAGED Fm(INCH/HR) =    .03
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =      57.15
LONGEST FLOWPATH FROM NODE     110.40 TO NODE     208.00 =  3459.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    208.00 TO NODE    209.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      4.34  DOWNSTREAM(FEET) =      3.84
FLOW LENGTH(FEET) =    283.00    MANNING'S N =  .015
DEPTH OF FLOW IN  72.0 INCH PIPE IS  57.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =    6.06
GIVEN PIPE DIAMETER(INCH) =  72.00     NUMBER OF PIPES =    1
PIPE-FLOW(CFS) =     147.33
PIPE TRAVEL TIME(MIN.) =     .78    Tc(MIN.) =  20.30

****************************************************************************
FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  20.30
RAINFALL INTENSITY(INCH/HR) =   2.78
AREA-AVERAGED Fm(INCH/HR) =    .03
AREA-AVERAGED Fp(INCH/HR) =    .25
AREA-AVERAGED Ap =    .10
EFFECTIVE STREAM AREA(ACRES) =   55.85
TOTAL STREAM AREA(ACRES) =   57.15
PEAK FLOW RATE(CFS) AT CONFLUENCE =     147.33

+--------------------------------------------------------------------------+
| SUBAREA "B-11"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    214.00 TO NODE    215.00 IS CODE =  2.1
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =    470.00
ELEVATION DATA: UPSTREAM(FEET) =     18.40  DOWNSTREAM(FEET) =     16.20
```

```
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.415
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.077
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS   Tc
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                   C        1.60       .25        .10    69   10.41
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA RUNOFF(CFS) =      5.83
TOTAL AREA(ACRES) =        1.60   PEAK FLOW RATE(CFS) =       5.83

****************************************************************************
FLOW PROCESS FROM NODE    215.00 TO NODE    216.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    13.13  DOWNSTREAM(FEET) =     8.19
FLOW LENGTH(FEET) =    390.00   MANNING'S N =  .015
DEPTH OF FLOW IN  27.0 INCH PIPE IS   8.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.77
GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       5.83
PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =  11.54

+--------------------------------------------------------------------------+
| SUBAREA "B-12"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  11.54
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.852
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                   C        1.30       .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     1.30     SUBAREA RUNOFF(CFS) =    4.48
EFFECTIVE AREA(ACRES) =      2.90   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =      2.90      PEAK FLOW RATE(CFS) =       9.99

+--------------------------------------------------------------------------+
| SUBAREA "B-13"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
 MAINLINE Tc(MIN) =  11.54
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.852
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap       SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 COMMERCIAL                  C       1.40       .25        .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    4.82
 EFFECTIVE AREA(ACRES) =     4.30   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    4.30        PEAK FLOW RATE(CFS) =      14.81

**************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    217.00 IS CODE =  4.1
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     8.19  DOWNSTREAM(FEET) =     6.82
 FLOW LENGTH(FEET) =   380.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  17.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.63
 GIVEN PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     14.81
 PIPE TRAVEL TIME(MIN.) =   1.37    Tc(MIN.) =  12.91

+-------------------------------------------------------------------------+
| SUBAREA "B-14"                                                          |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+

**************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  8.1
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN) =  12.91
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.601
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap       SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 NATURAL POOR COVER
 "BARREN"                    C       4.60       .25       1.00     91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
 SUBAREA AREA(ACRES) =    4.60      SUBAREA RUNOFF(CFS) =   13.87
 EFFECTIVE AREA(ACRES) =     8.90   AREA-AVERAGED Fm(INCH/HR) =   .14
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .57
 TOTAL AREA(ACRES) =    8.90        PEAK FLOW RATE(CFS) =      27.71

**************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    209.00 IS CODE =  4.1
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     6.82  DOWNSTREAM(FEET) =     6.31
```

```
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.94
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     27.71
 PIPE TRAVEL TIME(MIN.) =    .57    Tc(MIN.) =  13.48

****************************************************************************
 FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  13.48
 RAINFALL INTENSITY(INCH/HR) =   3.52
 AREA-AVERAGED Fm(INCH/HR) =   .14
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .57
 EFFECTIVE STREAM AREA(ACRES) =    8.90
 TOTAL STREAM AREA(ACRES) =    8.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.71

 ** CONFLUENCE DATA **
  STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae     HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1    147.33  20.30     2.777    .25(  .03)  .10    55.9     200.00
     1    144.07  21.79     2.664    .25(  .02)  .10    57.1     110.40
     1    121.88   9.54     4.295    .25(  .03)  .10    28.9     210.00
     2     27.71  13.48     3.518    .25(  .14)  .57     8.9     214.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae     HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1    146.00   9.54     4.295    .25(  .05)  .18    35.2     210.00
     2    168.96  20.30     2.777    .25(  .04)  .16    64.8     200.00
     3    164.76  21.79     2.664    .25(  .04)  .16    66.0     110.40
     4    158.92  13.48     3.518    .25(  .05)  .19    47.7     214.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     168.96    Tc(MIN.) =    20.30
 EFFECTIVE AREA(ACRES) =    64.75   AREA-AVERAGED Fm(INCH/HR) =   .04
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .16
 TOTAL AREA(ACRES) =     66.05
 LONGEST FLOWPATH FROM NODE    110.40 TO NODE    209.00 =  3742.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     3.83  DOWNSTREAM(FEET) =     2.60
 FLOW LENGTH(FEET) =   163.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  37.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.22
```

```
 GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    168.96
 PIPE TRAVEL TIME(MIN.) =    .24    Tc(MIN.) =  20.54

+--------------------------------------------------------------------------+
| SUBAREAS "B-15" AND "B-16"                                               |
| (COMBINED AREAS)                                                         |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  8.2
----------------------------------------------------------------------------
 >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
 >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  1280.00
 ELEVATION DATA: UPSTREAM(FEET) =     16.00  DOWNSTREAM(FEET) =     14.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.364
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.856
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C       4.09        .25         .10     69   19.36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    4.09   INITIAL SUBAREA RUNOFF(CFS) =   10.42

 ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
 MAINLINE Tc(MIN) =  20.54
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.759
 SUBAREA AREA(ACRES) =    4.09       SUBAREA RUNOFF(CFS) =   10.06
 EFFECTIVE AREA(ACRES) =    68.84   AREA-AVERAGED Fm(INCH/HR) =   .04
 AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .16
 TOTAL AREA(ACRES) =    70.14       PEAK FLOW RATE(CFS) =     168.96
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     2.60  DOWNSTREAM(FEET) =     2.21
 FLOW LENGTH(FEET) =   137.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  52.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.62
 GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    168.96
 PIPE TRAVEL TIME(MIN.) =    .30    Tc(MIN.) =  20.84
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)          =      70.14  TC(MIN.) =      20.84
 EFFECTIVE AREA(ACRES) =          68.84  AREA-AVERAGED Fm(INCH/HR)=   .04
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =   .16
 PEAK FLOW RATE(CFS)     =     168.96

 ** PEAK FLOW RATE TABLE **
```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	147.88	10.10	4.140	.25(.04)	.17	39.3	210.00
2	160.27	14.03	3.439	.25(.04)	.18	51.8	214.00
3	168.96	20.84	2.736	.25(.04)	.16	68.8	200.00
4	164.76	22.34	2.622	.25(.04)	.16	70.1	110.40

==

==

END OF RATIONAL METHOD ANALYSIS

```
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 OCEMA HYDROLOGY CRITERION)
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          Ver. 6.1  Release Date: 01/01/96  License ID 1204

                        Analysis prepared by:

                ADAMS*STREETER CIVIL ENGINEERS INC.
                        15 CORPORATE PARK
                        IRVINE, CA 92714
                         (714) 474-2330

************************** DESCRIPTION OF STUDY **************************
* HYDROLOGY STUDY FOR AREA "C"                                            *
* EXISTING CONDITIONS                                                     *
* 100-YEAR FLOWS                                                          *
***************************************************************************

 FILE NAME: J:\961097\HYDRO\97SKLBEX.MA
 TIME/DATE OF STUDY: 11:29   3/ 8/1997
============================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                  --*TIME-OF-CONCENTRATION MODEL*--

 USER SPECIFIED STORM EVENT(YEAR) =  100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
 *DATA BANK RAINFALL USED*
 *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR RATIONAL METHOD*

 *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
    HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
    WIDTH  CROSSFALL  IN-  / OUT-/PARK- HEIGHT WIDTH  LIP   HIKE   FACTOR
NO.  (FT)    (FT)     SIDE / SIDE/ WAY   (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  ================= ====== ===== ====== ===== =======
 1   30.0     20.0     .018/ .018/ .020   .67    2.00 .03125 .1670 .01500

 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =   .00 FEET
      as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
   2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)

+--------------------------------------------------------------------------+
| SUBAREA "C-1"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    318.00 TO NODE    319.00 IS CODE =  2.1
----------------------------------------------------------------------------

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   400.00
 ELEVATION DATA: UPSTREAM(FEET) =     21.20  DOWNSTREAM(FEET) =     18.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.216
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.392
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        5.10       .25        .10     69    9.22
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     20.05
 TOTAL AREA(ACRES) =       5.10   PEAK FLOW RATE(CFS) =     20.05

****************************************************************************
 FLOW PROCESS FROM NODE    319.00 TO NODE    320.00 IS CODE =  4.1
----------------------------------------------------------------------------

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    13.90  DOWNSTREAM(FEET) =    12.00
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.10
 GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.05
 PIPE TRAVEL TIME(MIN.) =    .47    Tc(MIN.) =   9.68

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    310.00 IS CODE =  4.1
----------------------------------------------------------------------------

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    11.40  DOWNSTREAM(FEET) =    10.70
 FLOW LENGTH(FEET) =   400.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  22.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.81
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.05
 PIPE TRAVEL TIME(MIN.) =   1.75    Tc(MIN.) =  11.44

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =   1
----------------------------------------------------------------------------

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  11.44
 RAINFALL INTENSITY(INCH/HR) =   3.87
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =    5.10
 TOTAL STREAM AREA(ACRES) =    5.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.05

+--------------------------------------------------------------------------+
| SUBAREA "C-2"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   550.00
 ELEVATION DATA: UPSTREAM(FEET) =     19.50  DOWNSTREAM(FEET) =     17.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.665
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.827
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 C       9.80       .25        .10     69   11.67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     33.53
 TOTAL AREA(ACRES) =       9.80   PEAK FLOW RATE(CFS) =     33.53

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  5.1
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     17.50  DOWNSTREAM(FEET) =     16.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  .0024
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.500
 MANNING'S FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.53
 FLOW VELOCITY(FEET/SEC) =   2.46   FLOW DEPTH(FEET) =   1.54
 TRAVEL TIME(MIN.) =   3.38   Tc(MIN.) =  15.05
```

```
+--------------------------------------------------------------------------+
| SUBAREA "C-3"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.05
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.295
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C       4.30       .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =   12.65
 EFFECTIVE AREA(ACRES) =    14.10   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    14.10       PEAK FLOW RATE(CFS) =      41.49

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  5.1
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     16.30  DOWNSTREAM(FEET) =     15.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =   .0014
 CHANNEL BASE(FEET) =    5.00    "Z" FACTOR =   2.500
 MANNING'S FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     41.49
 FLOW VELOCITY(FEET/SEC) =   2.13   FLOW DEPTH(FEET) =   1.96
 TRAVEL TIME(MIN.) =   5.08   Tc(MIN.) =  20.13

+--------------------------------------------------------------------------+
| SUBAREA "C-4"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  20.13
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.790
```

```
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        6.50       .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    6.50      SUBAREA RUNOFF(CFS) =   16.18
EFFECTIVE AREA(ACRES) =    20.60   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    20.60       PEAK FLOW RATE(CFS) =      51.27

****************************************************************************
FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  4.1
----------------------------------------------------------------------------

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    14.70  DOWNSTREAM(FEET) =    13.20
FLOW LENGTH(FEET) =   480.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  10.44
GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     51.27
PIPE TRAVEL TIME(MIN.) =    .77    Tc(MIN.) =  20.89

+--------------------------------------------------------------------------+
|SUBAREA "C-5"                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  8.1
----------------------------------------------------------------------------

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  20.89
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.732
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        4.10       .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    4.10      SUBAREA RUNOFF(CFS) =    9.99
EFFECTIVE AREA(ACRES) =    24.70   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    24.70       PEAK FLOW RATE(CFS) =      60.18

****************************************************************************
FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  20.89
 RAINFALL INTENSITY(INCH/HR) =   2.73
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   24.70
 TOTAL STREAM AREA(ACRES) =   24.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     60.18

 ** CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1      20.05  11.44     3.873    .25(  .03)  .10      5.1      318.00
     2      60.18  20.89     2.732    .25(  .03)  .10     24.7      306.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1      66.87  11.44     3.873    .25(  .03)  .10     18.6      318.00
     2      74.28  20.89     2.732    .25(  .03)  .10     29.8      306.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      74.28    Tc(MIN.) =     20.89
 EFFECTIVE AREA(ACRES) =     29.80   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =     29.80

******************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    300.00 IS CODE =  4.1
------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    10.70  DOWNSTREAM(FEET) =    10.49
 FLOW LENGTH(FEET) =    120.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.72
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      74.28
 PIPE TRAVEL TIME(MIN.) =    .26    Tc(MIN.) =  21.15

+----------------------------------------------------------------------------+
| SUBAREA "C-6"                                                              |
|                                                                            |
```

```
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  21.15
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.712
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap       SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        7.90       .25        .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    7.90       SUBAREA RUNOFF(CFS) =   19.11
 EFFECTIVE AREA(ACRES) =    37.70   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    37.70       PEAK FLOW RATE(CFS) =       91.19

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    400.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    10.49  DOWNSTREAM(FEET) =     9.97
 FLOW LENGTH(FEET) =   290.00    MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.43
 GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     91.19
 PIPE TRAVEL TIME(MIN.) =    .75    Tc(MIN.) =  21.90

+----------------------------------------------------------------------------+
| SUBAREA "C-7"                                                              |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  21.90
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.655
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap       SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        7.90       .25        .10     69
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   18.70
 EFFECTIVE AREA(ACRES) =    45.60   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    45.60       PEAK FLOW RATE(CFS) =     107.95

 ** PEAK FLOW RATE TABLE **
  STREAM      Q     Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
     1     112.72  12.48    3.664   .25(  .03)  .10    34.4     318.00
     2     107.95  21.90    2.655   .25(  .03)  .10    45.6     306.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =    112.72  Tc(MIN.) =  12.48
 AREA-AVERAGED Fm(INCH/HR) =   .03  AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10  EFFECTIVE AREA(ACRES) =    34.42

****************************************************************************
 FLOW PROCESS FROM NODE   400.00 TO NODE   504.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     9.97  DOWNSTREAM(FEET) =     9.35
 FLOW LENGTH(FEET) =   350.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.74
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    112.72
 PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =  13.50

+--------------------------------------------------------------------------+
| SUBAREA "C-8"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   504.00 TO NODE   504.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.50
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.516
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 COMMERCIAL                  C        5.00       .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    5.00      SUBAREA RUNOFF(CFS) =   15.71
 EFFECTIVE AREA(ACRES) =    39.42   AREA-AVERAGED Fm(INCH/HR) =   .03
```

```
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =    50.60       PEAK FLOW RATE(CFS) =     123.86

****************************************************************************
FLOW PROCESS FROM NODE    504.00 TO NODE    550.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      9.35  DOWNSTREAM(FEET) =      9.05
FLOW LENGTH(FEET) =   170.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.31
GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    123.86
PIPE TRAVEL TIME(MIN.) =    .45    Tc(MIN.) =  13.95

+--------------------------------------------------------------------------+
|SUBAREA "C-9"                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    550.00 TO NODE    550.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  13.95
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.452
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 C       6.80       .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    6.80       SUBAREA RUNOFF(CFS) =   20.97
EFFECTIVE AREA(ACRES) =    46.22   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =    57.40       PEAK FLOW RATE(CFS) =     142.54

****************************************************************************
FLOW PROCESS FROM NODE    550.00 TO NODE    600.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      9.05  DOWNSTREAM(FEET) =      8.12
FLOW LENGTH(FEET) =   520.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.26
GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =    142.54
 PIPE TRAVEL TIME(MIN.) =   1.19    Tc(MIN.) =  15.14

+--------------------------------------------------------------------------+
| SUBAREA "C-10"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.14
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.284
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        8.50        .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    8.50      SUBAREA RUNOFF(CFS) =   24.93
 EFFECTIVE AREA(ACRES) =    54.72   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    65.90       PEAK FLOW RATE(CFS) =     160.51

****************************************************************************
 FLOW PROCESS FROM NODE    600.00 TO NODE    650.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     8.12  DOWNSTREAM(FEET) =     7.55
 FLOW LENGTH(FEET) =   320.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.17
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    160.51
 PIPE TRAVEL TIME(MIN.) =    .65    Tc(MIN.) =  15.79

+--------------------------------------------------------------------------+
| SUBAREA "C-11"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
MAINLINE Tc(MIN) =  15.79
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.211
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        8.00        .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    8.00      SUBAREA RUNOFF(CFS) =   22.94
EFFECTIVE AREA(ACRES) =    62.72   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    73.90       PEAK FLOW RATE(CFS) =     179.85

****************************************************************************
FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  15.79
RAINFALL INTENSITY(INCH/HR) =   3.21
AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =   62.72
TOTAL STREAM AREA(ACRES) =   73.90
PEAK FLOW RATE(CFS) AT CONFLUENCE =    179.85

+--------------------------------------------------------------------------+
| SUBAREA "C-12"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    651.00 TO NODE    652.00 IS CODE =  2.1
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   420.00
ELEVATION DATA: UPSTREAM(FEET) =     18.90  DOWNSTREAM(FEET) =     17.40

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.510
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.058
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                  C        6.70        .25        .10    69  10.51
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
```

```
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA RUNOFF(CFS) =     24.32
TOTAL AREA(ACRES) =      6.70   PEAK FLOW RATE(CFS) =     24.32

****************************************************************************
 FLOW PROCESS FROM NODE    652.00 TO NODE    653.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    15.17  DOWNSTREAM(FEET) =    11.35
 FLOW LENGTH(FEET) =   800.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.11
 GIVEN PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     24.32
 PIPE TRAVEL TIME(MIN.) =   1.32    Tc(MIN.) =  11.83

----------------------------------------------------------------------------+
| SUBAREA "C-13"                                                            |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    653.00 TO NODE    653.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.83
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.794
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C       10.20       .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =   10.20       SUBAREA RUNOFF(CFS) =   34.60
 EFFECTIVE AREA(ACRES) =    16.90   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    16.90       PEAK FLOW RATE(CFS) =     57.33

+---------------------------------------------------------------------------+
| SUBAREA "C-14"                                                            |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    653.00 TO NODE    650.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    11.35  DOWNSTREAM(FEET) =     8.97
FLOW LENGTH(FEET) =   530.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.11
GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     57.33
PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =  12.92

******************************************************************************
FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =  8.1
------------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
MAINLINE Tc(MIN) =  12.92
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.600
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        7.40       .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     7.40      SUBAREA RUNOFF(CFS) =   23.81
EFFECTIVE AREA(ACRES) =    24.30   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    24.30       PEAK FLOW RATE(CFS) =      78.18

******************************************************************************
FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =   1
------------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  12.92
RAINFALL INTENSITY(INCH/HR) =   3.60
AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =   24.30
TOTAL STREAM AREA(ACRES) =   24.30
PEAK FLOW RATE(CFS) AT CONFLUENCE =      78.18

** CONFLUENCE DATA **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1    179.85  15.79    3.211    .25(  .03)  .10     62.7      318.00
    1    160.34  25.47    2.436    .25(  .03)  .10     73.9      306.00
    2     78.18  12.92    3.600    .25(  .03)  .10     24.3      651.00
```

```
RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM       Q       Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
    1     249.53  15.79     3.211    .25(  .03)  .10     87.0     318.00
    2     213.07  25.47     2.436    .25(  .03)  .10     98.2     306.00
    3     243.23  12.92     3.600    .25(  .03)  .10     75.6     651.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     249.53    Tc(MIN.) =     15.79
EFFECTIVE AREA(ACRES) =     87.02   AREA-AVERAGED Fm(INCH/HR) =    .03
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =     98.20

****************************************************************************
 FLOW PROCESS FROM NODE    650.00 TO NODE    705.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      8.12  DOWNSTREAM(FEET) =      7.12
 FLOW LENGTH(FEET) =    450.00    MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.71
 GIVEN PIPE DIAMETER(INCH) =  60.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     249.53
 PIPE TRAVEL TIME(MIN.) =    .59    Tc(MIN.) =  16.38

+--------------------------------------------------------------------------+
| SUBAREA "C-15"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    705.00 TO NODE    705.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  16.38
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.145
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C       5.00       .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =   14.04
 EFFECTIVE AREA(ACRES) =    92.02   AREA-AVERAGED Fm(INCH/HR) =    .03
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
```

```
TOTAL AREA(ACRES) =   103.20        PEAK FLOW RATE(CFS) =     258.39

****************************************************************************
FLOW PROCESS FROM NODE    705.00 TO NODE    700.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     7.12  DOWNSTREAM(FEET) =     6.82
FLOW LENGTH(FEET) =   130.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  13.16
GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    258.39
PIPE TRAVEL TIME(MIN.) =    .16    Tc(MIN.) =  16.55

+--------------------------------------------------------------------------+
| SUBAREA "C-16"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    700.00 TO NODE    700.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  16.55
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.127
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 C        4.60      .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    4.60       SUBAREA RUNOFF(CFS) =   12.84
EFFECTIVE AREA(ACRES) =    96.62   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =   107.80        PEAK FLOW RATE(CFS) =     269.71

****************************************************************************
FLOW PROCESS FROM NODE    700.00 TO NODE    750.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     6.82  DOWNSTREAM(FEET) =     5.64
FLOW LENGTH(FEET) =   660.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   9.54
GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    269.71
```

```
 PIPE TRAVEL TIME(MIN.) =   1.15    Tc(MIN.) =  17.70

****************************************************************************
 FLOW PROCESS FROM NODE    750.00 TO NODE    750.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  17.70
 RAINFALL INTENSITY(INCH/HR) =   3.00
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   96.62
 TOTAL STREAM AREA(ACRES) = 107.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    269.71

+--------------------------------------------------------------------------+
| SUBAREA "C-17"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    751.00 TO NODE    752.00 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   970.00
 ELEVATION DATA: UPSTREAM(FEET) =     20.00  DOWNSTREAM(FEET) =     15.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.135
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.425
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        7.80       .25        .10    69   14.13
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     23.87
 TOTAL AREA(ACRES) =      7.80   PEAK FLOW RATE(CFS) =      23.87

****************************************************************************
 FLOW PROCESS FROM NODE    752.00 TO NODE    750.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     8.96  DOWNSTREAM(FEET) =     5.64
```

```
 FLOW LENGTH(FEET) =   600.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       23.87
 PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =  15.77

+--------------------------------------------------------------------------+
| SUBAREA "C-18"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    750.00 TO NODE    750.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.77
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.214
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C       11.50       .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =   11.50      SUBAREA RUNOFF(CFS) =   33.01
 EFFECTIVE AREA(ACRES) =    19.30   AREA-AVERAGED Fm(INCH/HR) =    .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    19.30       PEAK FLOW RATE(CFS) =      55.39

****************************************************************************
 FLOW PROCESS FROM NODE    750.00 TO NODE    750.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  15.77
 RAINFALL INTENSITY(INCH/HR) =   3.21
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   19.30
 TOTAL STREAM AREA(ACRES) =   19.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      55.39

 ** CONFLUENCE DATA **
  STREAM      Q      Tc   Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1    269.71  17.70    3.002   .25(  .03)  .10    96.6      318.00
```

```
    1     229.43  27.71     2.321    .25(  .03)  .10   107.8      306.00
    1     265.58  14.86     3.320    .25(  .03)  .10    85.2      651.00
    2      55.39  15.77     3.214    .25(  .03)  .10    19.3      751.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc    Intensity   Fp(Fm)      Ap   Ae      HEADWATER
   NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1     319.52  14.86     3.320    .25(  .03)  .10   103.4      651.00
      2     321.42  17.70     3.002    .25(  .03)  .10   115.9      318.00
      3     269.32  27.71     2.321    .25(  .03)  .10   127.1      306.00
      4     322.29  15.77     3.214    .25(  .03)  .10   108.1      751.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     322.29    Tc(MIN.) =     15.77
  EFFECTIVE AREA(ACRES) =    108.14   AREA-AVERAGED Fm(INCH/HR) =    .03
  AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
  TOTAL AREA(ACRES) =    127.10

****************************************************************************
  FLOW PROCESS FROM NODE    750.00 TO NODE    800.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     5.64  DOWNSTREAM(FEET) =     5.00
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  .015
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.01
  GIVEN PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    322.29
  PIPE TRAVEL TIME(MIN.) =    .67    Tc(MIN.) =  16.43

****************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    800.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  16.43
  RAINFALL INTENSITY(INCH/HR) =   3.14
  AREA-AVERAGED Fm(INCH/HR) =   .03
  AREA-AVERAGED Fp(INCH/HR) =   .25
  AREA-AVERAGED Ap =   .10
  EFFECTIVE STREAM AREA(ACRES) =  108.14
  TOTAL STREAM AREA(ACRES) =  127.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    322.29

+--------------------------------------------------------------------------+
```

```
SUBAREA "C-19"                                                          |
                                                                        |
                                                                        |
------------------------------------------------------------------------+

**************************************************************************
FLOW PROCESS FROM NODE    801.00 TO NODE    800.00 IS CODE =  2.1
--------------------------------------------------------------------------

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   750.00
ELEVATION DATA: UPSTREAM(FEET) =     16.60  DOWNSTREAM(FEET) =     15.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.315
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.265
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                 C        6.80       .25        .10     69   15.32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA RUNOFF(CFS) =     19.83
TOTAL AREA(ACRES) =      6.80   PEAK FLOW RATE(CFS) =      19.83

**************************************************************************
FLOW PROCESS FROM NODE    800.00 TO NODE    800.00 IS CODE =   1
--------------------------------------------------------------------------

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  15.32
RAINFALL INTENSITY(INCH/HR) =   3.26
AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =    6.80
TOTAL STREAM AREA(ACRES) =    6.80
PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.83

+-------------------------------------------------------------------------+
|SUBAREA "C-20"                                                           |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+

**************************************************************************
FLOW PROCESS FROM NODE    803.00 TO NODE    802.00 IS CODE =  2.1
--------------------------------------------------------------------------

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
 ELEVATION DATA: UPSTREAM(FEET) =     16.90  DOWNSTREAM(FEET) =     15.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.396
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.531
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        6.60       .25         .10     69   13.40
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     20.83
 TOTAL AREA(ACRES) =       6.60   PEAK FLOW RATE(CFS) =     20.83

****************************************************************************
 FLOW PROCESS FROM NODE    802.00 TO NODE    800.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     11.50  DOWNSTREAM(FEET) =      7.60
 FLOW LENGTH(FEET) =    260.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.78
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.83
 PIPE TRAVEL TIME(MIN.) =    .37    Tc(MIN.) =  13.76

****************************************************************************
 FLOW PROCESS FROM NODE    800.00 TO NODE    800.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =  13.76
 RAINFALL INTENSITY(INCH/HR) =   3.48
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =    6.60
 TOTAL STREAM AREA(ACRES) =    6.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.83

 ** CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER   (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)     NODE
     1    319.52  15.53     3.240    .25(  .03)  .10   103.4      651.00
```

1	321.42	18.37	2.943	.25(	.03)	.10	115.9	318.00
1	269.32	28.50	2.286	.25(	.03)	.10	127.1	306.00
1	322.29	16.43	3.139	.25(	.03)	.10	108.1	751.00
2	19.83	15.32	3.265	.25(	.03)	.10	6.8	801.00
3	20.83	13.76	3.478	.25(	.03)	.10	6.6	803.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	356.78	15.32	3.265	.25(.03)	.10	115.3	801.00
2	358.58	15.53	3.240	.25(.03)	.10	116.8	651.00
3	360.13	16.43	3.139	.25(.03)	.10	121.5	751.00
4	356.88	18.37	2.943	.25(.03)	.10	129.3	318.00
5	296.79	28.50	2.286	.25(.03)	.10	140.5	306.00
6	343.86	13.76	3.478	.25(.03)	.10	104.3	803.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 360.13 Tc(MIN.) = 16.43
EFFECTIVE AREA(ACRES) = 121.54 AREA-AVERAGED Fm(INCH/HR) = .03
AREA-AVERAGED Fp(INCH/HR) = .25 AREA-AVERAGED Ap = .10
TOTAL AREA(ACRES) = 140.50

==

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 140.50 TC(MIN.) = 16.43
EFFECTIVE AREA(ACRES) = 121.54 AREA-AVERAGED Fm(INCH/HR)= .03
AREA-AVERAGED Fp(INCH/HR) = .25 AREA-AVERAGED Ap = .10
PEAK FLOW RATE(CFS) = 360.13

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	343.86	13.76	3.478	.25(.03)	.10	104.3	803.00
2	356.78	15.32	3.265	.25(.03)	.10	115.3	801.00
3	358.58	15.53	3.240	.25(.03)	.10	116.8	651.00
4	360.13	16.43	3.139	.25(.03)	.10	121.5	751.00
5	356.88	18.37	2.943	.25(.03)	.10	129.3	318.00
6	296.79	28.50	2.286	.25(.03)	.10	140.5	306.00

==
==

END OF RATIONAL METHOD ANALYSIS

```
****************************************************************************
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                          Analysis prepared by:

                  ADAMS*STREETER CIVIL ENGINEERS INC.
                           15 CORPORATE PARK
                           IRVINE, CA 92714
                            (714) 474-2330

 ************************** DESCRIPTION OF STUDY **************************
 * HYDROLOGY STUDY FOR AREA "D"                                             *
 * EXISTING CONDITIONS                                                      *
 * 100-YEAR FLOWS                                                           *
 **************************************************************************

  FILE NAME: J:\961097\HYDRO\97D.MA
  TIME/DATE OF STUDY: 13:20   2/ 6/1997
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1  30.0     20.0      .018/ .018/ .020    .67    2.00 .03125 .1670 .01500

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =   .00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)

+--------------------------------------------------------------------------+
| SUBAREA "D-1"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    901.00 IS CODE =  2.1
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   450.00
  ELEVATION DATA: UPSTREAM(FEET) =     20.20  DOWNSTREAM(FEET) =     19.50
```

```
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.270
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.779
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
PUBLIC PARK                 C        5.10       .25        .85    69   20.27
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .85
SUBAREA RUNOFF(CFS) =     11.78
TOTAL AREA(ACRES) =       5.10   PEAK FLOW RATE(CFS) =      11.78

****************************************************************************
FLOW PROCESS FROM NODE    901.00 TO NODE    900.00 IS CODE =  5.1
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     19.50  DOWNSTREAM(FEET) =     15.50
CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =   .0100
CHANNEL BASE(FEET) =     5.00    "Z" FACTOR =  20.000
MANNING'S FACTOR =  .015   MAXIMUM DEPTH(FEET) =   1.00
CHANNEL FLOW THRU SUBAREA(CFS) =     11.78
FLOW VELOCITY(FEET/SEC) =   3.39   FLOW DEPTH(FEET) =    .31
TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =  22.23

+--------------------------------------------------------------------------+
| SUBAREA "D-2"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    900.00 TO NODE    900.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  22.23
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.630
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        7.10       .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     7.10      SUBAREA RUNOFF(CFS) =   16.65
EFFECTIVE AREA(ACRES) =     12.20   AREA-AVERAGED Fm(INCH/HR) =   .10
AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .41
TOTAL AREA(ACRES) =    12.20        PEAK FLOW RATE(CFS) =      27.74

****************************************************************************
FLOW PROCESS FROM NODE    900.00 TO NODE    900.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    15.68  DOWNSTREAM(FEET) =    12.07
FLOW LENGTH(FEET) =   110.00   MANNING'S N =  .015
DEPTH OF FLOW IN  48.0 INCH PIPE IS  11.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  11.97
```

```
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      27.74
 PIPE TRAVEL TIME(MIN.) =    .15    Tc(MIN.) =  22.39
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =     12.20  TC(MIN.) =     22.39
 EFFECTIVE AREA(ACRES) =     12.20  AREA-AVERAGED Fm(INCH/HR)=   .10
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .41
 PEAK FLOW RATE(CFS)    =     27.74
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

100-YEAR HYDROLOGY
ULTIMATE CONDITIONS

```
****************************************************************************
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                        Analysis prepared by:

                 ADAMS*STREETER CIVIL ENGINEERS INC.
                          15 CORPORATE PARK
                           IRVINE, CA 92714
                            (714) 474-2330

************************* DESCRIPTION OF STUDY *************************
* ABLE LANE HYDROLOGY, AREAS "A-1" TO "A-14"                            *
* ULTIMATE CONDITIONS                                                   *
* 100-YEAR FLOWS                                                        *
**************************************************************************

 FILE NAME: J:\961097\HYDRO\97ABLUT.MA
 TIME/DATE OF STUDY: 13:20   3/ 1/1997
============================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                  --*TIME-OF-CONCENTRATION MODEL*--

 USER SPECIFIED STORM EVENT(YEAR) =  100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
 *DATA BANK RAINFALL USED*
 *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR RATIONAL METHOD*

 *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
    HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
    WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)    SIDE / SIDE/ WAY    (FT)   (FT)  (FT)  (FT)    (n)
=== =====  =========  ================= ====== ===== ====== ===== =======
 1   32.0     27.0     .020/ .083/ .020    .67   1.50 .03125 .1250 .01500

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
  1. Relative Flow-Depth =   .20 FEET
     as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
 *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
  OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

UNIT-HYDROGRAPH DATA:
  WATERSHED LAG =  .80 * Tc
  USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
  2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
  FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
  SIERRA MADRE DEPTH-AREA FACTORS USED.
                       AREA-AVERAGED
       DURATION     RAINFALL(INCH)
       5-MINUTES          .52
      30-MINUTES         1.09
       1-HOUR            1.45
       3-HOUR            2.43
       6-HOUR            3.36
      24-HOUR            5.63
*ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR UNIT HYDROGRAPH METHOD*

+--------------------------------------------------------------------------+
```

```
|                                                                           |
| SUBAREA "A-1"                                                             |
+---------------------------------------------------------------------------+

*****************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  2.1
-----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   640.00
 ELEVATION DATA: UPSTREAM(FEET) =     24.70  DOWNSTREAM(FEET) =     21.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.629
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.834
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  A        4.32      .40        .10     32   11.63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     14.75
 TOTAL AREA(ACRES) =       4.32   PEAK FLOW RATE(CFS) =     14.75

*****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  4.1
-----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    17.94  DOWNSTREAM(FEET) =    17.86
 FLOW LENGTH(FEET) =    78.00   MANNING'S N =  .013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.70
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     14.75
 PIPE TRAVEL TIME(MIN.) =    .28    Tc(MIN.) =  11.91

*****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =   1
-----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  11.91
 RAINFALL INTENSITY(INCH/HR) =   3.78
 AREA-AVERAGED Fm(INCH/HR) =   .04
 AREA-AVERAGED Fp(INCH/HR) =   .40
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =    4.32
 TOTAL STREAM AREA(ACRES) =    4.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.75

+---------------------------------------------------------------------------+
| SUBAREA "A-2"                                                             |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

*****************************************************************************
 FLOW PROCESS FROM NODE    102.20 TO NODE    102.10 IS CODE =  2.1
-----------------------------------------------------------------------------
```

```
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =    580.00
ELEVATION DATA: UPSTREAM(FEET) =      24.40  DOWNSTREAM(FEET) =      21.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.180
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.924
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
COMMERCIAL                   A        3.61       .40        .10     32   11.18
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA RUNOFF(CFS) =      12.62
TOTAL AREA(ACRES) =        3.61   PEAK FLOW RATE(CFS) =      12.62

****************************************************************************
FLOW PROCESS FROM NODE    102.10 TO NODE    102.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     17.40  DOWNSTREAM(FEET) =     17.33
FLOW LENGTH(FEET) =     63.00   MANNING'S N =  .013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =    4.02
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      12.62
PIPE TRAVEL TIME(MIN.) =     .26    Tc(MIN.) =  11.44

****************************************************************************
FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  11.44
RAINFALL INTENSITY(INCH/HR) =   3.87
AREA-AVERAGED Fm(INCH/HR) =   .04
AREA-AVERAGED Fp(INCH/HR) =   .40
AREA-AVERAGED Ap =    .10
EFFECTIVE STREAM AREA(ACRES) =    3.61
TOTAL STREAM AREA(ACRES) =    3.61
PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.62

** CONFLUENCE DATA **
 STREAM      Q       Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
    1      14.75   11.91     3.779    .40(  .04)  .10      4.3      100.00
    2      12.62   11.44     3.872    .40(  .04)  .10      3.6      102.20

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM      Q       Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
    1      27.06   11.91     3.779    .40(  .04)  .10      7.9      100.00
    2      27.15   11.44     3.872    .40(  .04)  .10      7.8      102.20

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      27.15     Tc(MIN.) =     11.44
  EFFECTIVE AREA(ACRES) =      7.76    AREA-AVERAGED Fm(INCH/HR) =    .04
  AREA-AVERAGED Fp(INCH/HR) =    .40   AREA-AVERAGED Ap =    .10
  TOTAL AREA(ACRES) =        7.93
  LONGEST FLOWPATH FROM NODE     100.00 TO NODE     102.00 =    718.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     102.00 TO NODE     103.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     17.29  DOWNSTREAM(FEET) =     17.07
  FLOW LENGTH(FEET) =     225.00    MANNING'S N =  .015
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.84
  GIVEN PIPE DIAMETER(INCH) =  36.00     NUMBER OF PIPES =    1
  PIPE-FLOW(CFS) =      27.15
  PIPE TRAVEL TIME(MIN.) =     .98     Tc(MIN.) =  12.42

****************************************************************************
  FLOW PROCESS FROM NODE     103.00 TO NODE     103.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.42
  RAINFALL INTENSITY(INCH/HR) =   3.68
  AREA-AVERAGED Fm(INCH/HR) =    .04
  AREA-AVERAGED Fp(INCH/HR) =    .40
  AREA-AVERAGED Ap =    .10
  EFFECTIVE STREAM AREA(ACRES) =     7.76
  TOTAL STREAM AREA(ACRES) =     7.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      27.15

+--------------------------------------------------------------------------+
| SUBAREA "A-3'                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     103.20 TO NODE     103.10 IS CODE =  2.1
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    610.00
  ELEVATION DATA: UPSTREAM(FEET) =      24.50  DOWNSTREAM(FEET) =      21.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    11.446
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.871
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  A        2.80       .40        .10     32   11.45
  COMMERCIAL                  C         .82       .25        .10     69   11.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .37
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
  SUBAREA RUNOFF(CFS) =      12.49
  TOTAL AREA(ACRES) =        3.62   PEAK FLOW RATE(CFS) =       12.49

****************************************************************************
```

```
FLOW PROCESS FROM NODE    103.10 TO NODE    103.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     17.09  DOWNSTREAM(FEET) =     17.01
FLOW LENGTH(FEET) =     72.00   MANNING'S N =  .013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.98
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     12.49
PIPE TRAVEL TIME(MIN.) =    .30    Tc(MIN.) =  11.75

****************************************************************************
FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  11.75
RAINFALL INTENSITY(INCH/HR) =   3.81
AREA-AVERAGED Fm(INCH/HR) =   .04
AREA-AVERAGED Fp(INCH/HR) =   .37
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =    3.62
TOTAL STREAM AREA(ACRES) =    3.62
PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.49

+--------------------------------------------------------------------------+
| SUBAREA "A-4"                                                            |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    103.40 TO NODE    103.30 IS CODE =  2.1
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   580.00
ELEVATION DATA: UPSTREAM(FEET) =     24.40  DOWNSTREAM(FEET) =     21.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.180
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.924
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS   Tc
    LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                 A        3.41       .40         .10     32   11.18
COMMERCIAL                 C         .20       .25         .10     69   11.18
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .39
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  .10
SUBAREA RUNOFF(CFS) =     12.62
TOTAL AREA(ACRES) =      3.61   PEAK FLOW RATE(CFS) =     12.62

****************************************************************************
FLOW PROCESS FROM NODE    103.40 TO NODE    103.30 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     17.06  DOWNSTREAM(FEET) =     17.01
FLOW LENGTH(FEET) =     28.00   MANNING'S N =  .013
```

```
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.02
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       12.62
  PIPE TRAVEL TIME(MIN.) =    .12    Tc(MIN.) =  11.30

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.30
  RAINFALL INTENSITY(INCH/HR) =   3.90
  AREA-AVERAGED Fm(INCH/HR) =   .04
  AREA-AVERAGED Fp(INCH/HR) =   .39
  AREA-AVERAGED Ap =   .10
  EFFECTIVE STREAM AREA(ACRES) =    3.61
  TOTAL STREAM AREA(ACRES) =    3.61
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.62

  ** CONFLUENCE DATA **
   STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)     NODE
      1      27.06  12.89    3.604    .40(  .04)  .10      7.9      100.00
      1      27.15  12.42    3.676    .40(  .04)  .10      7.8      102.20
      2      12.49  11.75    3.810    .37(  .04)  .10      3.6      103.20
      3      12.62  11.30    3.901    .39(  .04)  .10      3.6      103.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)     NODE
      1      51.45  11.75    3.810    .39(  .04)  .10     14.6      103.20
      2      51.08  12.42    3.676    .39(  .04)  .10     15.0      102.20
      3      50.53  12.89    3.604    .39(  .04)  .10     15.2      100.00
      4      51.14  11.30    3.901    .39(  .04)  .10     14.2      103.40

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      51.45    Tc(MIN.) =    11.75
  EFFECTIVE AREA(ACRES) =     14.57   AREA-AVERAGED Fm(INCH/HR) =   .04
  AREA-AVERAGED Fp(INCH/HR) =   .39   AREA-AVERAGED Ap =   .10
  TOTAL AREA(ACRES) =      15.16
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =   943.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.07  DOWNSTREAM(FEET) =    15.70
  FLOW LENGTH(FEET) =    350.00   MANNING'S N =  .013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.09
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       51.45
  PIPE TRAVEL TIME(MIN.) =   1.42    Tc(MIN.) =  13.17

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  13.17
 RAINFALL INTENSITY(INCH/HR) =   3.56
 AREA-AVERAGED Fm(INCH/HR) =   .04
 AREA-AVERAGED Fp(INCH/HR) =   .39
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   14.57
 TOTAL STREAM AREA(ACRES) =   15.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     51.45

+--------------------------------------------------------------------------+
| SUBAREA "A-5"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    104.20 TO NODE    104.10 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    580.00
 ELEVATION DATA: UPSTREAM(FEET) =     23.40  DOWNSTREAM(FEET) =     20.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.180
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.924
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 COMMERCIAL                  A         .23       .40        .10     32   11.18
 COMMERCIAL                  C        3.38       .25        .10     69   11.18
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =      12.66
 TOTAL AREA(ACRES) =       3.61   PEAK FLOW RATE(CFS) =      12.66

****************************************************************************
 FLOW PROCESS FROM NODE    104.10 TO NODE    104.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     16.76  DOWNSTREAM(FEET) =     16.73
 FLOW LENGTH(FEET) =     28.00   MANNING'S N =  .013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.03
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.66
 PIPE TRAVEL TIME(MIN.) =    .12    Tc(MIN.) =  11.30

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  11.30
```

```
RAINFALL INTENSITY(INCH/HR) =   3.90
AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .26
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =   3.61
TOTAL STREAM AREA(ACRES) =   3.61
PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.66

** CONFLUENCE DATA **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
    1      51.45  13.17     3.563    .39( .04)   .10     14.6     103.20
    1      51.08  13.85     3.465    .39( .04)   .10     15.0     102.20
    1      50.53  14.34     3.396    .39( .04)   .10     15.2     100.00
    1      51.14  12.73     3.627    .39( .04)   .10     14.2     103.40
    2      12.66  11.30     3.901    .26( .03)   .10      3.6     104.20

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
    1      62.91  12.73     3.627    .36( .04)   .10     17.8     103.40
    2      63.01  13.17     3.563    .36( .04)   .10     18.2     103.20
    3      62.32  13.85     3.465    .36( .04)   .10     18.6     102.20
    4      61.54  14.34     3.396    .36( .04)   .10     18.8     100.00
    5      61.51  11.30     3.901    .36( .04)   .10     16.2     104.20

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      63.01    Tc(MIN.) =     13.17
EFFECTIVE AREA(ACRES) =     18.18   AREA-AVERAGED Fm(INCH/HR) =    .04
AREA-AVERAGED Fp(INCH/HR) =   .36   AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =     18.77
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =  1293.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    15.60  DOWNSTREAM(FEET) =    14.32
FLOW LENGTH(FEET) =   270.00   MANNING'S N =  .013
DEPTH OF FLOW IN  48.0 INCH PIPE IS  28.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.18
GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     63.01
PIPE TRAVEL TIME(MIN.) =    .55    Tc(MIN.) =  13.72

****************************************************************************
FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  13.72
RAINFALL INTENSITY(INCH/HR) =   3.48
AREA-AVERAGED Fm(INCH/HR) =   .04
AREA-AVERAGED Fp(INCH/HR) =   .36
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =   18.18
TOTAL STREAM AREA(ACRES) =   18.77
PEAK FLOW RATE(CFS) AT CONFLUENCE =     63.01
```

```
+--------------------------------------------------------------------------+
| SUBAREA "A-6"                                                            |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    105.30 TO NODE    105.20 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   580.00
 ELEVATION DATA: UPSTREAM(FEET) =     22.90  DOWNSTREAM(FEET) =     20.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.180
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.924
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap       SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 COMMERCIAL                 C        3.61       .25        .10     69   11.18
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     12.67
 TOTAL AREA(ACRES) =       3.61   PEAK FLOW RATE(CFS) =      12.67

****************************************************************************
 FLOW PROCESS FROM NODE    105.20 TO NODE    105.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     14.42  DOWNSTREAM(FEET) =     14.20
 FLOW LENGTH(FEET) =     47.00   MANNING'S N =  .013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  14.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.47
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.67
 PIPE TRAVEL TIME(MIN.) =    .14    Tc(MIN.) =  11.32

+--------------------------------------------------------------------------+
| SUBAREA "A-7"                                                            |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  8.2
----------------------------------------------------------------------------
 >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
 >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   475.00
 ELEVATION DATA: UPSTREAM(FEET) =     22.40  DOWNSTREAM(FEET) =     21.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.591
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap       SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 COMMERCIAL                 C         .48       .25        .10     69   13.59
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
  SUBAREA AREA(ACRES) =     .48   INITIAL SUBAREA RUNOFF(CFS) =    1.50

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN) =  11.32
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.895
  SUBAREA AREA(ACRES) =     .48      SUBAREA RUNOFF(CFS) =    1.67
  EFFECTIVE AREA(ACRES) =     4.09   AREA-AVERAGED Fm(INCH/HR) =   .03
  AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
  TOTAL AREA(ACRES) =     4.09       PEAK FLOW RATE(CFS) =      14.25

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.32
  RAINFALL INTENSITY(INCH/HR) =   3.90
  AREA-AVERAGED Fm(INCH/HR) =   .03
  AREA-AVERAGED Fp(INCH/HR) =   .25
  AREA-AVERAGED Ap =   .10
  EFFECTIVE STREAM AREA(ACRES) =    4.09
  TOTAL STREAM AREA(ACRES) =    4.09
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.25

+--------------------------------------------------------------------------+
| SUBAREA "A-8"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    108.20 TO NODE    108.30 IS CODE =  2.1
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   470.00
  ELEVATION DATA: UPSTREAM(FEET) =     22.80  DOWNSTREAM(FEET) =     21.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.400
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.880
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        2.26       .25        .10     69   11.40
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
  SUBAREA RUNOFF(CFS) =      7.84
  TOTAL AREA(ACRES) =      2.26   PEAK FLOW RATE(CFS) =      7.84

+--------------------------------------------------------------------------+
| SUBAREA "A-9"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    108:30 TO NODE    108.00 IS CODE =   9
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
```

```
 UPSTREAM NODE ELEVATION(FEET) =      21.40
 DOWNSTREAM NODE ELEVATION(FEET) =      18.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   955.00
 "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =    .130
 PAVEMENT LIP(FEET) =    .030   MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .02000
 MAXIMUM DEPTH(FEET) =   1.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.833
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        4.62       .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     13.63
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.94
 AVERAGE FLOW DEPTH(FEET) =    .50   FLOOD WIDTH(FEET) =   36.88
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   8.22   Tc(MIN.) =  19.62
 SUBAREA AREA(ACRES) =    4.62        SUBAREA RUNOFF(CFS) =   11.68
 EFFECTIVE AREA(ACRES) =     6.88     AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =     .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =     6.88         PEAK FLOW RATE(CFS) =      17.39

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =    .54   FLOOD WIDTH(FEET) =   40.65
 FLOW VELOCITY(FEET/SEC.) =   2.05   DEPTH*VELOCITY(FT*FT/SEC) =   1.10

+--------------------------------------------------------------------------+
| SUBAREA "A-10"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  8.1
----------------------------------------------------------------------------

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  19.62
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.833
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        4.28       .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    4.28        SUBAREA RUNOFF(CFS) =   10.82
 EFFECTIVE AREA(ACRES) =     11.16    AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25   AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =     11.16        PEAK FLOW RATE(CFS) =      28.21

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    107.00 IS CODE =  4.1
----------------------------------------------------------------------------

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     15.00  DOWNSTREAM(FEET) =     14.75
 FLOW LENGTH(FEET) =     60.00   MANNING'S N =  .013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.75
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     28.21
 PIPE TRAVEL TIME(MIN.) =    .17    Tc(MIN.) =  19.80
```

```
+--------------------------------------------------------------------------+
| SUBAREA "A-11"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  8.2
----------------------------------------------------------------------------
  >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
  >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   475.00
  ELEVATION DATA: UPSTREAM(FEET) =     22.40  DOWNSTREAM(FEET) =     21.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.591
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C         .48       .25        .10    69   13.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
  SUBAREA AREA(ACRES) =      .48   INITIAL SUBAREA RUNOFF(CFS) =    1.50

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN) =  19.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.818
  SUBAREA AREA(ACRES) =      .48      SUBAREA RUNOFF(CFS) =    1.21
  EFFECTIVE AREA(ACRES) =    11.64   AREA-AVERAGED Fm(INCH/HR) =   .03
  AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
  TOTAL AREA(ACRES) =     11.64      PEAK FLOW RATE(CFS) =      29.26

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    105.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    14.75  DOWNSTREAM(FEET) =    14.60
  FLOW LENGTH(FEET) =     20.00   MANNING'S N =  .013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.91
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.26
  PIPE TRAVEL TIME(MIN.) =    .04    Tc(MIN.) =  19.84

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.84
  RAINFALL INTENSITY(INCH/HR) =   2.81
  AREA-AVERAGED Fm(INCH/HR) =   .03
  AREA-AVERAGED Fp(INCH/HR) =   .25
  AREA-AVERAGED Ap =   .10
  EFFECTIVE STREAM AREA(ACRES) =    11.64
  TOTAL STREAM AREA(ACRES) =   11.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.26
```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	62.91	13.28	3.548	.36(.04)	.10	17.8	103.40
1	63.01	13.72	3.484	.36(.04)	.10	18.2	103.20
1	62.32	14.40	3.386	.36(.04)	.10	18.6	102.20
1	61.54	14.89	3.316	.36(.04)	.10	18.8	100.00
1	61.51	11.85	3.790	.36(.04)	.10	16.2	104.20
2	14.25	11.32	3.895	.25(.03)	.10	4.1	105.30
3	29.26	19.84	2.814	.25(.03)	.10	11.6	108.20

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	97.85	11.32	3.895	.32(.03)	.10	26.2	105.30
2	98.96	11.85	3.790	.32(.03)	.10	27.2	104.20
3	100.61	13.28	3.548	.32(.03)	.10	29.6	103.40
4	100.84	13.72	3.484	.32(.03)	.10	30.3	103.20
5	100.29	14.40	3.386	.32(.03)	.10	31.1	102.20
6	99.57	14.89	3.316	.32(.03)	.10	31.6	100.00
7	91.65	19.84	2.814	.31(.03)	.10	34.5	108.20

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 100.84 Tc(MIN.) = 13.72
EFFECTIVE AREA(ACRES) = 30.32 AREA-AVERAGED Fm(INCH/HR) = .03
AREA-AVERAGED Fp(INCH/HR) = .32 AREA-AVERAGED Ap = .10
TOTAL AREA(ACRES) = 34.50
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 1563.00 FEET.

****
FLOW PROCESS FROM NODE 105.00 TO NODE 106.00 IS CODE = 4.1

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 14.18 DOWNSTREAM(FEET) = 13.66
FLOW LENGTH(FEET) = 55.00 MANNING'S N = .015
DEPTH OF FLOW IN 63.0 INCH PIPE IS 28.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.72
GIVEN PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 100.84
PIPE TRAVEL TIME(MIN.) = .09 Tc(MIN.) = 13.81

****
FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 13.81
RAINFALL INTENSITY(INCH/HR) = 3.47
AREA-AVERAGED Fm(INCH/HR) = .03
AREA-AVERAGED Fp(INCH/HR) = .32
AREA-AVERAGED Ap = .10
EFFECTIVE STREAM AREA(ACRES) = 30.32
TOTAL STREAM AREA(ACRES) = 34.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 100.84

--+
SUBAREA "A-13.1"

```
|                                                                              |
+------------------------------------------------------------------------------+

*******************************************************************************
  FLOW PROCESS FROM NODE    106.30 TO NODE    106.20 IS CODE =  2.1
-------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
  ELEVATION DATA: UPSTREAM(FEET) =     22.10  DOWNSTREAM(FEET) =     20.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.018
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.585
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp          Ap      SCS   Tc
       LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                   C        7.29       .25         .10    69  13.02
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
  SUBAREA RUNOFF(CFS) =     23.36
  TOTAL AREA(ACRES) =       7.29   PEAK FLOW RATE(CFS) =      23.36

+------------------------------------------------------------------------------+
| SUBAREA "A-13.2"                                                             |
|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+

*******************************************************************************
  FLOW PROCESS FROM NODE    106.20 TO NODE    106.10 IS CODE =   9
-------------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
===============================================================================
  UPSTREAM NODE ELEVATION(FEET) =      20.60
  DOWNSTREAM NODE ELEVATION(FEET) =      18.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =    670.00
  "V" GUTTER WIDTH(FEET) =    3.00   GUTTER HIKE(FEET) =    .130
  PAVEMENT LIP(FEET) =    .030   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .02000
  MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                   C        5.59       .25         .10    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      30.78
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    2.16
  AVERAGE FLOW DEPTH(FEET) =    .66   FLOOD WIDTH(FEET) =    52.96
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =    5.17   Tc(MIN.) =  18.19
  SUBAREA AREA(ACRES) =     5.59      SUBAREA RUNOFF(CFS) =    14.76
  EFFECTIVE AREA(ACRES) =    12.88    AREA-AVERAGED Fm(INCH/HR) =     .03
  AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
  TOTAL AREA(ACRES) =   12.88         PEAK FLOW RATE(CFS) =       34.01

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =    .68   FLOOD WIDTH(FEET) =    54.93
  FLOW VELOCITY(FEET/SEC.) =    2.22   DEPTH*VELOCITY(FT*FT/SEC) =    1.51

*******************************************************************************
  FLOW PROCESS FROM NODE    106.10 TO NODE    106.00 IS CODE =  4.1
-------------------------------------------------------------------------------
```

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

==

ELEVATION DATA: UPSTREAM(FEET) = 14.32 DOWNSTREAM(FEET) = 13.66
FLOW LENGTH(FEET) = 164.00 MANNING'S N = .013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.83
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.01
PIPE TRAVEL TIME(MIN.) = .25 Tc(MIN.) = 18.44

****

FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

==

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 18.44
RAINFALL INTENSITY(INCH/HR) = 2.94
AREA-AVERAGED Fm(INCH/HR) = .03
AREA-AVERAGED Fp(INCH/HR) = .25
AREA-AVERAGED Ap = .10
EFFECTIVE STREAM AREA(ACRES) = 12.88
TOTAL STREAM AREA(ACRES) = 12.88
PEAK FLOW RATE(CFS) AT CONFLUENCE = 34.01

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	97.85	11.41	3.878	.32(.03)	.10	26.2	105.30
1	98.96	11.94	3.773	.32(.03)	.10	27.2	104.20
1	100.61	13.37	3.535	.32(.03)	.10	29.6	103.40
1	100.84	13.81	3.472	.32(.03)	.10	30.3	103.20
1	100.29	14.49	3.373	.32(.03)	.10	31.1	102.20
1	99.57	14.98	3.304	.32(.03)	.10	31.6	100.00
1	91.65	19.93	2.807	.31(.03)	.10	34.5	108.20
2	34.01	18.44	2.937	.25(.03)	.10	12.9	106.30

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	125.69	11.41	3.878	.30(.03)	.10	34.2	105.30
2	127.29	11.94	3.773	.30(.03)	.10	35.5	104.20
3	130.33	13.37	3.535	.30(.03)	.10	39.0	103.40
4	130.98	13.81	3.472	.30(.03)	.10	40.0	103.20
5	131.02	14.49	3.373	.30(.03)	.10	41.3	102.20
6	130.66	14.98	3.304	.30(.03)	.10	42.1	100.00
7	124.14	19.93	2.807	.30(.03)	.10	47.4	108.20
8	128.03	18.44	2.937	.30(.03)	.10	46.5	106.30

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 131.02 Tc(MIN.) = 14.49
EFFECTIVE AREA(ACRES) = 41.26 AREA-AVERAGED Fm(INCH/HR) = .03
AREA-AVERAGED Fp(INCH/HR) = .30 AREA-AVERAGED Ap = .10
TOTAL AREA(ACRES) = 47.38
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 1618.00 FEET.

****

FLOW PROCESS FROM NODE 106.00 TO NODE 106.50 IS CODE = 4.1

```
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    13.63  DOWNSTREAM(FEET) =    12.09
 FLOW LENGTH(FEET) =   370.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  43.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.32
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    131.02
 PIPE TRAVEL TIME(MIN.) =    .74    Tc(MIN.) =  15.23

----------------------------------------------------------------------------+
 SUBAREA "C-1"                                                              |
                                                                            |
                                                                            |
----------------------------------------------------------------------------+

******************************************************************************
 FLOW PROCESS FROM NODE    106.70 TO NODE    106.50 IS CODE =  8.2
------------------------------------------------------------------------------
 >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
 >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
==============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   750.00
 ELEVATION DATA: UPSTREAM(FEET) =     20.00  DOWNSTREAM(FEET) =     18.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.051
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 COMMERCIAL                  C        5.10      .25         .10     69   14.05
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     5.10   INITIAL SUBAREA RUNOFF(CFS) =   15.66

 ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
 MAINLINE Tc(MIN) =  15.23
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.274
 SUBAREA AREA(ACRES) =     5.10       SUBAREA RUNOFF(CFS) =   14.91
 EFFECTIVE AREA(ACRES) =    46.36   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .30  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    52.48       PEAK FLOW RATE(CFS) =     135.38

******************************************************************************
 FLOW PROCESS FROM NODE    106.50 TO NODE    109.70 IS CODE =  4.1
------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    12.09  DOWNSTREAM(FEET) =    11.18
 FLOW LENGTH(FEET) =   688.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.25
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    135.38
 PIPE TRAVEL TIME(MIN.) =   1.83    Tc(MIN.) =  17.07

******************************************************************************
 FLOW PROCESS FROM NODE    109.70 TO NODE    109.70 IS CODE =   1
------------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
 TOTAL NUMBER OF STREAMS =  2
```

```
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  17.07
RAINFALL INTENSITY(INCH/HR) =   3.07
AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .30
AREA-AVERAGED Ap =    .10
EFFECTIVE STREAM AREA(ACRES) =   46.36
TOTAL STREAM AREA(ACRES) =   52.48
PEAK FLOW RATE(CFS) AT CONFLUENCE =    135.38

+--------------------------------------------------------------------------+
| SUBAREA "A-15.1"                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
****************************************************************************
FLOW PROCESS FROM NODE    109.60 TO NODE    109.50 IS CODE =  2.1
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   800.00
ELEVATION DATA: UPSTREAM(FEET) =     23.60  DOWNSTREAM(FEET) =     21.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.859
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.464
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
COMMERCIAL                  A         .49        .40        .10     32  13.86
COMMERCIAL                  C        4.33        .25        .10     69  13.86
COMMERCIAL                  D        2.30        .20        .10     75  13.86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA RUNOFF(CFS) =     22.04
TOTAL AREA(ACRES) =      7.12   PEAK FLOW RATE(CFS) =      22.04

****************************************************************************
FLOW PROCESS FROM NODE    109.50 TO NODE    109.70 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    14.04  DOWNSTREAM(FEET) =    13.43
FLOW LENGTH(FEET) =    64.50   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =    7.02
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      22.04
PIPE TRAVEL TIME(MIN.) =    .15    Tc(MIN.) =  14.01

****************************************************************************
FLOW PROCESS FROM NODE    109.70 TO NODE    109.70 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  14.01
RAINFALL INTENSITY(INCH/HR) =   3.44
AREA-AVERAGED Fm(INCH/HR) =   .02
AREA-AVERAGED Fp(INCH/HR) =   .24
```

```
AREA-AVERAGED Ap =    .10
EFFECTIVE STREAM AREA(ACRES) =    7.12
TOTAL STREAM AREA(ACRES) =    7.12
PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.04

** CONFLUENCE DATA **
 STREAM      Q      Tc    Intensity   Fp(Fm)       Ap    Ae       HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
     1    130.68  14.06     3.436    .29(  .03)  .10     39.3      105.30
     1    131.86  14.56     3.363    .29(  .03)  .10     40.6      104.20
     1    134.83  15.95     3.194    .30(  .03)  .10     44.1      103.40
     1    135.28  16.38     3.145    .30(  .03)  .10     45.1      103.20
     1    135.38  17.07     3.069    .30(  .03)  .10     46.4      102.20
     1    135.38  17.55     3.016    .30(  .03)  .10     47.2      100.00
     1    128.45  22.61     2.604    .29(  .03)  .10     52.5      108.20
     1    132.02  21.07     2.719    .29(  .03)  .10     51.6      106.30
     2     22.04  14.01     3.442    .24(  .02)  .10      7.1      109.60

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc    Intensity   Fp(Fm)       Ap    Ae       HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
     1    152.68  14.06     3.436    .29(  .03)  .10     46.4      105.30
     2    153.39  14.56     3.363    .29(  .03)  .10     47.8      104.20
     3    155.27  15.95     3.194    .29(  .03)  .10     51.2      103.40
     4    155.40  16.38     3.145    .29(  .03)  .10     52.2      103.20
     5    155.01  17.07     3.069    .29(  .03)  .10     53.5      102.20
     6    154.67  17.55     3.016    .29(  .03)  .10     54.3      100.00
     7    149.40  21.07     2.719    .29(  .03)  .10     58.7      106.30
     8    145.09  22.61     2.604    .29(  .03)  .10     59.6      108.20
     9    152.56  14.01     3.442    .29(  .03)  .10     46.2      109.60

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     155.40    Tc(MIN.) =    16.38
EFFECTIVE AREA(ACRES) =     52.19   AREA-AVERAGED Fm(INCH/HR) =    .03
AREA-AVERAGED Fp(INCH/HR) =    .29  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =     59.60
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.70 =  2676.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.70 TO NODE    109.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    11.17  DOWNSTREAM(FEET) =     10.47
 FLOW LENGTH(FEET) =    697.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.18
 GIVEN PIPE DIAMETER(INCH) =  63.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    155.40
 PIPE TRAVEL TIME(MIN.) =   1.62    Tc(MIN.) =  18.00

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  18.00
 RAINFALL INTENSITY(INCH/HR) =   2.98
 AREA-AVERAGED Fm(INCH/HR) =   .03
```

```
AREA-AVERAGED Fp(INCH/HR) =    .29
AREA-AVERAGED Ap =    .10
EFFECTIVE STREAM AREA(ACRES) =   52.19
TOTAL STREAM AREA(ACRES) =   59.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =    155.40

+--------------------------------------------------------------------------+
|                                                                          |
| SUBAREA "A-14.1"                                                         |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    109.40 TO NODE    109.30 IS CODE =  2.1
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   520.00
ELEVATION DATA: UPSTREAM(FEET) =      20.60  DOWNSTREAM(FEET) =     18.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.968
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp         Ap     SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                  C        5.35       .25        .10     69   10.97
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
SUBAREA RUNOFF(CFS) =     18.98
TOTAL AREA(ACRES) =       5.35   PEAK FLOW RATE(CFS) =      18.98

****************************************************************************
FLOW PROCESS FROM NODE    109.30 TO NODE    109.10 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     14.50  DOWNSTREAM(FEET) =     12.90
FLOW LENGTH(FEET) =    200.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.04
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     18.98
PIPE TRAVEL TIME(MIN.) =    .55    Tc(MIN.) =  11.52

+--------------------------------------------------------------------------+
|                                                                          |
| SUBAREA "A-14"                                                           |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    109.20 TO NODE    109.10 IS CODE =  8.2
----------------------------------------------------------------------------
>>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   500.00
ELEVATION DATA: UPSTREAM(FEET) =      19.80  DOWNSTREAM(FEET) =     16.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.159
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.128
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN   (MIN.)
 COMMERCIAL                  C        5.85       .25        .10     69   10.16
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    5.85   INITIAL SUBAREA RUNOFF(CFS) =   21.60

 ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
 MAINLINE Tc(MIN) =  11.52
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.856
 SUBAREA AREA(ACRES) =    5.85      SUBAREA RUNOFF(CFS) =   20.17
 EFFECTIVE AREA(ACRES) =    11.20   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    11.20       PEAK FLOW RATE(CFS) =      38.62

****************************************************************************
 FLOW PROCESS FROM NODE    109.10 TO NODE    109.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    12.90  DOWNSTREAM(FEET) =    11.50
 FLOW LENGTH(FEET) =   420.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     38.62
 PIPE TRAVEL TIME(MIN.) =   1.28    Tc(MIN.) =  12.80

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  12.80
 RAINFALL INTENSITY(INCH/HR) =   3.62
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   11.20
 TOTAL STREAM AREA(ACRES) =   11.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      38.62

 ** CONFLUENCE DATA **
  STREAM      Q      Tc   Intensity  Fp(Fm)       Ap   Ae      HEADWATER
  NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1    152.68  15.70    3.221    .29(  .03)  .10     46.4      105.30
     1    153.39  16.20    3.165    .29(  .03)  .10     47.8      104.20
     1    155.27  17.57    3.014    .29(  .03)  .10     51.2      103.40
     1    155.40  18.00    2.976    .29(  .03)  .10     52.2      103.20
     1    155.01  18.69    2.915    .29(  .03)  .10     53.5      102.20
     1    154.67  19.18    2.872    .29(  .03)  .10     54.3      100.00
     1    149.40  22.75    2.595    .29(  .03)  .10     58.7      106.30
     1    145.09  24.34    2.500    .29(  .03)  .10     59.6      108.20
     1    152.56  15.66    3.226    .29(  .03)  .10     46.2      109.60
     2     38.62  12.80    3.617    .25(  .03)  .10     11.2      109.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	186.97	15.66	3.226	.28(.03)	.10	57.4	109.60
2	187.05	15.70	3.221	.28(.03)	.10	57.6	105.30
3	187.15	16.20	3.165	.28(.03)	.10	59.0	104.20
4	187.41	17.57	3.014	.28(.03)	.10	62.4	103.40
5	187.13	18.00	2.976	.28(.03)	.10	63.4	103.20
6	186.09	18.69	2.915	.28(.03)	.10	64.7	102.20
7	185.29	19.18	2.872	.28(.03)	.10	65.5	100.00
8	177.03	22.75	2.595	.28(.03)	.10	69.9	106.30
9	171.69	24.34	2.500	.28(.03)	.10	70.8	108.20
10	178.55	12.80	3.617	.28(.03)	.10	49.0	109.40

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 187.41 Tc(MIN.) = 17.57
EFFECTIVE AREA(ACRES) = 62.40 AREA-AVERAGED Fm(INCH/HR) = .03
AREA-AVERAGED Fp(INCH/HR) = .28 AREA-AVERAGED Ap = .10
TOTAL AREA(ACRES) = 70.80
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 109.00 = 3373.00 FEET.

****
FLOW PROCESS FROM NODE 109.00 TO NODE 110.00 IS CODE = 4.1

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 10.46 DOWNSTREAM(FEET) = 10.00
FLOW LENGTH(FEET) = 365.00 MANNING'S N = .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.66
GIVEN PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 187.41
PIPE TRAVEL TIME(MIN.) = .70 Tc(MIN.) = 18.27
==
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 70.80 TC(MIN.) = 18.27
EFFECTIVE AREA(ACRES) = 62.40 AREA-AVERAGED Fm(INCH/HR)= .03
AREA-AVERAGED Fp(INCH/HR) = .28 AREA-AVERAGED Ap = .10
PEAK FLOW RATE(CFS) = 187.41

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	178.55	13.54	3.510	.28(.03)	.10	49.0	109.40
2	186.97	16.36	3.147	.28(.03)	.10	57.4	109.60
3	187.05	16.41	3.142	.28(.03)	.10	57.6	105.30
4	187.15	16.91	3.086	.28(.03)	.10	59.0	104.20
5	187.41	18.27	2.952	.28(.03)	.10	62.4	103.40
6	187.13	18.71	2.914	.28(.03)	.10	63.4	103.20
7	186.09	19.40	2.853	.28(.03)	.10	64.7	102.20
8	185.29	19.89	2.810	.28(.03)	.10	65.5	100.00
9	177.03	23.50	2.550	.28(.03)	.10	69.9	106.30
10	171.69	25.11	2.454	.28(.03)	.10	70.8	108.20

==
==
END OF RATIONAL METHOD ANALYSIS

```
****************************************************************************
         RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 OCEMA HYDROLOGY CRITERION)
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                      Analysis prepared by:

               ADAMS*STREETER CIVIL ENGINEERS INC.
                       15 CORPORATE PARK
                        IRVINE, CA 92714
                         (714) 474-2330

 ************************** DESCRIPTION OF STUDY **************************
 * BOLSA LINE HYDROLOGY, SUBAREAS "A-16.1" TO "A-31"                       *
 * EXISTING AND ULTIMATE CONDITIONS                                        *
 * 100-YEAR FLOWS                                                          *
 ***************************************************************************

  FILE NAME: J:\961097\HYDRO\97BLSEX.MA
  TIME/DATE OF STUDY: 13: 5   3/ 1/1997
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK- HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY   (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================= ======  ===== ====== ===== =======
  1   32.0     27.0     .020/ .020/ .020    .67    2.00 .03125 .1670 .01500
  2   40.0     35.0     .020/ .020/ .020    .67    2.00 .03125 .1670 .01500

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =   .20 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

  UNIT-HYDROGRAPH DATA:
    WATERSHED LAG =  .80 * Tc
    USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
    2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
    FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
    SIERRA MADRE DEPTH-AREA FACTORS USED.
                        AREA-AVERAGED
         DURATION     RAINFALL(INCH)
          5-MINUTES           .52
         30-MINUTES          1.09
          1-HOUR             1.45
          3-HOUR             2.43
          6-HOUR             3.36
         24-HOUR             5.63
 *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR UNIT HYDROGRAPH METHOD*
```

```
+--------------------------------------------------------------------------+
| SUBAREA "A-18"                                                           |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   4800.00 TO NODE   4790.00 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   745.00
 ELEVATION DATA: UPSTREAM(FEET) =     20.80  DOWNSTREAM(FEET) =     19.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.772
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.214
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C          .90       .25        .10     69  15.77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =        2.58
 TOTAL AREA(ACRES) =        .90   PEAK FLOW RATE(CFS) =      2.58

+--------------------------------------------------------------------------+
| SUBAREA "A-19"                                                           |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   4790.00 TO NODE   4794.00 IS CODE =  6.2
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   19.70  DOWNSTREAM ELEVATION(FEET) =   18.90
 STREET LENGTH(FEET) =   655.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  27.00
 INSIDE STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =    .020

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        3.67
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =    .51
   HALFSTREET FLOOD WIDTH(FEET) =   17.63
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.11
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =      .57
 STREET FLOW TRAVEL TIME(MIN.) =   9.81    Tc(MIN.) =  25.58
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.430
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C         1.00       .25        .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =     2.16
```

```
 EFFECTIVE AREA(ACRES) =     1.90    AREA-AVERAGED Fm(INCH/HR) =    .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    1.90         PEAK FLOW RATE(CFS) =        4.11

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) =  .53   HALFSTREET FLOOD WIDTH(FEET) =  18.47
 FLOW VELOCITY(FEET/SEC.) =  1.14   DEPTH*VELOCITY(FT*FT/SEC.) =    .60

****************************************************************************
 FLOW PROCESS FROM NODE   4794.00 TO NODE   4794.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  25.58
 RAINFALL INTENSITY(INCH/HR) =   2.43
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =    1.90
 TOTAL STREAM AREA(ACRES) =    1.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.11

+--------------------------------------------------------------------------+
| SUBAREA "A-16.1"                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   4794.20 TO NODE   4794.10 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   760.00
 ELEVATION DATA: UPSTREAM(FEET) =      21.00  DOWNSTREAM(FEET) =      19.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.437
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.251
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS   Tc
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 COMMERCIAL                   C         .72        .25        .10    69   15.44
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =       2.09
 TOTAL AREA(ACRES) =        .72   PEAK FLOW RATE(CFS) =       2.09

+--------------------------------------------------------------------------+
| SUBAREA "A-16.2"                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   4794.10 TO NODE   4794.30 IS CODE =  6.2
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   19.70  DOWNSTREAM ELEVATION(FEET) =   18.90
 STREET LENGTH(FEET) =   570.00   CURB HEIGHT(INCHES) =  8.0
```

```
STREET HALFWIDTH(FEET) = 32.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  27.00
INSIDE STREET CROSSFALL(DECIMAL) =   .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =   .020

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        2.71
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =   .46
  HALFSTREET FLOOD WIDTH(FEET) =   15.15
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.09
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =      .50
STREET FLOW TRAVEL TIME(MIN.) =   8.70   Tc(MIN.) =  24.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.512
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
COMMERCIAL                  A          .56        .40        .10    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =      .56      SUBAREA RUNOFF(CFS) =    1.25
EFFECTIVE AREA(ACRES) =     1.28    AREA-AVERAGED Fm(INCH/HR) =    .03
AREA-AVERAGED Fp(INCH/HR) =    .32  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =    1.28         PEAK FLOW RATE(CFS) =        2.86

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) =  .47   HALFSTREET FLOOD WIDTH(FEET) =  15.52
FLOW VELOCITY(FEET/SEC.) =  1.10   DEPTH*VELOCITY(FT*FT/SEC.) =    .52

+--------------------------------------------------------------------------+
|SUBAREA "A-15.2"                                                          |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE   4794.30 TO NODE   4794.30 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  24.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.512
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
COMMERCIAL                  D        2.25        .20        .10    75
COMMERCIAL                  C        1.94        .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     4.19      SUBAREA RUNOFF(CFS) =     9.39
EFFECTIVE AREA(ACRES) =      5.47   AREA-AVERAGED Fm(INCH/HR) =    .02
AREA-AVERAGED Fp(INCH/HR) =    .24  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =      5.47       PEAK FLOW RATE(CFS) =       12.25

****************************************************************************
FLOW PROCESS FROM NODE   4794.30 TO NODE   4794.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     14.00  DOWNSTREAM(FEET) =     12.60
FLOW LENGTH(FEET) =   150.00    MANNING'S N =  .015
```

```
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.93
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.25
 PIPE TRAVEL TIME(MIN.) =    .36    Tc(MIN.) =  24.49

****************************************************************************
 FLOW PROCESS FROM NODE   4794.00 TO NODE   4794.00 IS CODE =   1
----------------------------------------------------------------------------

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  24.49
 RAINFALL INTENSITY(INCH/HR) =   2.49
 AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .24
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =    5.47
 TOTAL STREAM AREA(ACRES) =    5.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.25

 ** CONFLUENCE DATA **
  STREAM     Q      Tc   Intensity   Fp(Fm)      Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      4.11  25.58    2.430    .25(  .03)  .10     1.9    4800.00
     2     12.25  24.49    2.490    .24(  .02)  .10     5.5    4794.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc   Intensity   Fp(Fm)      Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1     16.06  25.58    2.430    .25(  .02)  .10     7.4    4800.00
     2     16.28  24.49    2.490    .25(  .02)  .10     7.3    4794.20

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      16.28    Tc(MIN.) =    24.49
 EFFECTIVE AREA(ACRES) =      7.29   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =       7.37
 LONGEST FLOWPATH FROM NODE   4794.20 TO NODE   4794.00 =  1480.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4794.00 TO NODE   4390.00 IS CODE =  4.1
----------------------------------------------------------------------------

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    12.53  DOWNSTREAM(FEET) =    10.59
 FLOW LENGTH(FEET) =   450.00   MANNING'S N =  .015
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.18
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     16.28
 PIPE TRAVEL TIME(MIN.) =   1.45    Tc(MIN.) =  25.94

+--------------------------------------------------------------------------+
| SUBAREA "A-20"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   4320.00 TO NODE   4390.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  25.94
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.411
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C         .80        .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =       .80      SUBAREA RUNOFF(CFS) =     1.72
 EFFECTIVE AREA(ACRES) =      8.09    AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25   AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =       8.17       PEAK FLOW RATE(CFS) =      17.37

****************************************************************************
 FLOW PROCESS FROM NODE   4390.00 TO NODE   3887.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     10.59  DOWNSTREAM(FEET) =     9.62
 FLOW LENGTH(FEET) =   473.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  19.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.90
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     17.37
 PIPE TRAVEL TIME(MIN.) =   2.02    Tc(MIN.) =  27.96

****************************************************************************
 FLOW PROCESS FROM NODE   3887.00 TO NODE   3716.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      9.65  DOWNSTREAM(FEET) =     9.33
 FLOW LENGTH(FEET) =   171.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  19.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.75
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     17.37
 PIPE TRAVEL TIME(MIN.) =    .76    Tc(MIN.) =  28.72

+--------------------------------------------------------------------------+
| SUBAREA "A-21"                                                           |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   3716.00 TO NODE   3716.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  28.72
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.276
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        1.24        .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
```

```
 SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    2.51
 EFFECTIVE AREA(ACRES) =     9.33   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =     9.41       PEAK FLOW RATE(CFS) =      18.90

+--------------------------------------------------------------------------+
| SUBAREA "A-22"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   3716.00 TO NODE   3716.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  28.72
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.276
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        5.10        .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    5.10      SUBAREA RUNOFF(CFS) =   10.33
 EFFECTIVE AREA(ACRES) =    14.43   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    14.51       PEAK FLOW RATE(CFS) =      29.24

****************************************************************************
 FLOW PROCESS FROM NODE   3716.00 TO NODE   3071.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     9.33  DOWNSTREAM(FEET) =     8.24
 FLOW LENGTH(FEET) =   645.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  26.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.13
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     29.24
 PIPE TRAVEL TIME(MIN.) =   2.61    Tc(MIN.) =  31.33

+--------------------------------------------------------------------------+
| SUBAREA "A-23"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   3071.00 TO NODE   3071.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  31.33
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.169
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        1.23        .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    1.23      SUBAREA RUNOFF(CFS) =    2.37
 EFFECTIVE AREA(ACRES) =    15.66   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =   .10
```

```
TOTAL AREA(ACRES) =    15.74       PEAK FLOW RATE(CFS) =      30.23

****************************************************************************
FLOW PROCESS FROM NODE   3071.00 TO NODE   2761.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      8.24  DOWNSTREAM(FEET) =      7.62
FLOW LENGTH(FEET) =   310.00   MANNING'S N =  .015
DEPTH OF FLOW IN  57.0 INCH PIPE IS  23.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
GIVEN PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      30.23
PIPE TRAVEL TIME(MIN.) =   1.17    Tc(MIN.) =  32.50

---------------------------------------------------------------------------+
SUBAREA "A-24"                                                             |
                                                                           |
                                                                           |
---------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE   2761.00 TO NODE   2761.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  32.50
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.125
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
COMMERCIAL                  C         .63        .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =      .63      SUBAREA RUNOFF(CFS) =     1.19
EFFECTIVE AREA(ACRES) =     16.29   AREA-AVERAGED Fm(INCH/HR) =    .02
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =    16.37       PEAK FLOW RATE(CFS) =      30.79

****************************************************************************
FLOW PROCESS FROM NODE   2761.00 TO NODE   2565.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      7.62  DOWNSTREAM(FEET) =      6.48
FLOW LENGTH(FEET) =   196.00   MANNING'S N =  .015
DEPTH OF FLOW IN  57.0 INCH PIPE IS  17.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.54
GIVEN PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      30.79
PIPE TRAVEL TIME(MIN.) =    .50    Tc(MIN.) =  33.00

+--------------------------------------------------------------------------+
|SUBAREA "A-25"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE   2565.00 TO NODE   2565.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 MAINLINE Tc(MIN) =  33.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.106
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C         .44       .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =      .44     SUBAREA RUNOFF(CFS) =      .82
 EFFECTIVE AREA(ACRES) =    16.73   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    16.81       PEAK FLOW RATE(CFS) =      31.34

****************************************************************************
 FLOW PROCESS FROM NODE   2565.00 TO NODE   2271.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     6.48  DOWNSTREAM(FEET) =     5.91
 FLOW LENGTH(FEET) =   294.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  24.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
 GIVEN PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     31.34
 PIPE TRAVEL TIME(MIN.) =   1.11    Tc(MIN.) =  34.11

+--------------------------------------------------------------------------+
| SUBAREA "A-26"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   2271.00 TO NODE   2271.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  34.11
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.064
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C         .57       .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =      .57     SUBAREA RUNOFF(CFS) =     1.05
 EFFECTIVE AREA(ACRES) =    17.30   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    17.38       PEAK FLOW RATE(CFS) =      31.75

****************************************************************************
 FLOW PROCESS FROM NODE   2271.00 TO NODE   2035.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     5.91  DOWNSTREAM(FEET) =     5.29
 FLOW LENGTH(FEET) =   236.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  22.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.95
 GIVEN PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     31.75
 PIPE TRAVEL TIME(MIN.) =    .79    Tc(MIN.) =  34.90
```

```
************************************************************************
 FLOW PROCESS FROM NODE   2035.00 TO NODE   1920.00 IS CODE =  4.1
------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      5.29  DOWNSTREAM(FEET) =      5.23
 FLOW LENGTH(FEET) =    115.00   MANNING'S N = .015
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  33.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.71
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      31.75
 PIPE TRAVEL TIME(MIN.) =    .71    Tc(MIN.) =  35.61

+----------------------------------------------------------------------+
| SUBAREA "A-28"                                                       |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

************************************************************************
 FLOW PROCESS FROM NODE   1920.00 TO NODE   1920.00 IS CODE =  8.1
------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
 MAINLINE Tc(MIN) =  35.61
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.012
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C         .62       .25        .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =       .62     SUBAREA RUNOFF(CFS) =     1.11
 EFFECTIVE AREA(ACRES) =     17.92   AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =     18.00       PEAK FLOW RATE(CFS) =       32.04

************************************************************************
 FLOW PROCESS FROM NODE   1920.00 TO NODE   1587.00 IS CODE =  4.1
------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      5.23  DOWNSTREAM(FEET) =      5.07
 FLOW LENGTH(FEET) =    380.00   MANNING'S N = .015
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  36.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.50
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      32.04
 PIPE TRAVEL TIME(MIN.) =   2.53    Tc(MIN.) =  38.14

+----------------------------------------------------------------------+
| SUBAREA "A-29"                                                       |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

************************************************************************
 FLOW PROCESS FROM NODE   1587.00 TO NODE   1587.00 IS CODE =  8.1
------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
 MAINLINE Tc(MIN) =  38.14
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.936
```

```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C         .90        .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
 SUBAREA AREA(ACRES) =       .90      SUBAREA RUNOFF(CFS) =     1.55
 EFFECTIVE AREA(ACRES) =    18.82   AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =    18.90        PEAK FLOW RATE(CFS) =       32.37

****************************************************************************
 FLOW PROCESS FROM NODE   1587.00 TO NODE   1034.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      5.07  DOWNSTREAM(FEET) =      4.30
 FLOW LENGTH(FEET) =   500.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  24.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      32.37
 PIPE TRAVEL TIME(MIN.) =   2.05    Tc(MIN.) =  40.19

****************************************************************************
 FLOW PROCESS FROM NODE   1034.00 TO NODE   1034.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  40.19
 RAINFALL INTENSITY(INCH/HR) =   1.88
 AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   18.82
 TOTAL STREAM AREA(ACRES) =   18.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.37

+--------------------------------------------------------------------------+
| SUBAREA "A-27"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   1034.30 TO NODE   1034.20 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
 ELEVATION DATA: UPSTREAM(FEET) =      17.40  DOWNSTREAM(FEET) =      15.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.460
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.024
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS    Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN   (MIN.)
 COMMERCIAL                  C        7.63        .25        .10    69   17.46
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
```

```
SUBAREA RUNOFF(CFS) =       20.60
TOTAL AREA(ACRES) =        7.63   PEAK FLOW RATE(CFS) =      20.60

+--------------------------------------------------------------------------+
| SUBAREA "A-30"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE   1034.20 TO NODE   1034.10 IS CODE =  6.2
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =    15.80  DOWNSTREAM ELEVATION(FEET) =    13.50
STREET LENGTH(FEET) =  1555.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 40.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  35.00
INSIDE STREET CROSSFALL(DECIMAL) =   .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =   .020

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       32.80
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =    .94
  HALFSTREET FLOOD WIDTH(FEET) =    52.73
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.89
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.78
STREET FLOW TRAVEL TIME(MIN.) =  13.69   Tc(MIN.) =  31.15
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.176
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap       SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C       12.57      .25        .10     69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =   12.57      SUBAREA RUNOFF(CFS) =   24.34
EFFECTIVE AREA(ACRES) =   20.20    AREA-AVERAGED Fm(INCH/HR) =   .02
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =   20.20        PEAK FLOW RATE(CFS) =      39.11

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) =   .96   HALFSTREET FLOOD WIDTH(FEET) =  54.58
FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.83
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1555.0 FT WITH ELEVATION-DROP =   2.3 FT, IS   30.4 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1034.10

****************************************************************************
FLOW PROCESS FROM NODE   1034.10 TO NODE   1034.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     6.70  DOWNSTREAM(FEET) =     5.90
FLOW LENGTH(FEET) =    80.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  12.45
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     39.11
PIPE TRAVEL TIME(MIN.) =    .11    Tc(MIN.) =  31.26
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   1034.00 TO NODE   1034.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  31.26
 RAINFALL INTENSITY(INCH/HR) =   2.17
 AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   20.20
 TOTAL STREAM AREA(ACRES) =   20.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.11

 ** CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity   Fp(Fm)       Ap    Ae       HEADWATER
  NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
     1      31.92  41.35     1.849     .25(  .02)   .10     18.9     4800.00
     1      32.37  40.19     1.876     .25(  .02)   .10     18.8     4794.20
     2      39.11  31.26     2.172     .25(  .02)   .10     20.2     1034.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity   Fp(Fm)       Ap    Ae       HEADWATER
  NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
     1      66.08  40.19     1.876     .25(  .02)   .10     39.0     4794.20
     2      65.14  41.35     1.849     .25(  .02)   .10     39.1     4800.00
     3      68.32  31.26     2.172     .25(  .02)   .10     34.8     1034.30

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      68.32   Tc(MIN.) =    31.26
 EFFECTIVE AREA(ACRES) =     34.84   AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25   AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =     39.10
 LONGEST FLOWPATH FROM NODE   4794.20 TO NODE   1034.00 =  5250.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1034.00 TO NODE    884.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     4.30  DOWNSTREAM(FEET) =     4.22
 FLOW LENGTH(FEET) =   149.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  52.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.23
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      68.32
 PIPE TRAVEL TIME(MIN.) =    .77    Tc(MIN.) =  32.03

----------------------------------------------------------------------------+
 SUBAREA "A-31"                                                              |
                                                                             |
----------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    884.00 TO NODE    884.00 IS CODE =  8.1
----------------------------------------------------------------------------
```

```
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
MAINLINE Tc(MIN) =  32.03
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.143
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
COMMERCIAL                 C         1.93       .25        .10     69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
SUBAREA AREA(ACRES) =     1.93      SUBAREA RUNOFF(CFS) =     3.68
EFFECTIVE AREA(ACRES) =     36.77   AREA-AVERAGED Fm(INCH/HR) =    .02
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =    41.03        PEAK FLOW RATE(CFS) =      70.09

****************************************************************************
FLOW PROCESS FROM NODE    884.00 TO NODE    807.76 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      4.22  DOWNSTREAM(FEET) =      4.18
FLOW LENGTH(FEET) =    79.00   MANNING'S N =  .015
DEPTH OF FLOW IN  69.0 INCH PIPE IS  55.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.15
GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      70.09
PIPE TRAVEL TIME(MIN.) =    .42    Tc(MIN.) =  32.44
==============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)        =      41.03  TC(MIN.) =       32.44
EFFECTIVE AREA(ACRES) =     36.77  AREA-AVERAGED Fm(INCH/HR)=    .02
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
PEAK FLOW RATE(CFS)     =      70.09

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1      70.09  32.44     2.127    .25(  .02)  .10     36.8     1034.30
    2      67.56  41.37     1.848    .25(  .02)  .10     40.9     4794.20
    3      66.70  42.54     1.822    .25(  .02)  .10     41.0     4800.00
==============================================================================
==============================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
********************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              (Reference: 1986 OCEMA HYDROLOGY CRITERION)
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                         Analysis prepared by:

                  ADAMS*STREETER CIVIL ENGINEERS INC.
                          15 CORPORATE PARK
                           IRVINE, CA 92714
                            (714) 474-2330

 ************************** DESCRIPTION OF STUDY **************************
 * HYDROLOGY STUDY FOR AREA "B"                                             *
 * ULTIMATE CONDITIONS                                                      *
 * 100-YEAR FLOWS                                                           *
 ****************************************************************************

  FILE NAME: J:\961097\HYDRO\97BLSWUT.MA
  TIME/DATE OF STUDY: 13:26   3/ 1/1997
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
```

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN-SIDE / OUT-SIDE / PARK-WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	.020/ .020/ .020	.50	1.50	.03125	.1250	.01500

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =   .20 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

  UNIT-HYDROGRAPH DATA:
    WATERSHED LAG =  .80 * Tc
    USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
    2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
    FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
    SIERRA MADRE DEPTH-AREA FACTORS USED.
```

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	.52
30-MINUTES	1.09
1-HOUR	1.45
3-HOUR	2.43
6-HOUR	3.36
24-HOUR	5.63

```
 *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR UNIT HYDROGRAPH METHOD*

+----------------------------------------------------------------------------+
```

```
SUBAREA "B-1.2"
-------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    110.30 TO NODE    110.20 IS CODE =  2.1
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   485.00
ELEVATION DATA: UPSTREAM(FEET) =     19.40  DOWNSTREAM(FEET) =     17.20

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.613
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.037
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                  C        7.27       .25        .10     69   10.61
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA RUNOFF(CFS) =     26.25
TOTAL AREA(ACRES) =       7.27   PEAK FLOW RATE(CFS) =     26.25

****************************************************************************
FLOW PROCESS FROM NODE    110.20 TO NODE    110.10 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    11.25  DOWNSTREAM(FEET) =      9.98
FLOW LENGTH(FEET) =    80.00   MANNING'S N =  .015
DEPTH OF FLOW IN  30.0 INCH PIPE IS  16.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   9.30
GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      26.25
PIPE TRAVEL TIME(MIN.) =    .14    Tc(MIN.) =  10.76

****************************************************************************
FLOW PROCESS FROM NODE    110.10 TO NODE    203.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     8.14  DOWNSTREAM(FEET) =      7.75
FLOW LENGTH(FEET) =   391.00   MANNING'S N =  .015
DEPTH OF FLOW IN  60.0 INCH PIPE IS  25.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.29
GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      26.25
PIPE TRAVEL TIME(MIN.) =   1.98    Tc(MIN.) =  12.74

****************************************************************************
FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  12.74
RAINFALL INTENSITY(INCH/HR) =   3.63
AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25
```

```
  AREA-AVERAGED Ap =    .10
  EFFECTIVE STREAM AREA(ACRES) =     7.27
  TOTAL STREAM AREA(ACRES) =     7.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.25

+--------------------------------------------------------------------------+
| SUBAREA "B-1"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  2.1
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   360.00
  ELEVATION DATA: UPSTREAM(FEET) =      19.80  DOWNSTREAM(FEET) =      19.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.159
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.928
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
  COMMERCIAL                  C        2.14        .25        .10    69   11.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
  SUBAREA RUNOFF(CFS) =       7.52
  TOTAL AREA(ACRES) =       2.14   PEAK FLOW RATE(CFS) =       7.52

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    14.31  DOWNSTREAM(FEET) =    13.55
  FLOW LENGTH(FEET) =    370.00   MANNING'S N =  .015
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.52
  PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =  12.17

+--------------------------------------------------------------------------+
| SUBAREA "B-2"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  8.1
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  12.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.727
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
  COMMERCIAL                  C        3.88        .25        .10    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
```

```
SUBAREA AREA(ACRES) =     3.88      SUBAREA RUNOFF(CFS) =   12.93
EFFECTIVE AREA(ACRES) =     6.02    AREA-AVERAGED Fm(INCH/HR) =    .03
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =      6.02       PEAK FLOW RATE(CFS) =      20.06

****************************************************************************
FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     13.55  DOWNSTREAM(FEET) =     10.60
FLOW LENGTH(FEET) =    155.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  11.35
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       20.06
PIPE TRAVEL TIME(MIN.) =    .23    Tc(MIN.) =  12.39

****************************************************************************
FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  12.39
RAINFALL INTENSITY(INCH/HR) =   3.68
AREA-AVERAGED Fm(INCH/HR) =    .03
AREA-AVERAGED Fp(INCH/HR) =    .25
AREA-AVERAGED Ap =    .10
EFFECTIVE STREAM AREA(ACRES) =     6.02
TOTAL STREAM AREA(ACRES) =     6.02
PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.06

** CONFLUENCE DATA **
 STREAM      Q      Tc    Intensity  Fp(Fm)      Ap   Ae      HEADWATER
 NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1      26.25  12.74    3.626   .25(  .03)  .10      7.3      110.30
    2      20.06  12.39    3.681   .25(  .03)  .10      6.0      200.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc    Intensity  Fp(Fm)      Ap   Ae      HEADWATER
 NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1      46.01  12.74    3.626   .25(  .02)  .10     13.3      110.30
    2      46.00  12.39    3.681   .25(  .02)  .10     13.1      200.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      46.01    Tc(MIN.) =     12.74
EFFECTIVE AREA(ACRES) =     13.29   AREA-AVERAGED Fm(INCH/HR) =    .02
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =      13.29
LONGEST FLOWPATH FROM NODE     110.30 TO NODE     203.00 =    956.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      7.74  DOWNSTREAM(FEET) =      7.45
```

```
FLOW LENGTH(FEET) =   400.00   MANNING'S N =  .015
DEPTH OF FLOW IN  60.0 INCH PIPE IS  39.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.33
GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      46.01
PIPE TRAVEL TIME(MIN.) =   2.00    Tc(MIN.) =  14.74

+--------------------------------------------------------------------------+
| SUBAREA "B-3"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  14.74
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.338
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
COMMERCIAL                  C        3.92       .25          .10     69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     3.92       SUBAREA RUNOFF(CFS) =    11.69
EFFECTIVE AREA(ACRES) =     17.21   AREA-AVERAGED Fm(INCH/HR) =    .02
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
TOTAL AREA(ACRES) =     17.21        PEAK FLOW RATE(CFS) =      51.32

** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc    Intensity   Fp(Fm)      Ap   Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
    1      51.32  14.74     3.338    .25(  .02)  .10    17.2      110.30
    2      51.49  14.39     3.387    .25(  .02)  .10    17.0      200.00
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) =       51.49  Tc(MIN.) =  14.39
AREA-AVERAGED Fm(INCH/HR) =    .02  AREA-AVERAGED Fp(INCH/HR) =    .25
AREA-AVERAGED Ap =    .10  EFFECTIVE AREA(ACRES) =      17.01

****************************************************************************
FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =       7.34  DOWNSTREAM(FEET) =       6.96
FLOW LENGTH(FEET) =    389.00   MANNING'S N =  .015
DEPTH OF FLOW IN  72.0 INCH PIPE IS  34.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.87
GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      51.49
PIPE TRAVEL TIME(MIN.) =   1.67    Tc(MIN.) =  16.07

+--------------------------------------------------------------------------+
| SUBAREA "B-4"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
 MAINLINE Tc(MIN) =  16.07
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.180
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C       12.90       .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =   12.90       SUBAREA RUNOFF(CFS) =   36.63
 EFFECTIVE AREA(ACRES) =    29.91    AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    30.11        PEAK FLOW RATE(CFS) =       84.95

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =       6.95  DOWNSTREAM(FEET) =       6.54
 FLOW LENGTH(FEET) =   405.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  46.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
 GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      84.95
 PIPE TRAVEL TIME(MIN.) =   1.53    Tc(MIN.) =  17.60

+--------------------------------------------------------------------------+
| SUBAREA "B-5"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  17.60
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.011
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        6.90       .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    6.90       SUBAREA RUNOFF(CFS) =   18.55
 EFFECTIVE AREA(ACRES) =    36.81    AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    37.01        PEAK FLOW RATE(CFS) =       98.95

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =       6.54  DOWNSTREAM(FEET) =       5.42
 FLOW LENGTH(FEET) =   338.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  35.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.21
 GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      98.95
 PIPE TRAVEL TIME(MIN.) =    .78    Tc(MIN.) =  18.38
```

```
+--------------------------------------------------------------------------+
| SUBAREA "B-6"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  8.1
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  18.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.943
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
  COMMERCIAL                  C        8.19       .25        .10     69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
  SUBAREA AREA(ACRES) =     8.19      SUBAREA RUNOFF(CFS) =   21.51
  EFFECTIVE AREA(ACRES) =    45.00   AREA-AVERAGED Fm(INCH/HR) =   .02
  AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
  TOTAL AREA(ACRES) =    45.20        PEAK FLOW RATE(CFS) =     118.18

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     5.22  DOWNSTREAM(FEET) =     4.36
  FLOW LENGTH(FEET) =   488.00   MANNING'S N =  .015
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  48.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.88
  GIVEN PIPE DIAMETER(INCH) =  72.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    118.18
  PIPE TRAVEL TIME(MIN.) =   1.38    Tc(MIN.) =  19.76

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.76
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =   .02
  AREA-AVERAGED Fp(INCH/HR) =   .25
  AREA-AVERAGED Ap =   .10
  EFFECTIVE STREAM AREA(ACRES) =   45.00
  TOTAL STREAM AREA(ACRES) =   45.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    118.18

+--------------------------------------------------------------------------+
| SUBAREA "B-7"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  2.1
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    240.00
 ELEVATION DATA: UPSTREAM(FEET) =      17.70  DOWNSTREAM(FEET) =      15.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.679
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.324
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap     SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C       2.40       .25        .10     69    6.68
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =      11.44
 TOTAL AREA(ACRES) =        2.40   PEAK FLOW RATE(CFS) =      11.44

****************************************************************************
 FLOW PROCESS FROM NODE    211.00 TO NODE    212.00 IS CODE =  4.1
 ----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     10.22  DOWNSTREAM(FEET) =      9.35
 FLOW LENGTH(FEET) =    220.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.44
 PIPE TRAVEL TIME(MIN.) =    .84    Tc(MIN.) =   7.52

+--------------------------------------------------------------------------+
| SUBAREA "B-8"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =  8.1
 ----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN) =    7.52
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.894
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C       1.50       .25        .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     1.50       SUBAREA RUNOFF(CFS) =    6.57
 EFFECTIVE AREA(ACRES) =      3.90   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =      3.90       PEAK FLOW RATE(CFS) =      17.09

****************************************************************************
 FLOW PROCESS FROM NODE    212.00 TO NODE    213.00 IS CODE =  4.1
 ----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      9.35  DOWNSTREAM(FEET) =      8.35
 FLOW LENGTH(FEET) =    250.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.94
```

```
GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      17.09
PIPE TRAVEL TIME(MIN.) =     .84    Tc(MIN.) =   8.37

+--------------------------------------------------------------------------+
| SUBAREA "B-9"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    213.00 TO NODE    213.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =   8.37
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.644
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 C       2.30        .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     2.30      SUBAREA RUNOFF(CFS) =     9.56
EFFECTIVE AREA(ACRES) =      6.20   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =     6.20        PEAK FLOW RATE(CFS) =      25.77

+--------------------------------------------------------------------------+
| SUBAREA "B-10"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    213.00 TO NODE    213.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =   8.37
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.644
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 C        .90        .25         .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =      .90      SUBAREA RUNOFF(CFS) =     3.74
EFFECTIVE AREA(ACRES) =      7.10   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =     7.10        PEAK FLOW RATE(CFS) =      29.51

****************************************************************************
FLOW PROCESS FROM NODE    213.00 TO NODE    208.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     8.35  DOWNSTREAM(FEET) =     5.85
FLOW LENGTH(FEET) =   200.00   MANNING'S N =  .015
DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.77
GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      29.51
PIPE TRAVEL TIME(MIN.) =     .38    Tc(MIN.) =   8.75
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.75
  RAINFALL INTENSITY(INCH/HR) =   4.53
  AREA-AVERAGED Fm(INCH/HR) =    .03
  AREA-AVERAGED Fp(INCH/HR) =    .25
  AREA-AVERAGED Ap =   .10
  EFFECTIVE STREAM AREA(ACRES) =    7.10
  TOTAL STREAM AREA(ACRES) =    7.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      29.51

  ** CONFLUENCE DATA **
   STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
   NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1     117.45  20.11     2.792    .25(  .03)  .10     45.2      110.30
      1     118.18  19.76     2.821    .25(  .02)  .10     45.0      200.00
      2      29.51   8.75     4.531    .25(  .03)  .10      7.1      210.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
   NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1     136.49  19.76     2.821    .25(  .03)  .10     52.1      200.00
      2     135.57  20.11     2.792    .25(  .03)  .10     52.3      110.30
      3     113.81   8.75     4.531    .25(  .02)  .10     27.0      210.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     136.49    Tc(MIN.) =     19.76
  EFFECTIVE AREA(ACRES) =     52.10   AREA-AVERAGED Fm(INCH/HR) =    .03
  AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
  TOTAL AREA(ACRES) =      52.30
  LONGEST FLOWPATH FROM NODE     110.30 TO NODE    208.00 =  2976.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    209.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =      4.34  DOWNSTREAM(FEET) =      3.84
  FLOW LENGTH(FEET) =    283.00   MANNING'S N =  .015
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  53.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =    6.02
  GIVEN PIPE DIAMETER(INCH) =  72.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     136.49
  PIPE TRAVEL TIME(MIN.) =     .78     Tc(MIN.) =  20.54

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  20.54
  RAINFALL INTENSITY(INCH/HR) =   2.76
```

```
AREA-AVERAGED Fm(INCH/HR) =    .03
AREA-AVERAGED Fp(INCH/HR) =    .25
AREA-AVERAGED Ap =    .10
EFFECTIVE STREAM AREA(ACRES) =   52.10
TOTAL STREAM AREA(ACRES) =   52.30
PEAK FLOW RATE(CFS) AT CONFLUENCE =    136.49

+--------------------------------------------------------------------------+
| SUBAREA "B-11"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    214.00 TO NODE    215.00 IS CODE =  2.1
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   470.00
ELEVATION DATA: UPSTREAM(FEET) =     18.40  DOWNSTREAM(FEET) =     16.20

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.415
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.077
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                  C        1.60       .25        .10     69   10.41
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA RUNOFF(CFS) =       5.83
TOTAL AREA(ACRES) =       1.60   PEAK FLOW RATE(CFS) =      5.83

****************************************************************************
FLOW PROCESS FROM NODE    215.00 TO NODE    216.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     13.13  DOWNSTREAM(FEET) =      8.19
FLOW LENGTH(FEET) =    390.00   MANNING'S N =  .015
DEPTH OF FLOW IN  27.0 INCH PIPE IS   8.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.77
GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       5.83
PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =  11.54

+--------------------------------------------------------------------------+
| SUBAREA "B-12"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  11.54
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.852
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        1.30       .25        .10     69
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     1.30     SUBAREA RUNOFF(CFS) =    4.48
 EFFECTIVE AREA(ACRES) =      2.90   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =     2.90        PEAK FLOW RATE(CFS) =       9.99

+--------------------------------------------------------------------------+
| SUBAREA "B-13"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.54
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.852
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        1.40       .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     1.40     SUBAREA RUNOFF(CFS) =    4.82
 EFFECTIVE AREA(ACRES) =      4.30   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =     4.30        PEAK FLOW RATE(CFS) =      14.81

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    217.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     8.19  DOWNSTREAM(FEET) =     6.82
 FLOW LENGTH(FEET) =   380.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  17.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.63
 GIVEN PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.81
 PIPE TRAVEL TIME(MIN.) =   1.37    Tc(MIN.) =  12.91

+--------------------------------------------------------------------------+
| SUBAREA "B-14"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.91
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.601
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        4.60       .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     4.60     SUBAREA RUNOFF(CFS) =   14.80
```

```
EFFECTIVE AREA(ACRES) =      8.90   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =      8.90       PEAK FLOW RATE(CFS) =      28.64

****************************************************************************
FLOW PROCESS FROM NODE    217.00 TO NODE    209.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      6.82  DOWNSTREAM(FEET) =      6.31
FLOW LENGTH(FEET) =   170.00   MANNING'S N =  .015
DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.96
GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     28.64
PIPE TRAVEL TIME(MIN.) =    .57    Tc(MIN.) =  13.48

****************************************************************************
FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  13.48
RAINFALL INTENSITY(INCH/HR) =   3.52
AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =     8.90
TOTAL STREAM AREA(ACRES) =     8.90
PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.64

** CONFLUENCE DATA **
 STREAM      Q       Tc   Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
    1     136.49  20.54     2.759    .25(  .03)  .10     52.1      200.00
    1     135.57  20.89     2.732    .25(  .03)  .10     52.3      110.30
    1     113.81   9.55     4.292    .25(  .02)  .10     27.0      210.00
    2      28.64  13.48     3.519    .25(  .03)  .10      8.9      214.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM      Q       Tc   Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
    1     138.60   9.55     4.292    .25(  .02)  .10     33.3      210.00
    2     158.91  20.54     2.759    .25(  .03)  .10     61.0      200.00
    3     157.77  20.89     2.732    .25(  .03)  .10     61.2      110.30
    4     150.56  13.48     3.519    .25(  .02)  .10     44.9      214.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     158.91    Tc(MIN.) =     20.54
EFFECTIVE AREA(ACRES) =     61.00   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =     61.20
LONGEST FLOWPATH FROM NODE    110.30 TO NODE    209.00 =  3259.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =      3.83  DOWNSTREAM(FEET) =      2.60
  FLOW LENGTH(FEET) =   163.00   MANNING'S N =  .015
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  36.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.05
  GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    158.91
  PIPE TRAVEL TIME(MIN.) =    .25    Tc(MIN.) =  20.79

+----------------------------------------------------------------------------+
| SUBAREAS "B-15" AND "B-16"                                                 |
| (COMBINED AREAS)                                                           |
|                                                                            |
+----------------------------------------------------------------------------+

******************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  8.2
------------------------------------------------------------------------------
  >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
  >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1280.00
  ELEVATION DATA: UPSTREAM(FEET) =     16.00  DOWNSTREAM(FEET) =     14.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.364
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.856
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        4.10        .25        .10    69  19.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  .10
  SUBAREA AREA(ACRES) =    4.10   INITIAL SUBAREA RUNOFF(CFS) =   10.45

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN) =  20.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.740
  SUBAREA AREA(ACRES) =    4.10       SUBAREA RUNOFF(CFS) =   10.02
  EFFECTIVE AREA(ACRES) =    65.10   AREA-AVERAGED Fm(INCH/HR) =   .03
  AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
  TOTAL AREA(ACRES) =    65.30       PEAK FLOW RATE(CFS) =     159.08

******************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  4.1
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =      2.60  DOWNSTREAM(FEET) =      2.21
  FLOW LENGTH(FEET) =   137.00   MANNING'S N =  .015
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  50.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.55
  GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    159.08
  PIPE TRAVEL TIME(MIN.) =    .30    Tc(MIN.) =  21.09
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)          =     65.30  TC(MIN.) =      21.09
  EFFECTIVE AREA(ACRES) =      65.10  AREA-AVERAGED Fm(INCH/HR)=   .03
  AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =   .10
  PEAK FLOW RATE(CFS)     =    159.08

  ** PEAK FLOW RATE TABLE **
```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	141.20	10.12	4.137	.25(.03)	.10	37.4	210.00
2	152.45	14.04	3.439	.25(.02)	.10	49.0	214.00
3	159.08	21.09	2.717	.25(.03)	.10	65.1	200.00
4	158.00	21.44	2.690	.25(.03)	.10	65.3	110.30

==

==

END OF RATIONAL METHOD ANALYSIS

```
**************************************************************************
           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              (Reference: 1986 OCEMA HYDROLOGY CRITERION)
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                          Analysis prepared by:

                 ADAMS*STREETER CIVIL ENGINEERS INC.
                           15 CORPORATE PARK
                            IRVINE, CA 92714
                             (714) 474-2330

 ************************* DESCRIPTION OF STUDY *************************
* HYDROLOGY STUDY FOR AREA "C"                                           *
* ULTIMATE CONDITIONS                                                    *
* 100-YEAR FLOWS                                                         *
 ************************************************************************

  FILE NAME: J:\961097\HYDRO\97SKLBUT.MA
  TIME/DATE OF STUDY: 11:23   3/ 8/1997
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  ================= ======  ===== ====== ===== =======
 1   30.0      20.0     .018/ .018/ .020    .67    2.00 .03125 .1670 .01500

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =   .00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)

+------------------------------------------------------------------------+
| SUBAREA "C-2"                                                          |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

**************************************************************************
```

```
FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  2.1
----------------------------------------------------------------------------

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   550.00
 ELEVATION DATA: UPSTREAM(FEET) =     19.50  DOWNSTREAM(FEET) =     17.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.665
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.827
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 COMMERCIAL                  C       9.80       .25         .10     69   11.67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     33.53
 TOTAL AREA(ACRES) =      9.80   PEAK FLOW RATE(CFS) =     33.53

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  4.1
----------------------------------------------------------------------------

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     17.50  DOWNSTREAM(FEET) =     16.30
 FLOW LENGTH(FEET) =   500.00   MANNING'S N =  .013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.33
 GIVEN PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     33.53
 PIPE TRAVEL TIME(MIN.) =   1.56    Tc(MIN.) =  13.23

+--------------------------------------------------------------------------+
| SUBAREA "C-3"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =  8.1
----------------------------------------------------------------------------

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.23
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.555
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 COMMERCIAL                  C       4.30       .25         .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =   13.66
 EFFECTIVE AREA(ACRES) =    14.10   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    14.10       PEAK FLOW RATE(CFS) =      44.80

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    16.30  DOWNSTREAM(FEET) =    14.70
 FLOW LENGTH(FEET) =   655.00   MANNING'S N =  .013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.72
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      44.80
 PIPE TRAVEL TIME(MIN.) =   1.91    Tc(MIN.) =  15.14

+--------------------------------------------------------------------------+
| SUBAREA "C-4"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.14
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.285
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C       6.50       .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    6.50      SUBAREA RUNOFF(CFS) =   19.07
 EFFECTIVE AREA(ACRES) =    20.60   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    20.60       PEAK FLOW RATE(CFS) =      60.44

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    14.70  DOWNSTREAM(FEET) =    13.20
 FLOW LENGTH(FEET) =   480.00   MANNING'S N =  .015
```

```
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.28
GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      60.44
PIPE TRAVEL TIME(MIN.) =   1.27    Tc(MIN.) =  16.41

+--------------------------------------------------------------------------+
| SUBAREA "C-5"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  16.41
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.142
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 C       4.10       .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    4.10      SUBAREA RUNOFF(CFS) =   11.50
EFFECTIVE AREA(ACRES) =    24.70   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    24.70       PEAK FLOW RATE(CFS) =      69.29

****************************************************************************
FLOW PROCESS FROM NODE    310.00 TO NODE    300.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    10.70  DOWNSTREAM(FEET) =    10.49
FLOW LENGTH(FEET) =   120.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.20
GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      69.29
PIPE TRAVEL TIME(MIN.) =    .28    Tc(MIN.) =  16.69

****************************************************************************
FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  16.69
```

```
 RAINFALL INTENSITY(INCH/HR) =   3.11
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   24.70
 TOTAL STREAM AREA(ACRES) =   24.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     69.29

+--------------------------------------------------------------------------+
| SUBAREA "B-1.1"                                                          |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    302.00 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   350.00
 ELEVATION DATA: UPSTREAM(FEET) =     19.40  DOWNSTREAM(FEET) =     17.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.986
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.460
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 C        4.85       .25        .10    69    8.99
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     19.36
 TOTAL AREA(ACRES) =      4.85   PEAK FLOW RATE(CFS) =      19.36

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    301.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    15.40  DOWNSTREAM(FEET) =    13.68
 FLOW LENGTH(FEET) =   420.00   MANNING'S N =  .013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     19.36
 PIPE TRAVEL TIME(MIN.) =   1.22    Tc(MIN.) =  10.21

+--------------------------------------------------------------------------+
| SUBAREA "C-6"                                                            |
|                                                                          |
```

```
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  10.21
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.119
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        7.90       .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   29.10
EFFECTIVE AREA(ACRES) =    12.75   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    12.75       PEAK FLOW RATE(CFS) =      46.97

****************************************************************************
FLOW PROCESS FROM NODE    301.00 TO NODE    300.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    13.68  DOWNSTREAM(FEET) =    11.36
FLOW LENGTH(FEET) =   320.00   MANNING'S N =  .013
DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.79
GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     46.97
PIPE TRAVEL TIME(MIN.) =    .61    Tc(MIN.) =  10.81

****************************************************************************
FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  10.81
RAINFALL INTENSITY(INCH/HR) =   4.00
AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =   12.75
TOTAL STREAM AREA(ACRES) =   12.75
PEAK FLOW RATE(CFS) AT CONFLUENCE =      46.97
```

```
 ** CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1      69.29  16.69    3.111    .25(  .03)  .10     24.7     306.00
     2      46.97  10.81    3.997    .25(  .03)  .10     12.8     303.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1     105.79  16.69    3.111    .25(  .03)  .10     37.5     306.00
     2     104.77  10.81    3.997    .25(  .03)  .10     28.8     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     105.79    Tc(MIN.) =     16.69
 EFFECTIVE AREA(ACRES) =     37.45   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25   AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =     37.45

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    400.00 IS CODE =  4.1
----------------------------------------------------------------------------

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    10.49  DOWNSTREAM(FEET) =     9.97
 FLOW LENGTH(FEET) =   290.00   MANNING'S N =  .013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.24
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    105.79
 PIPE TRAVEL TIME(MIN.) =    .77    Tc(MIN.) =  17.46

+--------------------------------------------------------------------------+
| SUBAREA "C-7"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  8.1
----------------------------------------------------------------------------

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  17.46
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.024
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp          Ap       SCS
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 COMMERCIAL                   C        7.90        .25         .10    69
```

```
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     7.90      SUBAREA RUNOFF(CFS) =   21.32
EFFECTIVE AREA(ACRES) =    45.35   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    45.35        PEAK FLOW RATE(CFS) =     122.42

** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
 NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1    122.42  17.46    3.024   .25(  .03)  .10    45.4     306.00
    2    125.93  11.59    3.842   .25(  .03)  .10    36.7     303.00
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) =    125.93  Tc(MIN.) =  11.59
AREA-AVERAGED Fm(INCH/HR) =   .03  AREA-AVERAGED Fp(INCH/HR) =   .25
AREA-AVERAGED Ap =   .10  EFFECTIVE AREA(ACRES) =     36.66

****************************************************************************
FLOW PROCESS FROM NODE    400.00 TO NODE    504.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      9.97  DOWNSTREAM(FEET) =      9.35
FLOW LENGTH(FEET) =   350.00   MANNING'S N =  .013
DEPTH OF FLOW IN  66.0 INCH PIPE IS  49.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.57
GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    125.93
PIPE TRAVEL TIME(MIN.) =    .89    Tc(MIN.) =  12.48

+--------------------------------------------------------------------------+
|SUBAREA "C-8"                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    504.00 TO NODE    504.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  12.48
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.665
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C       5.00       .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =   16.38
EFFECTIVE AREA(ACRES) =    41.66   AREA-AVERAGED Fm(INCH/HR) =   .03
```

```
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =    50.35        PEAK FLOW RATE(CFS) =     136.46

****************************************************************************
 FLOW PROCESS FROM NODE    504.00 TO NODE    550.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     9.35  DOWNSTREAM(FEET) =     9.05
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  .013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  53.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.60
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    136.46
 PIPE TRAVEL TIME(MIN.) =    .43    Tc(MIN.) =  12.91

----------------------------------------------------------------------------+
 SUBAREA "C-9"                                                              |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    550.00 TO NODE    550.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.91
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.602
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 COMMERCIAL                  C       6.80        .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
 SUBAREA AREA(ACRES) =    6.80       SUBAREA RUNOFF(CFS) =    21.89
 EFFECTIVE AREA(ACRES) =    48.46   AREA-AVERAGED Fm(INCH/HR) =    .03
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =    57.15        PEAK FLOW RATE(CFS) =     155.98

****************************************************************************
 FLOW PROCESS FROM NODE    550.00 TO NODE    600.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     9.05  DOWNSTREAM(FEET) =     8.12
 FLOW LENGTH(FEET) =   520.00   MANNING'S N =  .013
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  53.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.98
 GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
```

```
PIPE-FLOW(CFS) =    155.98
PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =  14.15

+--------------------------------------------------------------------------+
| SUBAREA "C-10"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  14.15
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.423
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C       8.50       .25        .10     69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    8.50      SUBAREA RUNOFF(CFS) =   25.99
EFFECTIVE AREA(ACRES) =    56.96   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    65.65       PEAK FLOW RATE(CFS) =     174.17

****************************************************************************
FLOW PROCESS FROM NODE    600.00 TO NODE    650.00 IS CODE =  4.1
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     8.12  DOWNSTREAM(FEET) =     7.55
FLOW LENGTH(FEET) =   320.00   MANNING'S N =  .013
DEPTH OF FLOW IN  72.0 INCH PIPE IS  59.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    174.17
PIPE TRAVEL TIME(MIN.) =    .76    Tc(MIN.) =  14.91

+--------------------------------------------------------------------------+
| SUBAREA "C-11"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =  8.1
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
MAINLINE Tc(MIN) =  14.91
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.313
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  C        8.00       .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =    8.00      SUBAREA RUNOFF(CFS) =   23.68
EFFECTIVE AREA(ACRES) =    64.96   AREA-AVERAGED Fm(INCH/HR) =   .02
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    73.65       PEAK FLOW RATE(CFS) =     192.25

****************************************************************************
 FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  14.91
 RAINFALL INTENSITY(INCH/HR) =   3.31
 AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   64.96
 TOTAL STREAM AREA(ACRES) =   73.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    192.25

+--------------------------------------------------------------------------+
| SUBAREA "C-12"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    651.00 TO NODE    652.00 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   420.00
 ELEVATION DATA: UPSTREAM(FEET) =     18.90  DOWNSTREAM(FEET) =     17.40

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.510
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.058
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN   (MIN.)
 COMMERCIAL                  C        6.70       .25        .10    69   10.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
  SUBAREA RUNOFF(CFS) =      24.32
  TOTAL AREA(ACRES) =       6.70   PEAK FLOW RATE(CFS) =      24.32

****************************************************************************
  FLOW PROCESS FROM NODE    652.00 TO NODE    653.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    15.17  DOWNSTREAM(FEET) =    11.35
  FLOW LENGTH(FEET) =   800.00   MANNING'S N =  .015
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.11
  GIVEN PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.32
  PIPE TRAVEL TIME(MIN.) =   1.32    Tc(MIN.) =  11.83

+--------------------------------------------------------------------------+
| SUBAREA "C-13"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    653.00 TO NODE    653.00 IS CODE =  8.1
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.794
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C      10.20        .25        .10    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
  SUBAREA AREA(ACRES) =   10.20      SUBAREA RUNOFF(CFS) =   34.60
  EFFECTIVE AREA(ACRES) =    16.90   AREA-AVERAGED Fm(INCH/HR) =   .03
  AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
  TOTAL AREA(ACRES) =    16.90       PEAK FLOW RATE(CFS) =      57.33

+--------------------------------------------------------------------------+
| SUBAREA "C-14"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    653.00 TO NODE    650.00 IS CODE =  4.1
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    11.35  DOWNSTREAM(FEET) =     8.97
FLOW LENGTH(FEET) =   530.00   MANNING'S N =  .015
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.11
GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     57.33
PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =  12.92

******************************************************************************
FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =  8.1
------------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
MAINLINE Tc(MIN) =  12.92
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.600
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 C       7.40       .25        .10    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA AREA(ACRES) =     7.40      SUBAREA RUNOFF(CFS) =   23.81
EFFECTIVE AREA(ACRES) =    24.30   AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
TOTAL AREA(ACRES) =    24.30       PEAK FLOW RATE(CFS) =      78.18

******************************************************************************
FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =   1
------------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  12.92
RAINFALL INTENSITY(INCH/HR) =   3.60
AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =   24.30
TOTAL STREAM AREA(ACRES) =   24.30
PEAK FLOW RATE(CFS) AT CONFLUENCE =     78.18

** CONFLUENCE DATA **
 STREAM     Q      Tc   Intensity   Fp(Fm)      Ap    Ae      HEADWATER
 NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1    179.94  20.79    2.740   .25(  .03)  .10    73.7     306.00
    1    192.25  14.91    3.313   .25(  .02)  .10    65.0     303.00
    2     78.18  12.92    3.600   .25(  .03)  .10    24.3     651.00
```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	264.16	14.91	3.313	.25(.02)	.10	89.3	303.00
2	239.31	20.79	2.740	.25(.03)	.10	97.9	306.00
3	259.29	12.92	3.600	.25(.03)	.10	80.6	651.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 264.16 Tc(MIN.) = 14.91
EFFECTIVE AREA(ACRES) = 89.26 AREA-AVERAGED Fm(INCH/HR) = .02
AREA-AVERAGED Fp(INCH/HR) = .25 AREA-AVERAGED Ap = .10
TOTAL AREA(ACRES) = 97.95

****
FLOW PROCESS FROM NODE 650.00 TO NODE 705.00 IS CODE = 4.1

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 8.12 DOWNSTREAM(FEET) = 7.12
FLOW LENGTH(FEET) = 450.00 MANNING'S N = .013
DEPTH OF FLOW IN 96.0 INCH PIPE IS 55.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.81
GIVEN PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 264.16
PIPE TRAVEL TIME(MIN.) = .85 Tc(MIN.) = 15.76

SUBAREA "C-15"

****
FLOW PROCESS FROM NODE 705.00 TO NODE 705.00 IS CODE = 8.1

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
MAINLINE Tc(MIN) = 15.76
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.215
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	5.00	.25	.10	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = .10
SUBAREA AREA(ACRES) = 5.00 SUBAREA RUNOFF(CFS) = 14.36
EFFECTIVE AREA(ACRES) = 94.26 AREA-AVERAGED Fm(INCH/HR) = .02
AREA-AVERAGED Fp(INCH/HR) = .25 AREA-AVERAGED Ap = .10

```
 TOTAL AREA(ACRES) =   102.95       PEAK FLOW RATE(CFS) =     270.63

**************************************************************************
 FLOW PROCESS FROM NODE    705.00 TO NODE    700.00 IS CODE =. 4.1
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     7.12  DOWNSTREAM(FEET) =     6.82
 FLOW LENGTH(FEET) =   130.00   MANNING'S N = .013
 DEPTH OF FLOW IN  96.0 INCH PIPE IS  55.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.99
 GIVEN PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    270.63
 PIPE TRAVEL TIME(MIN.) =    .24    Tc(MIN.) =  16.00

+------------------------------------------------------------------------+
| SUBAREA "C-16"                                                         |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

**************************************************************************
 FLOW PROCESS FROM NODE    700.00 TO NODE    700.00 IS CODE =  8.1
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN) =  16.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        4.60       .25         .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    4.60       SUBAREA RUNOFF(CFS) =   13.10
 EFFECTIVE AREA(ACRES) =    98.86   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =   107.55       PEAK FLOW RATE(CFS) =     281.43

**************************************************************************
 FLOW PROCESS FROM NODE    700.00 TO NODE    750.00 IS CODE =  4.1
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     6.82  DOWNSTREAM(FEET) =     5.64
 FLOW LENGTH(FEET) =   660.00   MANNING'S N = .013
 DEPTH OF FLOW IN  96.0 INCH PIPE IS  62.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.20
 GIVEN PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    281.43
```

```
 PIPE TRAVEL TIME(MIN.) =   1.34    Tc(MIN.) =  17.34

****************************************************************************
 FLOW PROCESS FROM NODE    750.00 TO NODE    750.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  17.34
 RAINFALL INTENSITY(INCH/HR) =   3.04
 AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   98.86
 TOTAL STREAM AREA(ACRES) =  107.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    281.43

----------------------------------------------------------------------------+
| SUBAREA "C-17"                                                            |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    751.00 TO NODE    752.00 IS CODE =  2.1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   970.00
 ELEVATION DATA: UPSTREAM(FEET) =     20.00  DOWNSTREAM(FEET) =     15.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.135
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.425
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        7.80       .25        .10     69   14.13
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     23.87
 TOTAL AREA(ACRES) =       7.80   PEAK FLOW RATE(CFS) =      23.87

****************************************************************************
 FLOW PROCESS FROM NODE    752.00 TO NODE    750.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     8.96  DOWNSTREAM(FEET) =     5.64
```

```
 FLOW LENGTH(FEET) =   600.00   MANNING'S N =  .013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.82
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     23.87
 PIPE TRAVEL TIME(MIN.) =   1.47    Tc(MIN.) =  15.60

+--------------------------------------------------------------------------+
| SUBAREA "C-18"                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    750.00 TO NODE    750.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.60
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.233
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C       11.50        .25        .10    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =   11.50      SUBAREA RUNOFF(CFS) =   33.20
 EFFECTIVE AREA(ACRES) =    19.30   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    19.30       PEAK FLOW RATE(CFS) =      55.72

****************************************************************************
 FLOW PROCESS FROM NODE    750.00 TO NODE    750.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  15.60
 RAINFALL INTENSITY(INCH/HR) =   3.23
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   19.30
 TOTAL STREAM AREA(ACRES) =   19.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     55.72

 ** CONFLUENCE DATA **
  STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)         (ACRES)     NODE
     1    281.43  17.34    3.038   .25( .02)  .10    98.9      303.00
```

```
    1    254.55  23.28    2.563   .25(  .03)  .10   107.5      306.00
    1    277.36  15.36    3.260   .25(  .03)  .10    90.2      651.00
    2     55.72  15.60    3.233   .25(  .03)  .10    19.3      751.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1    332.67  15.36    3.260   .25(  .03)  .10   109.2      651.00
     2    333.77  17.34    3.038   .25(  .03)  .10   118.2      303.00
     3    298.63  23.28    2.563   .25(  .03)  .10   126.8      306.00
     4    333.57  15.60    3.233   .25(  .03)  .10   110.6      751.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    333.77    Tc(MIN.) =    17.34
 EFFECTIVE AREA(ACRES) =   118.16   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    126.85

****************************************************************************
 FLOW PROCESS FROM NODE    750.00 TO NODE    800.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     5.64  DOWNSTREAM(FEET) =     5.00
 FLOW LENGTH(FEET) =   360.00   MANNING'S N =  .013
 DEPTH OF FLOW IN  96.0 INCH PIPE IS  70.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.43
 GIVEN PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    333.77
 PIPE TRAVEL TIME(MIN.) =    .71    Tc(MIN.) =  18.05

****************************************************************************
 FLOW PROCESS FROM NODE    800.00 TO NODE    800.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  18.05
 RAINFALL INTENSITY(INCH/HR) =   2.97
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =  118.16
 TOTAL STREAM AREA(ACRES) =  126.85
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    333.77

+--------------------------------------------------------------------------+
```

```
SUBAREA "C-19"                                                          |
                                                                        |
                                                                        |
------------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    801.00 TO NODE    800.00 IS CODE =  2.1
----------------------------------------------------------------------------

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   750.00
ELEVATION DATA: UPSTREAM(FEET) =     16.60  DOWNSTREAM(FEET) =     15.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.315
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.265
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                 C        6.80       .25        .10    69   15.32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
SUBAREA RUNOFF(CFS) =     19.83
TOTAL AREA(ACRES) =      6.80   PEAK FLOW RATE(CFS) =     19.83

****************************************************************************
FLOW PROCESS FROM NODE    800.00 TO NODE    800.00 IS CODE =   1
----------------------------------------------------------------------------

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  15.32
RAINFALL INTENSITY(INCH/HR) =   3.26
AREA-AVERAGED Fm(INCH/HR) =   .03
AREA-AVERAGED Fp(INCH/HR) =   .25
AREA-AVERAGED Ap =   .10
EFFECTIVE STREAM AREA(ACRES) =    6.80
TOTAL STREAM AREA(ACRES) =    6.80
PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.83

+-----------------------------------------------------------------------+
|SUBAREA "C-20"                                                         |
|                                                                       |
|                                                                       |
+-----------------------------------------------------------------------+

****************************************************************************
FLOW PROCESS FROM NODE    803.00 TO NODE    802.00 IS CODE =  2.1
----------------------------------------------------------------------------

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
  ELEVATION DATA: UPSTREAM(FEET) =     16.90  DOWNSTREAM(FEET) =     15.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.396
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.531
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C       6.60        .25         .10     69   13.40
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
  SUBAREA RUNOFF(CFS) =     20.83
  TOTAL AREA(ACRES) =       6.60   PEAK FLOW RATE(CFS) =      20.83

******************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    800.00 IS CODE =  4.1
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.50  DOWNSTREAM(FEET) =      7.60
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  .015
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.78
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.83
  PIPE TRAVEL TIME(MIN.) =    .37    Tc(MIN.) =  13.76

******************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    800.00 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.76
  RAINFALL INTENSITY(INCH/HR) =   3.48
  AREA-AVERAGED Fm(INCH/HR) =   .03
  AREA-AVERAGED Fp(INCH/HR) =   .25
  AREA-AVERAGED Ap =   .10
  EFFECTIVE STREAM AREA(ACRES) =    6.60
  TOTAL STREAM AREA(ACRES) =    6.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.83

  ** CONFLUENCE DATA **
   STREAM      Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
   NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)        (ACRES)     NODE
      1    332.67  16.07     3.180    .25( .03)  .10   109.2      651.00
```

1	333.77	18.05	2.971	.25(.03)	.10	118.2	303.00
1	298.63	24.01	2.520	.25(.03)	.10	126.8	306.00
1	333.57	16.31	3.153	.25(.03)	.10	110.6	751.00
2	19.83	15.32	3.265	.25(.03)	.10	6.8	801.00
3	20.83	13.76	3.478	.25(.03)	.10	6.6	803.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	364.90	15.32	3.265	.25(.03)	.10	117.5	801.00
2	371.01	16.07	3.180	.25(.03)	.10	122.6	651.00
3	371.58	16.31	3.153	.25(.03)	.10	124.0	751.00
4	369.57	18.05	2.971	.25(.02)	.10	131.6	303.00
5	328.95	24.01	2.520	.25(.03)	.10	140.3	306.00
6	351.64	13.76	3.478	.25(.03)	.10	106.2	803.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 371.58 Tc(MIN.) = 16.31
EFFECTIVE AREA(ACRES) = 123.95 AREA-AVERAGED Fm(INCH/HR) = .03
AREA-AVERAGED Fp(INCH/HR) = .25 AREA-AVERAGED Ap = .10
TOTAL AREA(ACRES) = 140.25

==

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 140.25 TC(MIN.) = 16.31
EFFECTIVE AREA(ACRES) = 123.95 AREA-AVERAGED Fm(INCH/HR)= .03
AREA-AVERAGED Fp(INCH/HR) = .25 AREA-AVERAGED Ap = .10
PEAK FLOW RATE(CFS) = 371.58

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	351.64	13.76	3.478	.25(.03)	.10	106.2	803.00
2	364.90	15.32	3.265	.25(.03)	.10	117.5	801.00
3	371.01	16.07	3.180	.25(.03)	.10	122.6	651.00
4	371.58	16.31	3.153	.25(.03)	.10	124.0	751.00
5	369.57	18.05	2.971	.25(.02)	.10	131.6	303.00
6	328.95	24.01	2.520	.25(.03)	.10	140.3	306.00

==
==

END OF RATIONAL METHOD ANALYSIS

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                            Analysis prepared by:

                     ADAMS*STREETER CIVIL ENGINEERS INC.
                              15 CORPORATE PARK
                               IRVINE, CA 92714
                                (714) 474-2330

 ************************** DESCRIPTION OF STUDY **************************
 * HYDROLOGY STUDY FOR AREA "D"                                            *
 * ULTIMATE CONDITIONS                                                     *
 * 100-YEAR FLOWS                                                          *
 ***************************************************************************

  FILE NAME: J:\961097\HYDRO\97DUT.MA
  TIME/DATE OF STUDY: 11:56   2/ 6/1997
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC II) ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0     .018/ .018/ .020     .67    2.00 .03125 .1670 .01500

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =    .00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)

+--------------------------------------------------------------------------+
| SUBAREA "D-1"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    901.00 IS CODE =  2.1
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   450.00
  ELEVATION DATA: UPSTREAM(FEET) =     20.20  DOWNSTREAM(FEET) =     19.50
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.758
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.623
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        5.10       .25         .10     69   12.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =      16.51
 TOTAL AREA(ACRES) =        5.10   PEAK FLOW RATE(CFS) =      16.51

****************************************************************************
 FLOW PROCESS FROM NODE    901.00 TO NODE    900.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    14.20  DOWNSTREAM(FEET) =    12.07
 FLOW LENGTH(FEET) =   530.00   MANNING'S N =  .013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  5.42
 GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.51
 PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =  14.39

+--------------------------------------------------------------------------+
| SUBAREA "D-2"                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    900.00 TO NODE    900.00 IS CODE =  8.1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  14.39
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.388
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        7.10       .25         .10     69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =     7.10       SUBAREA RUNOFF(CFS) =   21.49
 EFFECTIVE AREA(ACRES) =     12.20   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    12.20       PEAK FLOW RATE(CFS) =      36.93

****************************************************************************
 FLOW PROCESS FROM NODE    900.00 TO NODE    900.00 IS CODE =  4.1
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    15.68  DOWNSTREAM(FEET) =    12.07
 FLOW LENGTH(FEET) =   110.00   MANNING'S N =  .015
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  13.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.00
```

```
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      36.93
 PIPE TRAVEL TIME(MIN.) =    .14    Tc(MIN.) =  14.53
==========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =      12.20  TC(MIN.) =      14.53
 EFFECTIVE AREA(ACRES) =       12.20  AREA-AVERAGED Fm(INCH/HR)=    .03
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 PEAK FLOW RATE(CFS)    =      36.93
==========================================================================
==========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

HYDRAULIC CALCULATIONS

The following section includes hydraulic calculations and for existing and proposed storm drains within the subject area. Water surface profile gradient (WSPG) computer program is used to calculate the hydraulic grade line for calculated flows. Control water surface elevation for hydraulic calculations at Bolsa Chica Channel is per O.C.E.M.A. letters dated June 8, 1995 and December 14, 1993 and copies are enclosed in this section for reference.

Two major storm drain systems convey the storm runoff from the study area to Bolsa Chica Channel C-2. The first system comprises of two parallel storm drain lines located at north side of Bolsa avenue and in the parking area north of Bolsa avenue. The portion of this system that is located in the McDonnell Douglas parking area and Able Lane, varies in size form 72" to 48" and was constructed in the fall of 1995. A split flow structure and connector pipe connects this system to the older portion of the system that is located in Bolsa avenue. In order to compute the maximum capacity of the system (combination of both storm drains) a trial and error method was used. For the purpose of hydraulic calculations the storm drain system is divided into four parts.

1. Storm drain in Bolsa
2. Connection between storm drains in Bolsa and parking area
3. Storm drain in north of Bolsa (in parking area)
4. Storm drain from Bolsa to Skylab in Able Lane

Using the calculated flows from hydrology calculations for 100-year storm at each lateral and an initial flow at split flow structure, hydraulic calculations for the first three parts of the storm drain as listed above is performed and the hydraulic grade line at the catch basins and split flow structure is examined. This procedure is repeated until a maximum hydraulic grade line at equal to the finished surface elevation at the split flow structure is achieved. This is the estimated maximum flow that the storm drain system will be able to convey up to the split flow structure. Then calculations are continued upstream for storm drain from Bolsa to Skylab in Able Lane using the calculated hydraulic grade line at split flow structure. The same trial and error procedure is used to estimate the maximum capacity of the storm drain system. The 100-year flows in excess of the storm drain capacity is then assumed to enter the street at and additional is performed to calculate the flow depth at several sections along Able Lane and Bolsa avenue.

Calculations are carried out for both existing and ultimate conditions and exhibits for each condition is provided at the beginning of each calculation. Each exhibit summarizes the results of calculations for existing and ultimate conditions and shows the maximum pipe capacity in each reach and the overflow for 100-year storm to street. Street flow depth calculations are enclosed at the end of hydraulic computations. Locations of the sections where street flow depth is calculated is shown as "AE", "BE" etc. on the exhibits at the beginning of hydraulic computations.

Hydrology and hydraulic calculations for storm drain lines in Bolsa and Able Lane and the methodology discussed above were used and approved as presented in "Hydrology study and hydraulic analysis for proposed storm drain system north of Bolsa Ave. and in Able lane and Skylab Drive" dated August 1, 1995. These calculations have been repeated and expanded on in this study for the purpose of EIR report.

Hydraulic calculations for future storm drain in Skylab West from Able Lane to Bolsa Chica are based on the storm drain profile for existing line in Skylab. Hydraulic calculations for existing and calculations are included in this report. Calculations for existing conditions indicate that existing storm drain not have the capacity to convey the calculated 100-year flows. For ultimate conditions and for planning purposes it is assumed that larger pipe sizes will be used and proposed future pipe sizes are calculated to carry the calculated 100-year flows. It should be mentioned that these pipe sizes are not final more detailed study and design is required. No attempt has been made in this study to verify exiting design constrains such as crossing and conflicts with existing utilities or pipe covers etc.

the following references have been used in the enclosed calculations:

- Hydrology study and hydraulic analysis for proposed storm drain system north of Bolsa Ave. and in Able Lane and Skylab Drive, August 1, 1995 (Adams-Streeter).
- Preliminary hydrology study for proposed development at north-west corner of Bolsa Ave. and Springdale St., July 19, 1995 (Adams-Streeter).
- Storm drain improvement plans for Bolsa Ave. and Able Lane DW # 95-032 (Adams-Streeter)
- Offsite storm drain (Bolsa) Proj. 161-2-1 (Daniel, Mann, Johnson & Mendenhall)
- Onsite storm drainage plan line "D" (Skylab) (Daniel, Mann, Johnson & Mendenhall)
- Water surface elevation letters form O.C.E.M.A. , June 8, 1995 and December 14, 1993.

COUNTY OF ORANGE

ENVIRONMENTAL MANAGEMENT AGENCY
BUILDING AND DEVELOPMENT SERVICES

MICHAEL M. RUANE
DIRECTOR, EMA

RONALD J. NOVELLO
DIRECTOR OF BUILDING AND
DEVELOPMENT SERVICES

300 N. FLOWER ST
P.O. BOX 4048
SANTA ANA, CA 92702-4048

INFO (714) 834-2626
SEC (714) 834-2609
FAX (714) 834-4588

JUN 08 1995

File: Water Surface Report No. 14/95

Mr. Mohammad Abadi
Adams Streeter Civil Engineers, Inc.
15 Corporate Park
Irvine, CA 92714

Subject: Water Surface (Elevation) Report
Bolsa Chica Channel (OCFCD Facility C02)

Dear Mr. Abadi:

This is in response to your request (letter dated April 17, 1995) for a water surface elevation for the subject Orange County Flood Control District (OCFCD) facility, in the City of Huntington Beach.

This reach of Bolsa Chica Channel was designed and constructed in 1985 and does not meet this Agency's current requirements. No current studies and reports are available at this time which provide hydraulics or associated ultimate conveyance sections. Consequently, it is suggested that you use the water surface elevation below, which we believe will not likely be exceeded at such time all proposed, ultimate flood facilitates are constructed.

Bolsa Chica Channel
OCFCD Facility ~~E09~~ C02

Station	Design Water Surface
142+95	13.8'

Note: OCFCD Record Drawin· No. C02-101-4A, sheet 4 of 8 is used.

Please realize that the existing channel system may not provide flood protection in accordance with the goals of the National Flood Insurance Program. Accordingly, until ultimate improvements are constructed, developments utilizing laterals to this facility will need to be elevated in such a manner that flood water storage, percolation, ponding and street flows will account for the excess runoff to protect structures and their contents from storm with a recurrence interval of 100 years.

Any questions regarding the above information should be directed to Amir K. Ilkhanipour at 834-4369. Please note that a public property permit from EMA will be required prior to any construction affecting OCFCD facilities or right-of-way. Questions concerning the permit process should be directed to George Rakas at 834-5707.

Very Truly Yours,

Patrick Stanton

Patrick J. Stanton, Manager
Subdivision and Grading Division

AKI:krs/jmh
(5159)5060808181439

CC: A. Vasquez, Manager, Public Property Permits Division
H. I. Nakasone, Manager, Flood Program Division
City Engineer, City of Huntington beach

[illegible]
DIRECTOR EMA

ROBERT F. WINGARD
DIRECTOR OF REGULATION

LOCATION
300 N. FLOWER ST.
SECOND FLOOR
SANTA ANA, CALIFORNIA

MAILING ADDRESS
P.O. BOX 4048
SANTA ANA, CA 92702-4048

TELEPHONE
(714) 834-2509
FAX # 834-4588

COUNTY OF ORANGE

ENVIRONMENTAL MANAGEMENT AGENCY
REGULATION

DEC 14 1993

Water Surface 5/93

Adams. Streeter Civil Engineers Inc.
15 Corporate Park
Irvine, California 92714
Attention: Jesse Green

SUBJECT: Water Surface Elevations for Bolsa Chica Channel (Facility C02)

Dear Mr. Green:

This letter is in response to your request on December 1, 1993 for two water surface elevations for subject Orange County Flood Control District (OCFCD) facility, in the City of Huntington Beach.

This reach of Bolsa Chica Channel was designed and constructed in 1985 and does not meet this agency's current requirements. No current studies or reports are available at this time which provide hydraulics or associated ultimate conveyance sections. Consequently, it is suggested that you use the water surface elevations below which we believe will not likely be exceeded at such time all proposed, ultimate flood facilities are constructed.

Bolsa Chica Channel
OCFCD Facility C02

Station	Design Water Surface	
142+08	13.5'	@ BOLSA CHICA
156+50	14.4'	@ SKYLAB

Note: The above stations reference Record Drawing number C02 101 4A sheets four and five of eight.

Please realize that the existing channel system may not provide flood protection in accordance with the goals of the National Flood Insurance Program. Accordingly, until ultimate channel improvements are constructed, developments utilizing laterals to this facility will need to be elevated in such a manner that flood water storage, percolation, ponding and street flows will account for the excess runoff to protect structures and their contents from storms with a recurrence interval of 100 years.

Any questions regarding the above information should be directed to Nadeem Majaj at 834-4369. Please note that a public property permit from EMA will be required prior to any construction affecting flood control district facilities or right-of-way. Questions concerning the permit process should be directed to David Moore at 834-5707.

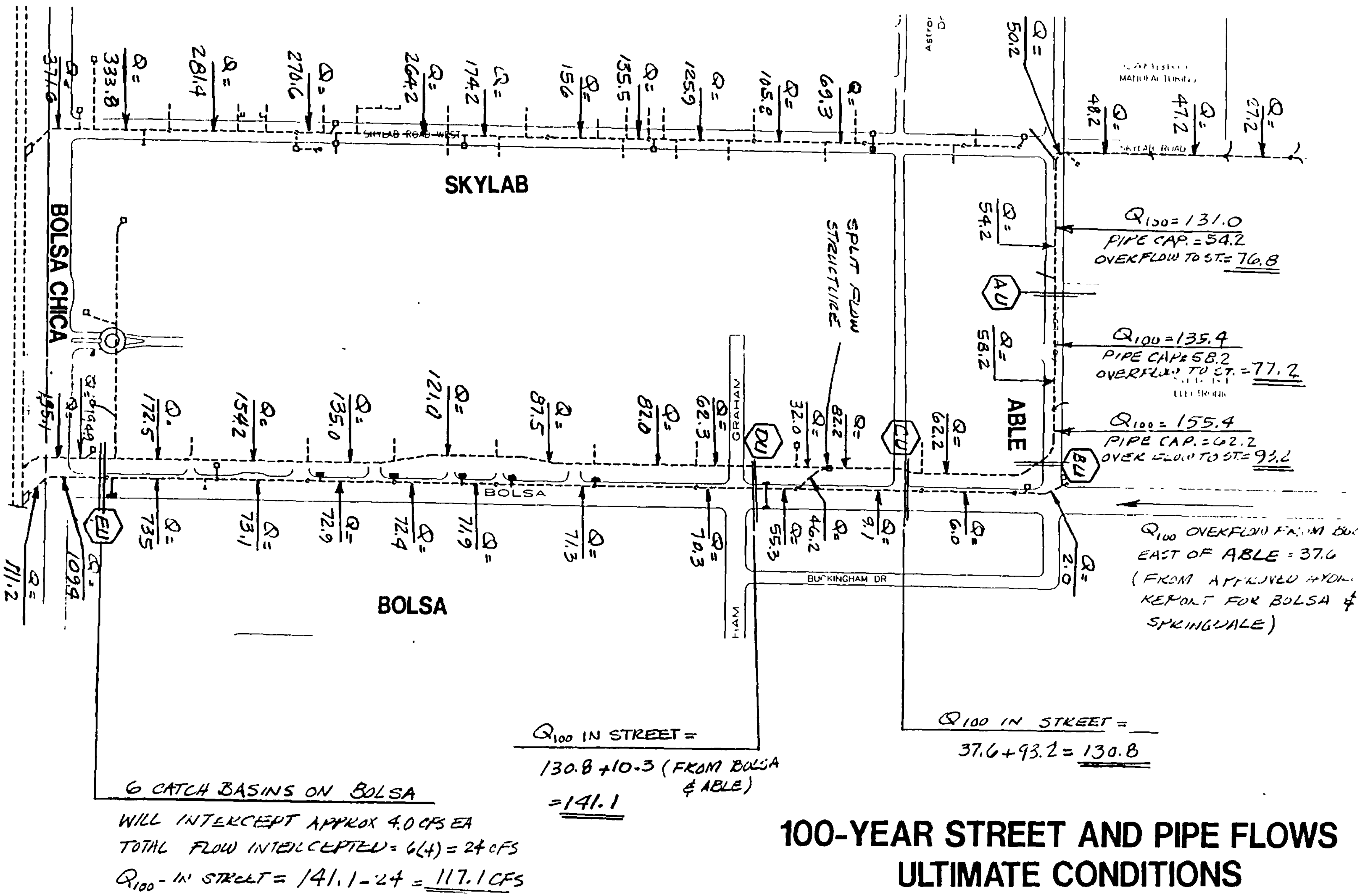
Very truly yours,

Patrick Stanton

Patrick J. Stanton, Manager
Development Services Division

cc: Al Vasquez, Manager, Public Property Permits
H. I. Nakasone, Manager, Flood Program Division
City Engineer, City of Huntington Beach

NHM:3121413414708



100-YEAR STREET AND PIPE FLOWS
ULTIMATE CONDITIONS

```
T1 EXIST. STORM DRAIN IN BOLSA
T2 100-YEAR FLOWS
T3 FILE NO. 48BLEO.WSP
SO    805.76   4.18  1               13.50
R     884.78   4.22  1     .015
JX    885.78   4.23  1  2  .015   1.8        5.3         45.00
R     955.98   4.26  1     .015                          45.33   .00 0
R    1034.00   4.29  1     .015
JX   1036.00   4.30  1  3  .015  35.9        5.90        90.00
R    1084.00   4.32  1     .015
JX   1090.00   4.82  4  2  .015  0.001       6.44        90.00
R    1585.00   5.07  4     .015
JX   1589.00   5.08  4  2  .015  0.4         6.5         90.00
R    1920.00   5.24  4     .015
JX   1921.00   5.25  4  2  .015  0.2         6.5         90.00
R    2085.00   5.32  4     .015
JX   2089.00   5.82  5  2  .015   .001       7.44        90.00
R    2273.00   5.91  5     .015
JX   2275.00   5.92  5  2  .015   .5         7.67        90.00
R    2565.00   6.48  5     .015
JX   2567.00   6.49  5  2  .015   .5         7.8         90.00
R    2761.00   7.62  5     .015
JX   2763.00   7.63  5  2  .015  0.6         7.8         90.00
R    3071.00   8.24  5     .015
JX   3073.00   8.25  6  2  .015  1.0         9.90        90.00
R    3716.00   9.33  6     .015                                    2
JX   3718.00   9.34  6  7 2.015  12.1   2.9  10.70 10.70 90.00 90.00
R    3884.00   9.62  6     .015                          22.50
JX   3886.00  10.12  8  8  .015  46.2        10.13       45.00
R    4359.00  10.59  8     .015                            .00   .00 0
JX   4361.00  10.60  8  2  .015   3.1        11.72       90.00
R    4384.00  10.61  8     .015                            .00   .00 0
JX   4390.00  11.11  7     .015
R    4798.00  12.53  7     .015                            .00   .00 0
JX   4800.00  12.54  2  7  .015   4.0        12.65       45.00
R    4833.35  12.67  2     .015                            .00   .00 0
R    4846.64  12.76  2     .015                          16.90   .00 0
R    4899.59  13.05  2     .015                            .00   .00 0
R    4915.83  13.37  2     .015                          41.35
R    4944.96  13.96  2     .015
SH   4944.96  13.96  2               0.0
CD   1  4             5.75
CD   2  4             1.50
CD   3  4             2.50
CD   4  4             5.25
CD   5  4             4.75
CD   6  4             4.00
CD   7  4             2.00
CD   8  4             3.50
Q              2.0   .0
```

WATER SURFACE PROFILE LISTING

EXIST. STORM DRAIN IN BOLSA
100-YEAR FLOWS
FILE NO. 48BLE0.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
805.76	4.18	9.320	13.500	111.2	4.28	.285	13.785	.00	2.882		5.75	.00	.00	0	.0
79.02	.00051					.001152	.09			5.750			.00		
884.78	4.22	9.371	13.591	111.2	4.28	.285	13.876	.00	2.882		5.75	.00	.00	0	.0
JUNCT STR	.01000					.001134	.00						.00		
885.78	4.23	9.379	13.609	109.4	4.21	.276	13.885	.00	2.858		5.75	.00	.00	0	.0
70.20	.00043					.001115	.08			5.750			.00		
955.98	4.26	9.466	13.726	109.4	4.21	.276	14.002	.00	2.858		5.75	.00	.00	0	.0
78.02	.00038					.001115	.09			5.750			.00		
1034.00	4.29	9.523	13.813	109.4	4.21	.276	14.089	.00	2.858		5.75	.00	.00	0	.0
JUNCT STR	.00500					.000809	.00						.00		
1036.00	4.30	9.817	14.117	73.5	2.83	.124	14.241	.00	2.322		5.75	.00	.00	0	.0
48.00	.00042					.000503	.02			5.750			.00		
1084.00	4.32	9.821	14.141	73.5	2.83	.124	14.265	.00	2.322		5.75	.00	.00	0	.0
JUNCT STR	.08333					.000660	.00						.00		
1090.00	4.82	9.271	14.091	73.5	3.40	.179	14.270	.00	2.387		5.25	.00	.00	0	.0
495.00	.00051					.000817	.40			5.250			.00		
1585.00	5.07	9.426	14.496	73.5	3.40	.179	14.675	.00	2.387		5.25	.00	.00	0	.0
JUNCT STR	.00250					.000813	.00						.00		
1589.00	5.08	9.423	14.503	73.1	3.38	.177	14.680	.00	2.380		5.25	.00	.00	0	.0
331.00	.00048					.000809	.27			5.250			.00		
1920.00	5.24	9.531	14.771	73.1	3.38	.177	14.948	.00	2.380		5.25	.00	.00	0	.0
JUNCT STR	.01000					.000806	.00						.00		

WATER SURFACE PROFILE LISTING

EXIST. STORM DRAIN IN BOLSA
100-YEAR FLOWS
FILE NO. 48BLEO.WSP

STATION / L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
1921.00	5.25	9.523	14.773	72.9	3.37	.176	14.949	.00	2.377		5.25	.00	.00	0	.0
164.00	.00043					.000804	.13			5.250			.00		
2085.00	5.32	9.585	14.905	72.9	3.37	.176	15.081	.00	2.377		5.25	.00	.00	0	.0
UNCT STR	.12500					.001088	.00						.00		
2089.00	5.82	9.004	14.824	72.9	4.11	.263	15.087	.00	2.451		4.75	.00	.00	0	.0
184.00	.00049					.001371	.25			4.750			.00		
2273.00	5.91	9.166	15.076	72.9	4.11	.263	15.339	.00	2.451		4.75	.00	.00	0	.0
.UNCT STR	.00500					.001362	.00						.00		
2275.00	5.92	9.166	15.086	72.4	4.09	.259	15.345	.00	2.442		4.75	.00	.00	0	.0
290.00	.00193					.001353	.39			3.324			.00		
2565.00	6.48	8.998	15.478	72.4	4.09	.259	15.737	.00	2.442		4.75	.00	.00	0	.0
JUNCT STR	.00500					.001344	.00						.00		
2567.00	6.49	8.998	15.488	71.9	4.06	.256	15.744	.00	2.433		4.75	.00	.00	0	.0
194.00	.00582					.001334	.26			2.315			.00		
2761.00	7.62	8.127	15.747	71.9	4.06	.256	16.003	.00	2.433		4.75	.00	.00	0	.0
JUNCT STR	.00500					.001323	.00						.00		
2763.00	7.63	8.128	15.758	71.3	4.02	.251	16.009	.00	2.423		4.75	.00	.00	0	.0
308.00	.00198					.001312	.40			3.254			.00		
3071.00	8.24	7.922	16.162	71.3	4.02	.251	16.413	.00	2.423		4.75	.00	.00	0	.0
JUNCT STR	.00500					.002251	.00						.00		
3073.00	8.25	7.698	15.948	70.3	5.59	.486	16.434	.00	2.535		4.00	.00	.00	0	.0
643.00	.00168					.003189	2.05			4.000			.00		

EXIST. STORM DRAIN IN BOLSA
100-YEAR FLOWS
FILE NO. 48BLEO.WSP

STATION / L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
3716.00	9.33	8.717	18.047	70.3	5.59	.486	18.533	.00	2.535		4.00	.00	.00	0	.0
NCT STR	.00500					.002581	.01						.00		
3718.00	9.34	9.083	18.423	55.3	4.40	.301	18.724	.00	2.237		4.00	.00	.00	0	.0
166.00	.00169					.001973	.33			4.000			.00		
3884.00	9.62	9.161	18.781	55.3	4.40	.301	19.082	.00	2.237		4.00	.00	.00	0	.0
UNCT STR	.25000					.001041	.00						.00		
3886.00	10.12	8.950	19.070	9.1	.95	.014	19.084	.00	.912		3.50	.00	.00	0	.0
473.00	.00099		HGL @ CONNECTION TO SPLIT FLOW STRUCTURE			.000109	.05			1.386			.00		
4359.00	10.59	8.531	19.121	9.1	.95	.014	19.135	.00	.912		3.50	.00	.00	0	.0
JUNCT STR	.00500					.000078	.00						.00		
4361.00	10.60	8.537	19.137	6.0	.62	.006	19.143	.00	.736		3.50	.00	.00	0	.0
23.00	.00043					.000047	.00			1.383			.00		
4384.00	10.61	8.528	19.138	6.0	.62	.006	19.144	.00	.736		3.50	.00	.00	0	.0
NCT STR	.08333					.000492	.00						.00		
4390.00	11.11	7.993	19.103	6.0	1.91	.057	19.160	.00	.866		2.00	.00	.00	0	.0
408.00	.00348					.000937	.38			1.020			.00		
4798.00	12.53	6.955	19.485	6.0	1.91	.057	19.542	.00	.866		2.00	.00	.00	0	.0
NCT STR	.00500					.000710	.00						.00		
4800.00	12.54	7.018	19.558	2.0	1.13	.020	19.578	.00	.533		1.50	.00	.00	0	.0
33.35	.00390					.000483	.02			.610			.00		
4833.35	12.67	6.904	19.574	2.0	1.13	.020	19.594	.00	.533		1.50	.00	.00	0	.0
13.29	.00677					.000483	.01			.530			.00		

WATER SURFACE PROFILE LISTING

EXIST. STORM DRAIN IN BOLSA
100-YEAR FLOWS
FILE NO. 48BLE0.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
4846.64	12.76	6.822	19.582	2.0	1.13	.020	19.602	.00	.533		1.50	.00	.00	0	.0
52.95	.00548					.000483	.03			.560			.00		
4899.59	13.05	6.557	19.607	2.0	1.13	.020	19.627	.00	.533		1.50	.00	.00	0	.0
16.24	.01970					.000483	.01			.400			.00		
4915.83	13.37	6.248	19.618	2.0	1.13	.020	19.638	.00	.533		1.50	.00	.00	0	.0
29.13	.02025					.000483	.01			.400			.00		
4944.96	13.96	5.672	19.632	2.0	1.13	.020	19.652	.00	.533		1.50	.00	.00	0	.0

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T1 EXISTING CONNCTION BTWN STORM DRAINS IN BOLSA AND PARKING AREA
T2 100-YEAR FLOWS
T3 FILE NO. 48BPE0.wsp
SO  1037.90   9.63  1                            19.07
R   1109.89   9.86  1      .015
R   1180.58  10.00  1      .015                              45.00   .00 0
SH  1180.58  10.00  1                            0.0
CD  1  4              4.00
Q            46.2   .0
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FROM HYDRAULIC CALCULATIONS AT STA 38+86.00 "STORM DRAIN IN BOLSA"

WATER SURFACE PROFILE LISTING

EXISTING CONNCTION BTWN STORM DRAINS IN BOLSA AND PARKING AREA

100-YEAR FLOWS

FILE NO. 488PE0.wsp

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
1037.90	9.63	9.440	19.070	46.2	3.68	.210	19.280	.00	2.036		4.00	.00	.00	0	.0
71.99	.00320					.001377	.10			2.364			.00		
1109.89	9.86	9.309	19.169	46.2	3.68	.210	19.379	.00	2.036		4.00	.00	.00	0	.0
70.69	.00198					.001377	.10			2.791			.00		
1180.58	10.00	9.296	19.296	46.2	3.68	.210	19.506	.00	2.036		4.00	.00	.00	0	.0

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@ SPLIT FLOW STRUCTURE

[redacted]1 EXISTING STORM DRAIN IN NORTH OF BOLSA (IN PARKING AREA)

T2 100-YEAR FLOWS

[redacted]3 FILE NO. 48BLPO.WSP

[redacted]	1112.01	2.21	1				13.80	
R	1141.53	2.30	1		.015			36.22
[redacted]	1239.63	2.60	1		.015			
[redacted]X	1242.63	2.66	1	2	.015	.2	3.5	90.00
R	1307.11	3.11	1		.015			
[redacted]X	1307.12	3.12	1	4	.015	.001	5.88	90.00
[redacted]	1409.10	3.83	1		.015			
JX	1415.10	3.84	1	2	.015	22.4	6.31	45.00
[redacted]	1698.04	4.34	1		.015			
[redacted]X	1705.54	4.36	1	2	.015	18.3	5.85	45.00
R	2193.55	5.22	1		.015			
[redacted]X	2198.55	5.42	1	3	.015	19.2	6.36	90.00
[redacted]	2462.78	6.21	1		.015			
R	2478.87	6.25	1		.015			9.70
[redacted]	2536.60	6.44	1		.015			
[redacted]X	2542.10	6.54	1	4	.015	14.0	7.75	80.00
R	2669.88	6.67	1		.015			
[redacted]	2685.16	6.68	1		.015			9.70
[redacted]	2947.25	6.95	1		.015			
JX	2952.75	6.96	1	6	.015	33.5	9.0	45.00
[redacted]	3031.86	7.03	1		.015			
[redacted]	3047.35	7.05	1		.015			9.86
R	3166.11	7.16	1		.015			
[redacted]	3181.60	7.18	1		.015			9.86
[redacted]	3341.10	7.34	1		.015			
JX	3346.60	7.35	7	8	.015	5.5	8.84	90.00
[redacted]	3739.91	7.74	7		.015			
[redacted]X	3745.41	7.75	7	4	.015	19.7	9.64	90.00
R	4136.42,	8.14	7		.015			
[redacted]	4142.42	8.25	9	10	.015	26.3	10.29	45.00
[redacted]	4261.61	10.00	9		.015			
SH	4261.61	10.00	9				.00	
[redacted]	1	4		6.00				
CD	2	4		3.00				
CD	3	4		1.75				
[redacted]	4	4		1.50				
CD	5	4		5.50				
CD	6	4		2.00				
[redacted]	7	4		5.00				
CD	8	4		1.25				
CD	9	4		4.00				
[redacted]	10	4		2.50				
Q		36.0	.0					

WATER SURFACE PROFILE LISTING
EXISTING STORM DRAIN IN NORTH OF BOLSA (IN PARKING AREA)
100-YEAR FLOWS
FILE NO. 48BLPO.WSP

STATION / L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
1112.01	2.21	11.590	13.800	195.1	6.90	.739	14.539	.00	3.816		6.00	.00	.00	0	.0
29.52	.00305					.002825	.08			4.728			.00		
1141.53	2.30	11.677	13.977	195.1	6.90	.739	14.716	.00	3.816		6.00	.00	.00	0	.0
98.10	.00306					.002825	.28			4.721			.00		
1239.63	2.60	11.654	14.254	195.1	6.90	.739	14.993	.00	3.816		6.00	.00	.00	0	.0
JUNCT STR	.02000					.002823	.01						.00		
1242.63	2.66	11.606	14.266	194.9	6.89	.738	15.004	.00	3.814		6.00	.00	.00	0	.0
64.48	.00698					.002820	.18			3.474			.00		
1307.11	3.11	11.338	14.448	194.9	6.89	.738	15.186	.00	3.814		6.00	.00	.00	0	.0
JUNCT STR	.99902					.002820	.00						.00		
1307.12	3.12	11.328	14.448	194.9	6.89	.738	15.186	.00	3.814		6.00	.00	.00	0	.0
101.98	.00696					.002820	.29			3.476			.00		
1409.10	3.83	10.905	14.735	194.9	6.89	.738	15.473	.00	3.814		6.00	.00	.00	0	.0
JUNCT STR	.00167					.002515	.02						.00		
1415.10	3.84	11.175	15.015	172.5	6.10	.578	15.593	.00	3.580		6.00	.00	.00	0	.0
282.94	.00177					.002209	.63			6.000			.00		
1698.04	4.34	11.300	15.640	172.5	6.10	.578	16.218	.00	3.580		6.00	.00	.00	0	.0
JUNCT STR	.00267					.001987	.01						.00		
1705.54	4.36	11.490	15.850	154.2	5.45	.462	16.312	.00	3.376		6.00	.00	.00	0	.0
488.01	.00176					.001765	.86			4.922			.00		
2193.55	5.22	11.492	16.712	154.2	5.45	.462	17.174	.00	3.376		6.00	.00	.00	0	.0
JUNCT STR	.04000					.001559	.01						.00		

WATER SURFACE PROFILE LISTING

EXISTING STORM DRAIN IN NORTH OF BOLSA (IN PARKING AREA)

100-YEAR FLOWS

FILE NO. 48BLPO.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
2198.55	5.42	11.515	16.935	135.0	4.77	.354	17.289	.00	3.149		6.00	.00	.00	0	.0
264.23	.00299					.001353	.36			3.603			.00		
2462.78	6.21	11.083	17.293	135.0	4.77	.354	17.647	.00	3.149		6.00	.00	.00	0	.0
16.09	.00249					.001353	.02			3.833			.00		
2478.87	6.25	11.088	17.338	135.0	4.77	.354	17.692	.00	3.149		6.00	.00	.00	0	.0
57.73	.00329					.001353	.08			3.493			.00		
2536.60	6.44	10.976	17.416	135.0	4.77	.354	17.770	.00	3.149		6.00	.00	.00	0	.0
JUNCT STR	.01818					.001220	.01						.00		
2542.10	6.54	11.000	17.540	121.0	4.28	.284	17.824	.00	2.973		6.00	.00	.00	0	.0
127.78	.00102					.001087	.14			5.120			.00		
2669.88	6.67	11.009	17.679	121.0	4.28	.284	17.963	.00	2.973		6.00	.00	.00	0	.0
15.28	.00065					.001087	.02			6.000			.00		
2685.16	6.68	11.035	17.715	121.0	4.28	.284	17.999	.00	2.973		6.00	.00	.00	0	.0
262.09	.00103					.001087	.28			5.078			.00		
2947.25	6.95	11.049	17.999	121.0	4.28	.284	18.283	.00	2.973		6.00	.00	.00	0	.0
JUNCT STR	.00182					.000828	.00						.00		
2952.75	6.96	11.180	18.140	87.5	3.09	.149	18.289	.00	2.510		6.00	.00	.00	0	.0
79.11	.00088					.000568	.04			4.065			.00		
3031.86	7.03	11.155	18.185	87.5	3.09	.149	18.334	.00	2.510		6.00	.00	.00	0	.0
15.49	.00129					.000568	.01			3.571			.00		
3047.35	7.05	11.153	18.203	87.5	3.09	.149	18.352	.00	2.510		6.00	.00	.00	0	.0
118.76	.00093					.000568	.07			3.998			.00		

WATER SURFACE PROFILE LISTING

EXISTING STORM DRAIN IN NORTH OF BOLSA (IN PARKING AREA)

100-YEAR FLOWS

FILE NO. 48BLPO.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
3166.11	7.16	11.111	18.271	87.5	3.09	.149	18.420	.00	2.510		6.00	.00	.00	0	.0
15.49	.00129					.000568	.01			3.571			.00		
3181.60	7.18	11.109	18.289	87.5	3.09	.149	18.438	.00	2.510		6.00	.00	.00	0	.0
159.50	.00100					.000568	.09			3.887			.00		
3341.10	7.34	11.040	18.380	87.5	3.09	.149	18.529	.00	2.510		6.00	.00	.00	0	.0
JUNCT STR	.00182					.000944	.01						.00		
3346.60	7.35	10.942	18.292	82.0	4.18	.271	18.563	.00	2.566		5.00	.00	.00	0	.0
393.31	.00099					.001320	.52			5.000			.00		
3739.91	7.74	11.071	18.811	82.0	4.18	.271	19.082	.00	2.566		5.00	.00	.00	0	.0
JUNCT STR	.00182					.001041	.01						.00		
3745.41	7.75	11.296	19.046	62.3	3.17	.156	19.202	.00	2.222		5.00	.00	.00	0	.0
391.01	.00100					.000762	.30			3.620			.00		
4136.42	8.14	11.204	19.344	62.3	3.17	.156	19.500	.00	2.222		5.00	.00	.00	0	.0
JUNCT STR	.01833					.000799	.00						.00		
4142.42	8.25	11.089	19.339	36.0	2.86	.127	19.466	.00	1.787		4.00	.00	.00	0	.0
119.19	.01468					.000836	.10			1.330			.00		
4261.61	10.00	9.439	19.439	36.0	2.86	.127	19.566	.00	1.787		4.00	.00	.00	0	.0

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AT SPLIT FLOW STRUCTURE

ULTIMATE

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  EXISTING STORM DRAIN FROM BOLSA TO SKYLAB IN ABLE LANE
 2 100-YEAR FLOWS
 3 FILE NO. 48ABLO.WSP
    1190.58  10.02  1                          19.44
    1454.27  10.36  1     .015                                 .00    .00 0
 ?  1496.07  10.40  1     .015                               26.61    .00 0
    1536.97  10.44  1     .015                               26.04    .00 0
    1555.08  10.46  1     .015                                 .00    .00 0
 X  1561.08  10.47  1  2  .015   20.0          10.80         45.00
    1920.32  10.82  1     .015                                 .00    .00 0
    1978.36  10.88  1     .015                               37.50    .00 1
    2066.19  10.97  1     .015
    2149.15  11.05  1     .015                               53.36
    2273.81  11.17  1     .015
    2281.31  11.18  1  3  .015    4.0          13.43         45.00
    2800.00  11.70  1     .015
    2805.00  11.71  1  4  .015    4.0          13.5          45.00
    3270.55  13.57  1     .015
    3284.66  13.63  1     .015                               18.00
 X  3287.00  13.64  1  4  .015    4.0          13.66         45.00
    3339.62  13.85  1     .015                               72.00
    3345.12  13.86  5  4 4.015    1.0     1.0  13.40  13.40 45.00 90.00
    3615.00  14.13  5     .015
    3619.00  14.14  5  3  .015    1.0          14.20         45.00
    3945.00  14.47  5     .015
JX  3950.00  14.48  2  3 3.015   10.0    10.0  14.30  14.30 45.00 45.00
    4115.00  14.65  2     .015
    4115.00  14.65  2
CD   1  4   0    .00   5.25    .00  .00  .00  .00
CD   2  4   0    .00   3.00    .00  .00  .00  .00
     3  4   0    .00   2.00    .00  .00  .00  .00
     4  4              2.50
CD   5  4              4.00
             27.2    .0
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WATER SURFACE PROFILE LISTING

EXISTING STORM DRAIN FROM BOLSA TO SKYLAB IN ABLE LANE

100-YEAR FLOWS

FILE NO. 48ABLO.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
1190.58	10.02	9.420	19.440	82.2	3.80	.224	19.664	.00	2.531		5.25	.00	.00	0	.0
263.69	.00129					.001022	.27			3.859			.00		
1454.27	10.36	9.350	19.710	82.2	3.80	.224	19.934	.00	2.531		5.25	.00	.00	0	.0
41.80	.00096					.001022	.04			4.481			.00		
1496.07	10.40	9.377	19.777	82.2	3.80	.224	20.001	.00	2.531		5.25	.00	.00	0	.0
40.90	.00098					.001022	.04			4.417			.00		
1536.97	10.44	9.403	19.843	82.2	3.80	.224	20.067	.00	2.531		5.25	.00	.00	0	.0
18.11	.00110					.001022	.02			4.134			.00		
1555.08	10.46	9.401	19.861	82.2	3.80	.224	20.085	.00	2.531		5.25	.00	.00	0	.0
JUNCT STR	.00167					.000803	.00						.00		
1561.08	10.47	9.530	20.000	62.2	2.87	.128	20.128	.00	2.188		5.25	.00	.00	0	.0
359.24	.00097					.000585	.21			3.472			.00		
1920.32	10.82	9.390	20.210	62.2	2.87	.128	20.338	.00	2.188		5.25	.00	.00	0	.0
58.04	.00103					.000585	.03			3.400			.00		
1978.36	10.88	9.387	20.267	62.2	2.87	.128	20.395	.00	2.188		5.25	.00	.00	0	.0
87.83	.00103					.000585	.05			3.411			.00		
2066.19	10.97	9.349	20.319	62.2	2.87	.128	20.447	.00	2.188		5.25	.00	.00	0	.0
82.96	.00096					.000585	.05			3.485			.00		
2149.15	11.05	9.337	20.387	62.2	2.87	.128	20.515	.00	2.188		5.25	.00	.00	0	.0
124.66	.00096					.000585	.07			3.487			.00		
2273.81	11.17	9.290	20.460	62.2	2.87	.128	20.588	.00	2.188		5.25	.00	.00	0	.0
JUNCT STR	.00133					.000549	.00						.00		

WATER SURFACE PROFILE LISTING
EXISTING STORM DRAIN FROM BOLSA TO SKYLAB IN ABLE LANE
100-YEAR FLOWS
FILE NO. 48ABLO.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
2281.31	11.18	9.311	20.491	58.2	2.69	.112	20.603	.00	2.113		5.25	.00	.00	0	.0
518.69	.00100					.000513	.27			3.283			.00		
2800.00	11.70	9.057	20.757	58.2	2.69	.112	20.869	.00	2.113		5.25	.00	.00	0	.0
JUNCT STR	.00200					.000479	.00						.00		
2805.00	11.71	9.075	20.785	54.2	2.50	.097	20.882	.00	2.037		5.25	.00	.00	0	.0
465.55	.00399					.000444	.21			2.088			.00		
3270.55	13.57	7.422	20.992	54.2	2.50	.097	21.089	.00	2.037		5.25	.00	.00	0	.0
14.11	.00425					.000444	.01			2.053			.00		
3284.66	13.63	7.377	21.007	54.2	2.50	.097	21.104	.00	2.037		5.25	.00	.00	0	.0
JUNCT STR	.00427					.000412	.00						.00		
3287.00	13.64	7.393	21.033	50.2	2.32	.083	21.117	.00	1.957		5.25	.00	.00	0	.0
52.62	.00399					.000381	.02			2.004			.00		
3339.62	13.85	7.218	21.068	50.2	2.32	.083	21.152	.00	1.957		5.25	.00	.00	0	.0
JUNCT STR	.00182					.000940	.01						.00		
3345.12	13.86	7.088	20.948	48.2	3.84	.228	21.176	.00	2.081		4.00	.00	.00	0	.0
269.88	.00100					.001499	.40			4.000			.00		
3615.00	14.13	7.223	21.353	48.2	3.84	.228	21.581	.00	2.081		4.00	.00	.00	0	.0
JUNCT STR	.00250					.001469	.01						.00		
3619.00	14.14	7.237	21.377	47.2	3.76	.219	21.596	.00	2.059		4.00	.00	.00	0	.0
326.00	.00101					.001438	.47			4.000			.00		
3945.00	14.47	7.376	21.846	47.2	3.76	.219	22.065	.00	2.059		4.00	.00	.00	0	.0
JUNCT STR	.00200					.001826	.01						.00		

WATER SURFACE PROFILE LISTING
EXISTING STORM DRAIN FROM BOLSA TO SKYLAB IN ABLE LANE
100-YEAR FLOWS
FILE NO. 48ABLO.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
3950.00	14.48	7.462	21.942	27.2	3.85	.230	22.172	.00	1.686		3.00	.00	.00	0	.0
165.00	.00103					.002214	.37			3.000			.00		
4115.00	14.65	7.657	22.307	27.2	3.85	.230	22.537	.00	1.686		3.00	.00	.00	0	.0

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   FUTURE STORM DRAIN IN SKYLAB
T2 100-YEAR FLOWS
T3 FILE NO. 48SKFU.WSP
      826.01   4.81  1                              14.40
R    1087.00   4.94  1       .015                                     .00   .00 0
JX   1090.00   4.95  1  2  2.015    18.4    19.4    7.01    7.6  90.00 90.00
     1387.00   5.09  1       .015                                     .00   .00 0
JX   1390.00   5.84  1  6    .015   52.4            7.11         90.00
     1900.00   6.10  1       .015
     1903.00   6.10  1  4    .015   10.8            8.00         90.00
R    1987.00   6.34  1       .015                                     .00   .00 0
     1990.00   6.34  1 11    .015    6.4            8.00         90.00
     2487.00   7.74  1       .015                                     .00   .00 0
JX   2490.00   8.47 12  6  4.015    66.7    23.3    8.97    8.50 90.00 90.00
     2807.00   8.63 12       .015                                     .00   .00 0
     2810.00   8.64 10  2    .015   18.2           10.40         90.00
R    3187.08   8.82 10       .015                                     .00   .00 0
     3190.00   8.83 10  2    .015   19.5           10.60         90.00
     3350.00   8.88 10       .015                                     .00   .00 0
JX   3358.00   8.89  8  3    .015   10.6           10.8          90.00
     3687.00   9.27  8       .015                                     .00   .00 0
     3690.00  10.02  9  6    .015   20.1           10.6          90.00
R    3987.00  10.17  9       .015
     3990.00  10.92  7  4    .015   36.5           11.36         90.00
     4590.00  11.22  7       .015
SH   4590.00  11.22  7
      1  4   0     .00    8.00      .00  .00  .00  .00
      2  4   0     .00    1.50      .00  .00  .00  .00
CD    3  4   0     .00    1.75      .00  .00  .00  .00
      4  4   0     .00    2.00      .00  .00  .00  .00
      5  4   0     .00    2.50      .00  .00  .00  .00
CD    6  4   0     .00    3.00      .00  .00  .00  .00
      7  4   0     .00    4.00      .00  .00  .00  .00
      8  4   0     .00    5.50      .00  .00  .00  .00
CD    9  4   0     .00    5.00      .00  .00  .00  .00
     10  4   0     .00    6.00      .00  .00  .00  .00
CD   11  4   0     .00    1.25      .00  .00  .00  .00
CD   12  4   0     .00    7.00      .00  .00  .00  .00
               69.3   .0
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WATER SURFACE PROFILE LISTING

FUTURE STORM DRAIN IN SKYLAB

100-YEAR FLOWS

FILE NO. 48SKFU.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
826.01	4.81	9.590	14.400	371.6	7.39	.849	15.249	.00	4.894		8.00	.00	.00	0	.0
260.99	.00050					.002210	.58			8.000			.00		
1087.00	4.94	10.037	14.977	371.6	7.39	.849	15.826	.00	4.894		8.00	.00	.00	0	.0
JUNCT STR	.00333					.001996	.01						.00		
1090.00	4.95	10.361	15.311	333.8	6.64	.685	15.996	.00	4.628		8.00	.00	.00	0	.0
297.00	.00047					.001783	.53			8.000			.00		
1387.00	5.09	10.750	15.840	333.8	6.64	.685	16.525	.00	4.628		8.00	.00	.00	0	.0
JUNCT STR	.25000					.001525	.00						.00		
1390.00	5.84	10.401	16.241	281.4	5.60	.487	16.728	.00	4.232		8.00	.00	.00	0	.0
510.00	.00051					.001267	.65			8.000			.00		
1900.00	6.10	10.787	16.887	281.4	5.60	.487	17.374	.00	4.232		8.00	.00	.00	0	.0
JUNCT STR	.00000					.001219	.00						.00		
1903.00	6.10	10.864	16.964	270.6	5.38	.450	17.414	.00	4.146		8.00	.00	.00	0	.0
84.00	.00286					.001172	.10			4.654			.00		
1987.00	6.34	10.723	17.063	270.6	5.38	.450	17.513	.00	4.146		8.00	.00	.00	0	.0
JUNCT STR	.00000					.001144	.00						.00		
1990.00	6.34	10.768	17.108	264.2	5.26	.429	17.537	.00	4.095		8.00	.00	.00	0	.0
497.00	.00282					.001117	.56			4.604			.00		
2487.00	7.74	9.923	17.663	264.2	5.26	.429	18.092	.00	4.095		8.00	.00	.00	0	.0
JUNCT STR	.24333					.001053	.00						.00		
2490.00	8.47	9.617	18.087	174.2	4.53	.318	18.405	.00	3.431		7.00	.00	.00	0	.0

WATER SURFACE PROFILE LISTING

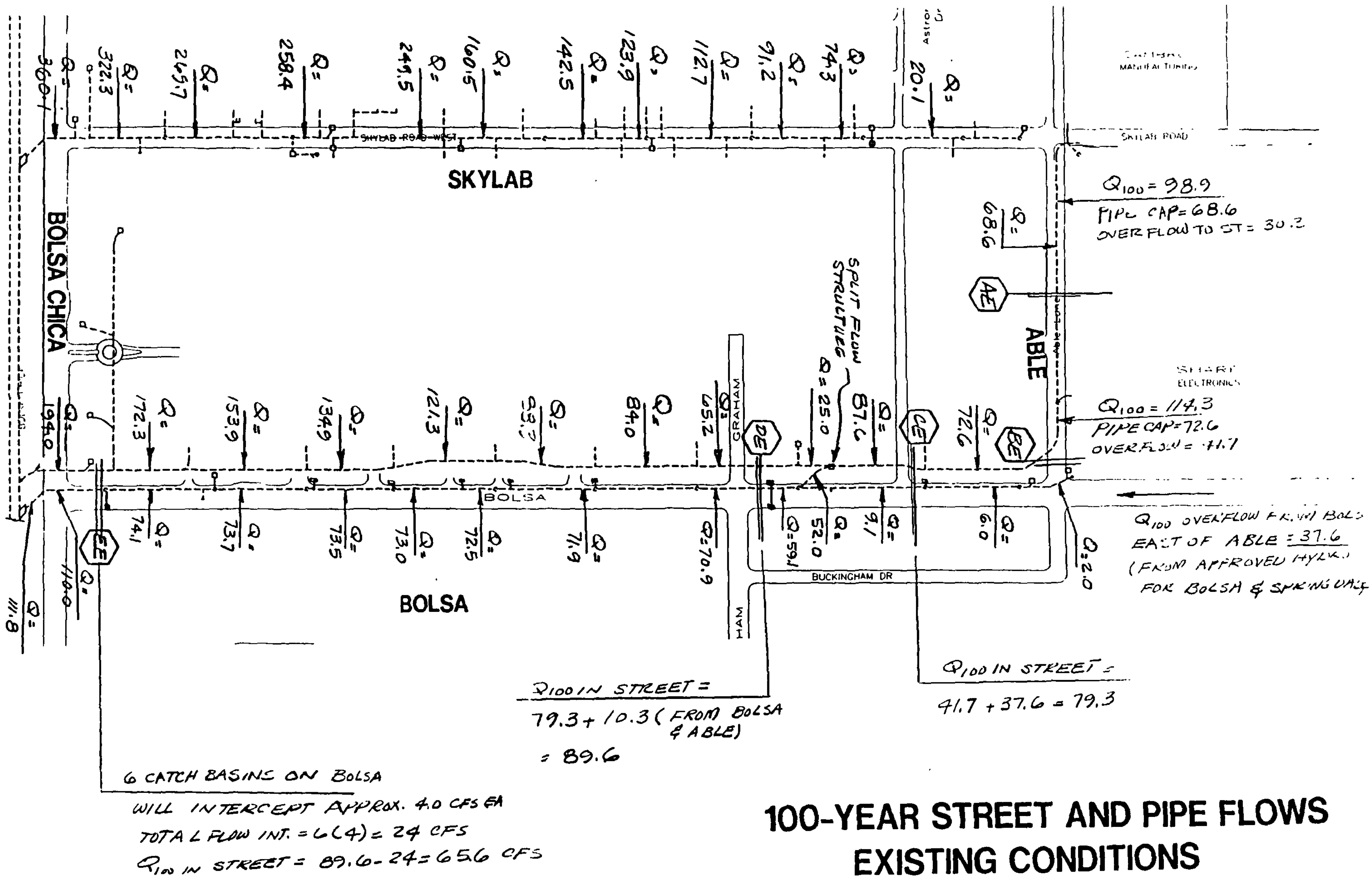
FUTURE STORM DRAIN IN SKYLAB

100-YEAR FLOWS

FILE NO. 48SKFU.WSP

STATION / L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
2807.00	8.63	9.770	18.400	174.2	4.53	.318	18.718	.00	3.431		7.00	.00	.00	0	.0
[illegible]CT STR	.00333					.001398	.00						.00		
2810.00	8.64	9.697	18.337	156.0	5.52	.473	18.810	.00	3.396		6.00	.00	.00	0	.0
377.08	.00048					.001806	.68			6.000			.00		
[illegible]187.08	8.82	10.199	19.019	156.0	5.52	.473	19.492	.00	3.396		6.00	.00	.00	0	.0
[illegible]CT STR	.00343					.001595	.00						.00		
3190.00	8.83	10.415	19.245	136.5	4.83	.362	19.607	.00	3.167		6.00	.00	.00	0	.0
[illegible]160.00	.00031					.001383	.22			6.000			.00		
[illegible]350.00	8.88	10.586	19.466	136.5	4.83	.362	19.828	.00	3.167		6.00	.00	.00	0	.0
JUNCT STR	.00125					.001627	.01						.00		
[illegible]358.00	8.89	10.579	19.469	125.9	5.30	.436	19.905	.00	3.119		5.50	.00	.00	0	.0
[illegible]329.00	.00115					.001871	.62			5.500			.00		
3687.00	9.27	10.815	20.085	125.9	5.30	.436	20.521	.00	3.119		5.50	.00	.00	0	.0
J[illegible]CT STR	.25000					.002034	.01						.00		
[illegible]690.00	10.02	10.210	20.230	105.8	5.39	.451	20.681	.00	2.932		5.00	.00	.00	0	.0
297.00	.00051					.002197	.65			5.000			.00		
3987.00	10.17	10.713	20.883	105.8	5.39	.451	21.334	.00	2.932		5.00	.00	.00	0	.0
J[illegible]CT STR	.25000					.002648	.01						.00		
3990.00	10.92	10.333	21.253	69.3	5.51	.472	21.725	.00	2.516		4.00	.00	.00	0	.0
600.00	.00050					.003099	1.86			4.000			.00		
[illegible]590.00	11.22	11.892	23.112	69.3	5.51	.472	23.584	.00	2.516		4.00	.00	.00	0	.0

1



100-YEAR STREET AND PIPE FLOWS EXISTING CONDITIONS

ULTIMATE
AND EXIST.

[redacted] EXIST. STORM DRAIN IN BOLSA
[redacted] 100-YEAR FLOWS
T3 FILE NO. 488LEO.WSP

[redacted]	805.76	4.18	1					13.50				
[redacted]	884.78	4.22	1		.015							
JX	885.78	4.23	1	2	.015	1.8		5.3		45.00		
R	955.98	4.26	1		.015					45.33	.00	0
[redacted]	1034.00	4.29	1		.015							
JX	1036.00	4.30	1	3	.015	35.9		5.90		90.00		
R	1084.00	4.32	1		.015							
[redacted]	1090.00	4.82	4	2	.015	0.001		6.44		90.00		
[redacted]	1585.00	5.07	4		.015							
JX	1589.00	5.08	4	2	.015	0.4		6.5		90.00		
[redacted]	1920.00	5.24	4		.015							
[redacted]	1921.00	5.25	4	2	.015	0.2		6.5		90.00		
R	2085.00	5.32	4		.015							
[redacted]	2089.00	5.82	5	2	.015	.001		7.44		90.00		
[redacted]	2273.00	5.91	5		.015							
[redacted]	2275.00	5.92	5	2	.015	.5		7.67		90.00		
	2565.00	6.48	5		.015							
[redacted]	2567.00	6.49	5	2	.015	.5		7.8		90.00		
[redacted]	2761.00	7.62	5		.015							
JX	2763.00	7.63	5	2	.015	0.6		7.8		90.00		
[redacted]	3071.00	8.24	5		.015							
[redacted]	3073.00	8.25	6	2	.015	1.0		9.90		90.00		
R	3716.00	9.33	6		.015							2
JX	3718.00	9.34	6	7	2.015	9.5	2.3	10.70	10.70	90.00	90.00	
[redacted]	3884.00	9.62	6		.015					22.50		
[redacted]	3886.00	10.12	8	8	.015	50.0		10.13		45.00		
R	4359.00	10.59	8		.015					.00	.00	0
[redacted]	4361.00	10.60	8	2	.015	3.1		11.72		90.00		
[redacted]	4384.00	10.61	8		.015					.00	.00	0
JX	4390.00	11.11	7		.015							
[redacted]	4798.00	12.53	7		.015					.00	.00	0
[redacted]	4800.00	12.54	2	7	.015	4.0		12.65		45.00		
R	4833.35	12.67	2		.015					.00	.00	0
R	4846.64	12.76	2		.015					16.90	.00	0
[redacted]	4899.59	13.05	2		.015					.00	.00	0
[redacted]	4915.83	13.37	2		.015					41.35		
R	4944.96	13.96	2		.015							
[redacted]	4944.96	13.96	2					0.0				

[redacted]	1	4		5.75
CD	2	4		1.50
[redacted]	3	4		2.50
[redacted]	4	4		5.25
CD	5	4		4.75
CD	6	4		4.00
[redacted]	7	4		2.00
[redacted]	8	4		3.50
Q			2.0	.0

WATER SURFACE PROFILE LISTING

EXIST. STORM DRAIN IN BOLSA
100-YEAR FLOWS
FILE NO. 48BLE0.WSP

STATION / L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
805.76	4.18	9.320	13.500	111.8	4.31	.288	13.788	.00	2.891		5.75	.00	.00	0	.0
79.02	.00051					.001164	.09			5.750			.00		
884.78	4.22	9.372	13.592	111.8	4.31	.288	13.880	.00	2.891		5.75	.00	.00	0	.0
JUNCT STR	.01000					.001145	.00						.00		
885.78	4.23	9.380	13.610	110.0	4.24	.279	13.889	.00	2.866		5.75	.00	.00	0	.0
70.20	.00043					.001127	.08			5.750			.00		
955.98	4.26	9.469	13.729	110.0	4.24	.279	14.008	.00	2.866		5.75	.00	.00	0	.0
78.02	.00038					.001127	.09			5.750			.00		
1034.00	4.29	9.527	13.817	110.0	4.24	.279	14.096	.00	2.866		5.75	.00	.00	0	.0
JUNCT STR	.00500					.000819	.00						.00		
1036.00	4.30	9.823	14.123	74.1	2.85	.126	14.249	.00	2.332		5.75	.00	.00	0	.0
48.00	.00042					.000511	.02			5.750			.00		
1084.00	4.32	9.827	14.147	74.1	2.85	.126	14.273	.00	2.332		5.75	.00	.00	0	.0
JUNCT STR	.08333					.000671	.00						.00		
1090.00	4.82	9.276	14.096	74.1	3.42	.182	14.278	.00	2.397		5.25	.00	.00	0	.0
495.00	.00051					.000831	.41			5.250			.00		
1585.00	5.07	9.437	14.507	74.1	3.42	.182	14.689	.00	2.397		5.25	.00	.00	0	.0
JUNCT STR	.00250					.000827	.00						.00		
1589.00	5.08	9.435	14.515	73.7	3.40	.180	14.695	.00	2.390		5.25	.00	.00	0	.0
331.00	.00048					.000822	.27			5.250			.00		
1920.00	5.24	9.547	14.787	73.7	3.40	.180	14.967	.00	2.390		5.25	.00	.00	0	.0
JUNCT STR	.01000					.000819	.00						.00		

WATER SURFACE PROFILE LISTING

EXIST. STORM DRAIN IN BOLSA
100-YEAR FLOWS
FILE NO. 48BLE0.WSP

STATION / L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
1921.00	5.25	9.539	14.789	73.5	3.40	.179	14.968	.00	2.387		5.25	.00	.00	0	.0
164.00	.00043					.000817	.13			5.250			.00		
2085.00	5.32	9.603	14.923	73.5	3.40	.179	15.102	.00	2.387		5.25	.00	.00	0	.0
JUNCT STR	.12500					.001106	.00						.00		
2089.00	5.82	9.021	14.841	73.5	4.15	.267	15.108	.00	2.462		4.75	.00	.00	0	.0
184.00	.00049					.001394	.26			4.750			.00		
2273.00	5.91	9.187	15.097	73.5	4.15	.267	15.364	.00	2.462		4.75	.00	.00	0	.0
JUNCT STR	.00500					.001384	.00						.00		
2275.00	5.92	9.187	15.107	73.0	4.12	.264	15.371	.00	2.453		4.75	.00	.00	0	.0
290.00	.00193					.001375	.40			3.345			.00		
2565.00	6.48	9.026	15.506	73.0	4.12	.264	15.770	.00	2.453		4.75	.00	.00	0	.0
JUNCT STR	.00500					.001366	.00						.00		
2567.00	6.49	9.026	15.516	72.5	4.09	.260	15.776	.00	2.444		4.75	.00	.00	0	.0
194.00	.00582					.001356	.26			2.326			.00		
2761.00	7.62	8.159	15.779	72.5	4.09	.260	16.039	.00	2.444		4.75	.00	.00	0	.0
JUNCT STR	.00500					.001345	.00						.00		
2763.00	7.63	8.160	15.790	71.9	4.06	.256	16.046	.00	2.433		4.75	.00	.00	0	.0
308.00	.00198					.001334	.41			3.275			.00		
3071.00	8.24	7.961	16.201	71.9	4.06	.256	16.457	.00	2.433		4.75	.00	.00	0	.0
JUNCT STR	.00500					.002289	.00						.00		
3073.00	8.25	7.734	15.984	70.9	5.64	.494	16.478	.00	2.546		4.00	.00	.00	0	.0
643.00	.00168					.003244	2.09			4.000			.00		

WATER SURFACE PROFILE LISTING

EXIST. STORM DRAIN IN BOLSA

100-YEAR FLOWS

FILE NO. 48BLEO.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
3716.00	9.33	8.789	18.119	70.9	5.64	.494	18.613	.00	2.546		4.00	.00	.00	0	.0
UNCT STR	.00500					.002749	.01						.00		
3718.00	9.34	9.086	18.426	59.1	4.70	.343	18.769	.00	2.316		4.00	.00	.00	0	.0
166.00	.00169					.002254	.37			4.000			.00		
3884.00	9.62	9.214	18.834	59.1	4.70	.343	19.177	.00	2.316		4.00	.00	.00	0	.0
UNCT STR	.25000					.001181	.00						.00		
3886.00	10.12	9.046	19.166	9.1	.95	.014	19.180	.00	.912		3.50	.00	.00	0	.0
473.00	.00099		HGL AT CONNECTION TO SPLIT FLOW STRUCTURE			.000109	.05			1.386			.00		
4359.00	10.59	8.628	19.218	9.1	.95	.014	19.232	.00	.912		3.50	.00	.00	0	.0
JUNCT STR	.00500					.000078	.00						.00		
4361.00	10.60	8.634	19.234	6.0	.62	.006	19.240	.00	.736		3.50	.00	.00	0	.0
23.00	.00043					.000047	.00			1.383			.00		
4384.00	10.61	8.625	19.235	6.0	.62	.006	19.241	.00	.736		3.50	.00	.00	0	.0
'UNCT STR	.08333					.000492	.00						.00		
4390.00	11.11	8.090	19.200	6.0	1.91	.057	19.257	.00	.866		2.00	.00	.00	0	.0
408.00	.00348					.000937	.38			1.020			.00		
4798.00	12.53	7.052	19.582	6.0	1.91	.057	19.639	.00	.866		2.00	.00	.00	0	.0
JUNCT STR	.00500					.000710	.00						.00		
4800.00	12.54	7.114	19.654	2.0	1.13	.020	19.674	.00	.533		1.50	.00	.00	0	.0
33.35	.00390					.000483	.02			.610			.00		
4833.35	12.67	7.000	19.670	2.0	1.13	.020	19.690	.00	.533		1.50	.00	.00	0	.0
13.29	.00677					.000483	.01			.530			.00		

EXIST. STORM DRAIN IN BOLSA
100-YEAR FLOWS
FILE NO. 48BLEO.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
4846.64	12.76	6.919	19.679	2.0	1.13	.020	19.699	.00	.533		1.50	.00	.00	0	.0
52.95	.00548					.000483	.03			.560			.00		
4899.59	13.05	6.654	19.704	2.0	1.13	.020	19.724	.00	.533		1.50	.00	.00	0	.0
16.24	.01970					.000483	.01			.400			.00		
4915.83	13.37	6.345	19.715	2.0	1.13	.020	19.735	.00	.533		1.50	.00	.00	0	.0
29.13	.02025					.000483	.01			.400			.00		
4944.96	13.96	5.769	19.729	2.0	1.13	.020	19.749	.00	.533		1.50	.00	.00	0	.0

EXISTING
AND ULTIMATE

```
T1 EXISTING CONNCTION BTWN STORM DRAINS IN BOLSA AND PARKING AREA
T2 100-YEAR FLOWS
T3 FILE NO. 488PEO.wsp
SO   1037.90   9.63  1                        19.17
R    1109.89   9.86  1        .015
R    1180.58  10.00  1        .015                        45.00   .00 0
SH   1180.58  10.00  1                         0.0
CD   1  4              4.00
Q              50.0   .0
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FROM "STORM DRAIN IN BOLSA" CALCULATION @ STA 3886.00

WATER SURFACE PROFILE LISTING

EXISTING CONNCTION BTWN STORM DRAINS IN BOLSA AND PARKING AREA

100-YEAR FLOWS

FILE NO. 488PE0.wsp

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
037.90	9.63	9.540	19.170	50.0	3.98	.246	19.416	.00	2.122		4.00	.00	.00	0	.0
71.99	.00320					.001613	.12			2.490			.00		
109.89	9.86	9.426	19.286	50.0	3.98	.246	19.532	.00	2.122		4.00	.00	.00	0	.0
70.69	.00198					.001613	.11			2.973			.00		
180.58	10.00	9.435	19.435	50.0	3.98	.246	19.681	.00	2.122		4.00	.00	.00	0	.0

```
T1 EXISTING STORM DRAIN IN NORTH OF BOLSA (IN PARKING AREA)
T2 100-YEAR FLOWS (EXIST. CONDITIONS)
T3 FILE NO. 48BLEX.WSP
SO   1112.01   2.21  1                            13.80
R    1141.53   2.30  1      .015                                  36.22
R    1239.63   2.60  1      .015
JX   1242.63   2.66  1  2   .015    .001           3.5            90.00
R    1307.11   3.11  1      .015
JX   1307.12   3.12  1  4   .015    .001           5.88           90.00
R    1409.10   3.83  1      .015
JX   1415.10   3.84  1  2   .015    21.7           6.31           45.00
R    1698.04   4.34  1      .015
JX   1705.54   4.36  1  2   .015    18.4           5.85           45.00
R    2193.55   5.22  1      .015
JX   2198.55   5.42  1  3   .015    19.0           6.36           90.00
R    2462.78   6.21  1      .015
R    2478.87   6.25  1      .015                                   9.70
R    2536.60   6.44  1      .015
JX   2542.10   6.54  1  4   .015    13.6           7.75           80.00
R    2669.88   6.67  1      .015
R    2685.16   6.68  1      .015                                   9.70
R    2947.25   6.95  1      .015
JX   2952.75   6.96  1  6   .015    33.0           9.0            45.00
R    3031.86   7.03  1      .015
R    3047.35   7.05  1      .015                                   9.86
R    3166.11   7.16  1      .015
R    3181.60   7.18  1      .015                                   9.86
R    3341.10   7.34  1      .015
JX   3346.60   7.35  7  8   .015     4.3           8.84           90.00
R    3739.91   7.74  7      .015
JX   3745.41   7.75  7  4   .015    18.8           9.64           90.00
R    4136.42   8.14  7      .015
JX   4142.42   8.25  9 10   .015    40.2          10.29           45.00
R    4261.61  10.00  9      .015
SH   4261.61  10.00  9                             .00
CD   1  4              6.00
CD   2  4              3.00
CD   3  4              1.75
CD   4  4              1.50
CD   5  4              5.50
CD   6  4              2.00
CD   7  4              5.00
CD   8  4              1.25
CD   9  4              4.00
CD  10  4              2.50
Q             25.0   .0
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WATER SURFACE PROFILE LISTING
EXISTING STORM DRAIN IN NORTH OF BOLSA (IN PARKING AREA)
100-YEAR FLOWS (EXIST. CONDITIONS)
FILE NO. 48BLEX.WSP

STATION /ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
[illegible]112.01	2.21	11.590	13.800	194.0	6.86	.731	14.531	.00	3.805		6.00	.00	.00	0	.0
29.52	.00305					.002794	.08			4.702			.00		
[illegible]141.53	2.30	11.675	13.975	194.0	6.86	.731	14.706	.00	3.805		6.00	.00	.00	0	.0
98.10	.00306					.002794	.27			4.695			.00		
1239.63	2.60	11.649	14.249	194.0	6.86	.731	14.980	.00	3.805		6.00	.00	.00	0	.0
[illegible]CT STR	.02000					.002794	.01						.00		
1242.63	2.66	11.598	14.258	194.0	6.86	.731	14.989	.00	3.805		6.00	.00	.00	0	.0
64.48	.00698					.002794	.18			3.463			.00		
1307.11	3.11	11.328	14.438	194.0	6.86	.731	15.169	.00	3.805		6.00	.00	.00	0	.0
JUNCT STR	.99902					.002794	.00						.00		
[illegible]307.12	3.12	11.318	14.438	194.0	6.86	.731	15.169	.00	3.805		6.00	.00	.00	0	.0
101.98	.00696					.002794	.28			3.466			.00		
[illegible]409.10	3.83	10.893	14.723	194.0	6.86	.731	15.454	.00	3.805		6.00	.00	.00	0	.0
JUNCT STR	.00167					.002499	.01						.00		
[illegible]415.10	3.84	11.155	14.995	172.3	6.09	.577	15.572	.00	3.577		6.00	.00	.00	0	.0
[illegible]282.94	.00177					.002204	.62			6.000			.00		
1698.04	4.34	11.278	15.618	172.3	6.09	.577	16.195	.00	3.577		6.00	.00	.00	0	.0
JUNCT STR	.00267					.001981	.01						.00		
1705.54	4.36	11.469	15.829	153.9	5.44	.460	16.289	.00	3.372		6.00	.00	.00	0	.0
[illegible]88.01	.00176					.001758	.86			4.911			.00		
[illegible]93.55	5.22	11.467	16.687	153.9	5.44	.460	17.147	.00	3.372		6.00	.00	.00	0	.0
JUNCT STR	.04000					.001555	.01						.00		

WATER SURFACE PROFILE LISTING

EXISTING STORM DRAIN IN NORTH OF BOLSA (IN PARKING AREA)

100-YEAR FLOWS (EXIST. CONDITIONS)

FILE NO. 48BLEX.WSP

STATION / L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
2198.55	5.42	11.488	16.908	134.9	4.77	.353	17.261	.00	3.148		6.00	.00	.00	0	.0
264.23	.00299					.001351	.36			3.601			.00		
2462.78	6.21	11.055	17.265	134.9	4.77	.353	17.618	.00	3.148		6.00	.00	.00	0	.0
16.09	.00249					.001351	.02			3.831			.00		
2478.87	6.25	11.060	17.310	134.9	4.77	.353	17.663	.00	3.148		6.00	.00	.00	0	.0
57.73	.00329					.001351	.08			3.491			.00		
2536.60	6.44	10.948	17.388	134.9	4.77	.353	17.741	.00	3.148		6.00	.00	.00	0	.0
JUNCT STR	.01818					.001222	.01						.00		
2542.10	6.54	10.970	17.510	121.3	4.29	.286	17.796	.00	2.977		6.00	.00	.00	0	.0
127.78	.00102					.001092	.14			5.138			.00		
2669.88	6.67	10.980	17.650	121.3	4.29	.286	17.936	.00	2.977		6.00	.00	.00	0	.0
15.28	.00065					.001092	.02			6.000			.00		
2685.16	6.68	11.005	17.685	121.3	4.29	.286	17.971	.00	2.977		6.00	.00	.00	0	.0
262.09	.00103					.001092	.29			5.094			.00		
2947.25	6.95	11.021	17.971	121.3	4.29	.286	18.257	.00	2.977		6.00	.00	.00	0	.0
JUNCT STR	.00182					.000836	.00						.00		
2952.75	6.96	11.150	18.110	88.3	3.12	.151	18.261	.00	2.522		6.00	.00	.00	0	.0
79.11	.00088					.000579	.05			4.092			.00		
3031.86	7.03	11.126	18.156	88.3	3.12	.151	18.307	.00	2.522		6.00	.00	.00	0	.0
15.49	.00129					.000579	.01			3.592			.00		
3047.35	7.05	11.125	18.175	88.3	3.12	.151	18.326	.00	2.522		6.00	.00	.00	0	.0
118.76	.00093					.000579	.07			4.024			.00		

WATER SURFACE PROFILE LISTING

EXISTING STORM DRAIN IN NORTH OF BOLSA (IN PARKING AREA)

100-YEAR FLOWS (EXIST. CONDITIONS)

FILE NO. 48BLEX.WSP

STATION	INVERT	DEPTH	W.S.	Q	VEL	VEL	ENERGY	SUPER	CRITICAL		HGT/	BASE/	ZL	NO	AVBPR
	ELEV	OF FLOW	ELEV			HEAD	GRD.EL.	ELEV	DEPTH		DIA	ID NO.		PIER	
/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
166.11	7.16	11.084	18.244	88.3	3.12	.151	18.395	.00	2.522		6.00	.00	.00	0	.0
15.49	.00129					.000579	.01			3.592			.00		
181.60	7.18	11.083	18.263	88.3	3.12	.151	18.414	.00	2.522		6.00	.00	.00	0	.0
159.50	.00100					.000579	.09			3.911			.00		
3341.10	7.34	11.015	18.355	88.3	3.12	.151	18.506	.00	2.522		6.00	.00	.00	0	.0
CT STR	.00182					.000982	.01						.00		
3346.60	7.35	10.902	18.252	84.0	4.28	.284	18.536	.00	2.599		5.00	.00	.00	0	.0
393.31	.00099					.001385	.54			5.000			.00		
3739.91	7.74	11.057	18.797	84.0	4.28	.284	19.081	.00	2.599		5.00	.00	.00	0	.0
JUNCT STR	.00182					.001109	.01						.00		
745.41	7.75	11.279	19.029	65.2	3.32	.171	19.200	.00	2.276		5.00	.00	.00	0	.0
391.01	.00100					.000834	.33			3.760			.00		
136.42	8.14	11.215	19.355	65.2	3.32	.171	19.526	.00	2.276		5.00	.00	.00	0	.0
NCT STR	.01833					.000618	.00						.00		
142.42	8.25	11.218	19.468	25.0	1.99	.061	19.529	.00	1.478		4.00	.00	.00	0	.0
119.19	.01468					.000403	.05			1.101			.00		
4261.61	10.00	9.517	19.517	25.0	1.99	.061	19.578	.00	1.478		4.00	.00	.00	0	.0

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T1 EXISTING STORM DRAIN FROM BOLSA TO SKYLAB IN ABLE LANE
T2 100-YEAR FLOWS (EXISTING CONDITIONS)
T3 FILE NO. 48ABEX.WSP
SO   1190.58  10.02  1                              19.44
R    1454.27  10.36  1      .015                                     .00    .00 0
R    1496.07  10.40  1      .015                                   26.61    .00 0
R    1536.97  10.44  1      .015                                   26.04    .00 0
R    1555.08  10.46  1      .015                                     .00    .00 0
JX   1561.08  10.47  1  2   .015    15.0            10.80          45.00
R    1920.32  10.82  1      .015                                     .00    .00 0
R    1978.36  10.88  1      .015                                   37.50    .00 1
R    2066.19  10.97  1      .015
R    2149.15  11.05  1      .015                                   53.36
R    2273.81  11.17  1      .015
JX   2281.31  11.18  1  3   .015     4.0            13.43          45.00        1
R    3270.55  13.57  1      .015
R    3339.62  13.85  1      .015                                   90.00
JX   3345.12  13.86  5  4   .015    48.3            13.40          45.00 90.00
SH   3345.12  13.86  5
CD   1  4    0     .00    5.25     .00  .00  .00  .00
CD   2  4    0     .00    3.00     .00  .00  .00  .00
CD   3  4    0     .00    2.00     .00  .00  .00  .00
CD   4  4                 2.50
CD   5  4                 4.00
Q             20.3   .0
```

WATER SURFACE PROFILE LISTING

EXISTING STORM DRAIN FROM BOLSA TO SKYLAB IN ABLE LANE

100-YEAR FLOWS (EXISTING CONDITIONS)

FILE NO. 48ABEX.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
1190.58	10.02	9.420	19.440	87.6	4.05	.254	19.694	.00	2.616		5.25	.00	.00	0	.0
263.69	.00129					.001161	.31			4.080			.00		
1454.27	10.36	9.386	19.746	87.6	4.05	.254	20.000	.00	2.616		5.25	.00	.00	0	.0
41.80	.00096					.001161	.05			5.250			.00		
1496.07	10.40	9.422	19.822	87.6	4.05	.254	20.076	.00	2.616		5.25	.00	.00	0	.0
40.90	.00098					.001161	.05			5.250			.00		
1536.97	10.44	9.457	19.897	87.6	4.05	.254	20.151	.00	2.616		5.25	.00	.00	0	.0
18.11	.00110					.001161	.02			4.433			.00		
1555.08	10.46	9.458	19.918	87.6	4.05	.254	20.172	.00	2.616		5.25	.00	.00	0	.0
JUNCT STR	.00167					.000980	.01						.00		
1561.08	10.47	9.581	20.051	72.6	3.35	.175	20.226	.00	2.371		5.25	.00	.00	0	.0
359.24	.00097					.000798	.29			3.911			.00		
1920.32	10.82	9.518	20.338	72.6	3.35	.175	20.513	.00	2.371		5.25	.00	.00	0	.0
58.04	.00103					.000798	.05			3.816			.00		
1978.36	10.88	9.535	20.415	72.6	3.35	.175	20.590	.00	2.371		5.25	.00	.00	0	.0
87.83	.00103					.000798	.07			3.830			.00		
2066.19	10.97	9.515	20.485	72.6	3.35	.175	20.660	.00	2.371		5.25	.00	.00	0	.0
82.96	.00096					.000798	.07			3.928			.00		
2149.15	11.05	9.528	20.578	72.6	3.35	.175	20.753	.00	2.371		5.25	.00	.00	0	.0
124.66	.00096					.000798	.10			3.931			.00		
273.81	11.17	9.508	20.678	72.6	3.35	.175	20.853	.00	2.371		5.25	.00	.00	0	.0
JUNCT STR	.00133					.000755	.01						.00		

WATER SURFACE PROFILE LISTING

EXISTING STORM DRAIN FROM BOLSA TO SKYLAB IN ABLE LANE

100-YEAR FLOWS (EXISTING CONDITIONS)

FILE NO. 48ABEX.WSP

STATION L/ELEM	INVERT ELEV SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD SF AVE	ENERGY GRD.EL. HF	SUPER ELEV	CRITICAL DEPTH	 NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL ZR	NO PIER	AVBPR
2281.31	11.18	9.536	20.716	68.6	3.17	.156	20.872	.00	2.302		5.25	.00	.00	0	.0
989.24	.00242					.000712	.70			2.757			.00		
3270.55	13.57	7.850	21.420	68.6	3.17	.156	21.576	.00	2.302		5.25	.00	.00	0	.0
69.07	.00405					.000712	.05			2.371			.00		
3339.62	13.85	7.650	21.500	68.6	3.17	.156	21.656	.00	2.302		5.25	.00	.00	0	.0
JUNCT STR	.00182					.000489	.00						.00		
3345.12	13.86	7.758	21.618	20.3	1.62	.041	21.659	.00	1.326		4.00	.00	.00	0	.0

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1

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   EXISTING STORM DRAIN IN SKYLAB
T2 100-YEAR FLOWS
   FILE NO. 48SKEX.WSP
      826.01   4.81  1                              14.40
R    1087.00   4.94  1      .015                                     .00   .00 0
     1090.00   4.95  1  2  2.015    18.4    19.4    7.01    7.60 90.00 90.00
     1387.00   5.09  1      .015                                     .00   .00 0
JX   1390.00   5.84 10  6   .015    52.6            7.11         90.00
     1900.00   6.10 10      .015
     1903.00   6.10 10  4   .015    11.3            7.1          90.00
R    1987.00   6.34 10      .015                                     .00   .00 0
     1990.00   6.34  9 11   .015     8.9            8.00         90.00
     2487.00   7.74  9      .015                                     .00   .00 0
JX   2490.00   8.47  9  6  4.015    65.9    23.1    8.97    8.50 90.00 90.00
     2807.00   8.63  9      .015                                     .00   .00 0
     2810.00   8.64  9  2   .015    18.0           10.40         90.00
R    3187.08   8.82  9      .015                                     .00   .00 0
     3190.00   8.83  9  2   .015    18.6           10.60         90.00
     3350.00   8.88  9      .015                                     .00   .00 0
JX   3358.00   8.89  9  3   .015    11.2           10.8          90.00
     3687.00   9.27  9      .015                                     .00   .00 0
     3690.00  10.02  8  6   .015    21.5           10.6          90.00
R    3987.00  10.17  8      .015
     3990.00  10.92 12  4   .015    16.9           11.36         90.00
     4087.00  10.97 12      .015
JX   4090.00  10.98 12  5   .015    54.2           11.4          90.0
     4590.00  11.22 12      .015
     4590.00  11.22 12
CD   1  4   0    .00   6.75    .00  .00  .00  .00
     2  4   0    .00   1.50    .00  .00  .00  .00
CD   3  4   0    .00   1.75    .00  .00  .00  .00
CD   4  4   0    .00   2.00    .00  .00  .00  .00
     5  4   0    .00   2.50    .00  .00  .00  .00
CD   6  4   0    .00   3.00    .00  .00  .00  .00
CD   7  4   0    .00   4.00    .00  .00  .00  .00
     8  4   0    .00   4.25    .00  .00  .00  .00
CD   9  4   0    .00   5.00    .00  .00  .00  .00
CD  10  4   0    .00   6.00    .00  .00  .00  .00
    11  4   0    .00   1.25    .00  .00  .00  .00
CD  12  4   0    .00   3.50
Q             20.1    .0
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WATER SURFACE PROFILE LISTING

EXISTING STORM DRAIN IN SKYLAB

100-YEAR FLOWS

FILE NO. 48SKEX.WSP

STATION	INVERT	DEPTH	W.S.	Q	VEL	VEL	ENERGY	SUPER	CRITICAL		HGT/	BASE/	ZL	NO	AVBPR
	ELEV	OF FLOW	ELEV			HEAD	GRD.EL.	ELEV	DEPTH		DIA	ID NO.		PIER	
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
826.01	4.81	9.590	14.400	360.1	10.06	1.572	15.972	.00	5.047		6.75	.00	.00	0	.0
260.99	.00050					.005136	1.34			6.750			.00		
1087.00	4.94	10.800	15.740	360.1	10.06	1.572	17.312	.00	5.047		6.75	.00	.00	0	.0
JUNCT STR	.00333					.004625	.01						.00		
1090.00	4.95	11.430	16.380	322.3	9.01	1.260	17.640	.00	4.775		6.75	.00	.00	0	.0
297.00	.00047					.004114	1.22			6.750			.00		
1387.00	5.09	12.512	17.602	322.3	9.01	1.260	18.862	.00	4.775		6.75	.00	.00	0	.0
JUNCT STR	.25000					.004757	.01						.00		
1390.00	5.84	12.096	17.936	269.7	9.54	1.413	19.349	.00	4.498		6.00	.00	.00	0	.0
510.00	.00051					.005399	2.75			6.000			.00		
1900.00	6.10	14.590	20.690	269.7	9.54	1.413	22.103	.00	4.498		6.00	.00	.00	0	.0
JUNCT STR	.00000					.005177	.02						.00		
1903.00	6.10	14.837	20.937	258.4	9.14	1.297	22.234	.00	4.404		6.00	.00	.00	0	.0
84.00	.00286					.004956	.42			6.000			.00		
1987.00	6.34	15.014	21.354	258.4	9.14	1.297	22.651	.00	4.404		6.00	.00	.00	0	.0
JUNCT STR	.00000					.008587	.03						.00		
1990.00	6.34	13.991	20.331	249.5	12.71	2.507	22.838	.00	4.420		5.00	.00	.00	0	.0
497.00	.00282					.012218	6.07			5.000			.00		
2487.00	7.74	18.663	26.403	249.5	12.71	2.507	28.910	.00	4.420		5.00	.00	.00	0	.0
JUNCT STR	.24333					.008637	.03						.00		
2490.00	8.47	20.899	29.369	160.5	8.17	1.038	30.407	.00	3.633		5.00	.00	.00	0	.0

317.00	.00051	.005056	1.60	5.000	.00

WATER SURFACE PROFILE LISTING

EXISTING STORM DRAIN IN SKYLAB

100-YEAR FLOWS

FILE NO. 48SKEX.WSP

STATION	INVERT	DEPTH	W.S.	Q	VEL	VEL	ENERGY	SUPER	CRITICAL		HGT/	BASE/	ZL	NO	AVBPR
	ELEV	OF FLOW	ELEV			HEAD	GRD.EL.	ELEV	DEPTH		DIA	ID NO.		PIER	
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
2807.00	8.63	22.341	30.971	160.5	8.17	1.038	32.009	.00	3.633		5.00	.00	.00	0	.0
JUNCT STR	.00333					.004521	.01						.00		
2810.00	8.64	22.784	31.424	142.5	7.26	.818	32.242	.00	3.420		5.00	.00	.00	0	.0
377.08	.00048					.003986	1.50			5.000			.00		
3187.08	8.82	24.107	32.927	142.5	7.26	.818	33.745	.00	3.420		5.00	.00	.00	0	.0
JUNCT STR	.00343					.003499	.01						.00		
3190.00	8.83	24.506	33.336	123.9	6.31	.618	33.954	.00	3.183		5.00	.00	.00	0	.0
160.00	.00031					.003013	.48			5.000			.00		
3350.00	8.88	24.939	33.819	123.9	6.31	.618	34.437	.00	3.183		5.00	.00	.00	0	.0
JUNCT STR	.00125					.002753	.02						.00		
3358.00	8.89	25.164	34.054	112.7	5.74	.512	34.566	.00	3.030		5.00	.00	.00	0	.0
329.00	.00115					.002493	.82			5.000			.00		
3687.00	9.27	25.604	34.874	112.7	5.74	.512	35.386	.00	3.030		5.00	.00	.00	0	.0
JUNCT STR	.25000					.003188	.01						.00		
3690.00	10.02	24.975	34.995	91.2	6.43	.642	35.637	.00	2.849		4.25	.00	.00	0	.0
297.00	.00051					.003884	1.15			4.250			.00		
3987.00	10.17	25.979	36.149	91.2	6.43	.642	36.791	.00	2.849		4.25	.00	.00	0	.0
JUNCT STR	.25000					.005573	.02						.00		
3990.00	10.92	25.278	36.198	74.3	7.72	.926	37.124	.00	2.699		3.50	.00	.00	0	.0
97.00	.00052					.007261	.70			3.500			.00		
4087.00	10.97	25.932	36.902	74.3	7.72	.926	37.828	.00	2.699		3.50	.00	.00	0	.0

WATER SURFACE PROFILE LISTING

EXISTING STORM DRAIN IN SKYLAB

100-YEAR FLOWS

FILE NO. 48SKEX.WSP

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
4090.00	10.98	27.651	38.631	20.1	2.09	.068	38.699	.00	1.373		3.50	.00	.00	0	.0
500.00	.00048					.000531	.27			3.070			.00		
4590.00	11.22	27.676	38.896	20.1	2.09	.068	38.964	.00	1.373		3.50	.00	.00	0	.0

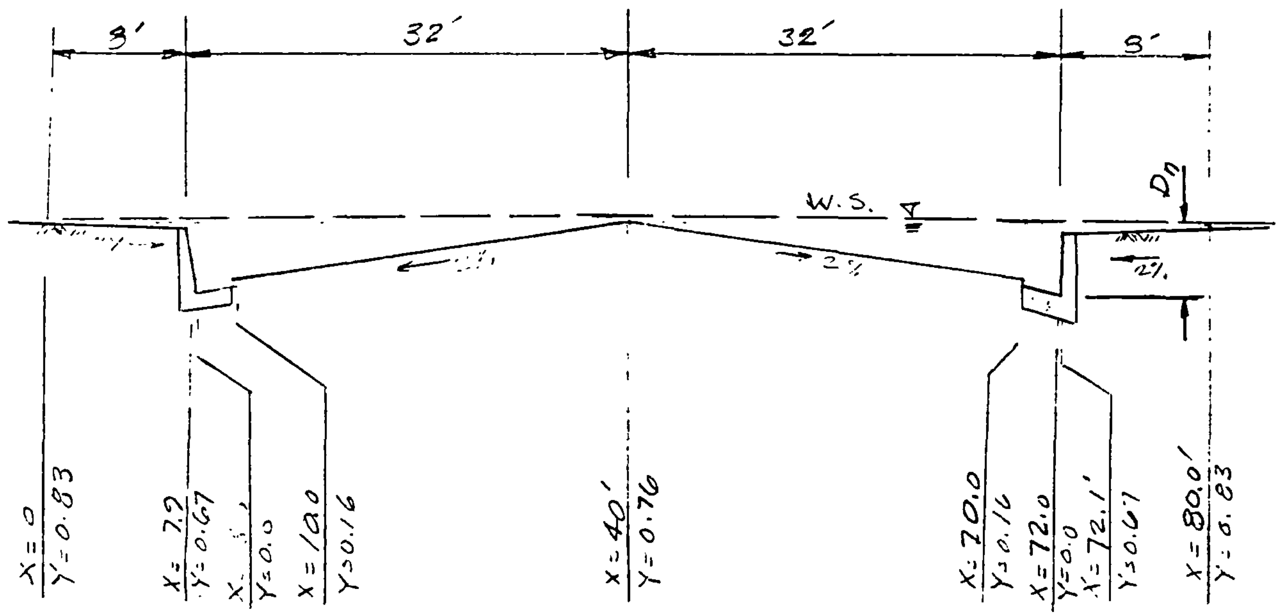
STREET FLOW CALCULATIONS

ADAMS · STREETER
CIVIL ENGINEERS INC.

COMPUTATION SHEET

JOB NO. [illegible]
CALC. BY [illegible]
CHECK. BY
DATE 7/24/95
SHEET ____ OF ____

ABLE LANE



	SECTION NO.	Q_{100}	D_n	DEPTH ABOVE TC
EXIST.	AE	30.3	0.69'	0.02'
	BE	41.7	0.77'	0.10'
ULTIMATE	AU	76.8	0.90'	0.23'
	BU	93.2	0.95'	0.28'

* SEE EXHIBIT FOR ULTIMATE 100-YEAR CONDITIONS AT BEGINING OF HYDRAULIC CALCULATIONS SECTION FOR LOCATION OF SECTIONS

```
========================================================================
             ** RESULTS OF IRREGULAR CHANNEL ANALYSIS **
               CALCULATIONS BASED ON MANNINGS EQUATION
           WITH ALL DIMENSIONS IN FEET OR FEET AND SECONDS

========================================================================
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          Ver. 6.1  Release Date: 01/01/96  License ID 1204

                         Analysis prepared by:

                ADAMS*STREETER CIVIL ENGIMEERS INC.
                         15 CORPORATE PARK
                          IRVINE, CA 92630
                           (714) 474-2330


************************** DESCRIPTION OF STUDY **************************
* EXISTING 100-YEAR FLOW DEPTH                                           *
* AT ABLE LANE SOUTH OF SKYLAB SECTION "AE"                              *
*                                                                        *
**************************************************************************

   TIME/DATE OF STUDY: 11:44   2/ 9/1997
------------------------------------------------------------------------
          * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  1 :
          NODE NUMBER      "X" COORDINATE     "Y" COORDINATE

               1                  .00               .83
               2                 7.90               .67
               3                 8.00               .00
               4                10.00               .16
               5                40.00               .76
          SUBCHANNEL SLOPE(FEET/FEET) =  .002000
          SUBCHANNEL MANNINGS FRICTION FACTOR =  .015000

........................................................................
       SUBCHANNEL FLOW(CFS) =       15.5
       SUBCHANNEL FLOW AREA(SQUARE FEET) =       8.29
       SUBCHANNEL FLOW VELOCITY(FEET/SEC.) =    1.872
       SUBCHANNEL FROUDE NUMBER =    .623
       SUBCHANNEL FLOW TOP-WIDTH(FEET) =      29.59
       SUBCHANNEL HYDRAULIC DEPTH(FEET) =     .28

------------------------------------------------------------------------
------------------------------------------------------------------------
          * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  2 :
          NODE NUMBER      "X" COORDINATE     "Y" COORDINATE

               1                40.00               .76
               2                70.00               .16
               3                72.00               .00
               4                72.10               .67
               5                80.00               .83
          SUBCHANNEL SLOPE(FEET/FEET) =  .002000
          SUBCHANNEL MANNINGS FRICTION FACTOR =  .015000

........................................................................
```

SUBCHANNEL FLOW(CFS) = 15.5
SUBCHANNEL FLOW AREA(SQUARE FEET) = 8.29
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 1.872
SUBCHANNEL FROUDE NUMBER = .623
SUBCHANNEL FLOW TOP-WIDTH(FEET) = 29.59
SUBCHANNEL HYDRAULIC DEPTH(FEET) = .28

TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED = 30.30
COMPUTED IRREGULAR CHANNEL FLOW(CFS) = 31.03

ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
ELEVATION............................ .69

NOTE: WATER SURFACE IS BELOW EXTREME
LEFT AND RIGHT BANK ELEVATIONS.

************************** DESCRIPTION OF STUDY **************************
EXISTING 100-YEAR FLOWS *
ABLE LANE, NORTH OF BOLSA, SECTION "BE" *
*
****

TIME/DATE OF STUDY: 11:46 2/ 9/1997

---

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 1 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	.00	.83
2	7.90	.67
3	8.00	.00
4	10.00	.16
5	40.00	.76

SUBCHANNEL SLOPE(FEET/FEET) = .002000
SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

SUBCHANNEL FLOW(CFS) = 21.4
SUBCHANNEL FLOW AREA(SQUARE FEET) = 10.97
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 1.948
SUBCHANNEL FROUDE NUMBER = .631
SUBCHANNEL FLOW TOP-WIDTH(FEET) = 37.04
SUBCHANNEL HYDRAULIC DEPTH(FEET) = .30

---

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 2 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	40.00	.76
2	70.00	.16
3	72.00	.00
4	72.10	.67
5	80.00	.83

SUBCHANNEL SLOPE(FEET/FEET) = .002000

SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 21.4
SUBCHANNEL FLOW AREA(SQUARE FEET) = 10.97
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 1.948
SUBCHANNEL FROUDE NUMBER = .631
SUBCHANNEL FLOW TOP-WIDTH(FEET) = 37.04
SUBCHANNEL HYDRAULIC DEPTH(FEET) = .30

TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED = 41.70
COMPUTED IRREGULAR CHANNEL FLOW(CFS) = 42.74

ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
ELEVATION............................. .77

NOTE: WATER SURFACE IS BELOW EXTREME
LEFT AND RIGHT BANK ELEVATIONS.

************************** DESCRIPTION OF STUDY **************************
ULTIMATE 100-YEAR FLOWS *
ABLE LANE, SOUTH OF SKYLAB, SECTION "AU" *
*
****

TIME/DATE OF STUDY: 9:48 3/ 8/1997

----

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 1 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	.00	.83
2	7.90	.67
3	8.00	.00
4	10.00	.16
5	40.00	.76

SUBCHANNEL SLOPE(FEET/FEET) = .002000
SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 38.4
SUBCHANNEL FLOW AREA(SQUARE FEET) = 16.08
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 2.390
SUBCHANNEL FROUDE NUMBER = .664
SUBCHANNEL FLOW TOP-WIDTH(FEET) = 40.00
SUBCHANNEL HYDRAULIC DEPTH(FEET) = .40

----

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 2 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	40.00	.76

2	70.00	.16
3	72.00	.00
4	72.10	.67
5	80.00	.83

SUBCHANNEL SLOPE(FEET/FEET) = .002000
SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 38.4
SUBCHANNEL FLOW AREA(SQUARE FEET) = 16.08
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 2.390
SUBCHANNEL FROUDE NUMBER = .664
SUBCHANNEL FLOW TOP-WIDTH(FEET) = 40.00
SUBCHANNEL HYDRAULIC DEPTH(FEET) = .40

TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED = 76.80
COMPUTED IRREGULAR CHANNEL FLOW(CFS) = 76.86

ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
ELEVATION............................. .90

NOTE: WATER SURFACE IS ABOVE LEFT OR RIGHT
BANK ELEVATIONS.

************************** DESCRIPTION OF STUDY **************************
* ULTIMATE 100-YEAR FLOWS *
* ABLE LANE, NORTH OF BOLSA AT SECTION "BU" *
* *
****

TIME/DATE OF STUDY: 9:52 3/ 8/1997

----

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 1 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	.00	.83
2	7.90	.67
3	8.00	.00
4	10.00	.16
5	40.00	.76

SUBCHANNEL SLOPE(FEET/FEET) = .002000
SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 46.7
SUBCHANNEL FLOW AREA(SQUARE FEET) = 18.08

```
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) =    2.584
SUBCHANNEL FROUDE NUMBER =    .677
SUBCHANNEL FLOW TOP-WIDTH(FEET) =      40.00
SUBCHANNEL HYDRAULIC DEPTH(FEET) =     .45

----------------------------------------------------------------------------
----------------------------------------------------------------------------
    * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  2 :
    NODE NUMBER      "X" COORDINATE     "Y" COORDINATE

         1                 40.00              .76
         2                 70.00              .16
         3                 72.00              .00
         4                 72.10              .67
         5                 80.00              .83
    SUBCHANNEL SLOPE(FEET/FEET) =  .002000
    SUBCHANNEL MANNINGS FRICTION FACTOR =  .015000

............................................................................
SUBCHANNEL FLOW(CFS) =      46.7
SUBCHANNEL FLOW AREA(SQUARE FEET) =      18.08
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) =    2.584
SUBCHANNEL FROUDE NUMBER =   .677
SUBCHANNEL FLOW TOP-WIDTH(FEET) =      40.00
SUBCHANNEL HYDRAULIC DEPTH(FEET) =     .45

----------------------------------------------------------------------------
----------------------------------------------------------------------------
TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED =      93.20
COMPUTED IRREGULAR CHANNEL FLOW(CFS) =      93.45

ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
ELEVATION.............................       .95


     NOTE: WATER SURFACE IS ABOVE LEFT OR RIGHT
           BANK ELEVATIONS.

----------------------------------------------------------------------------
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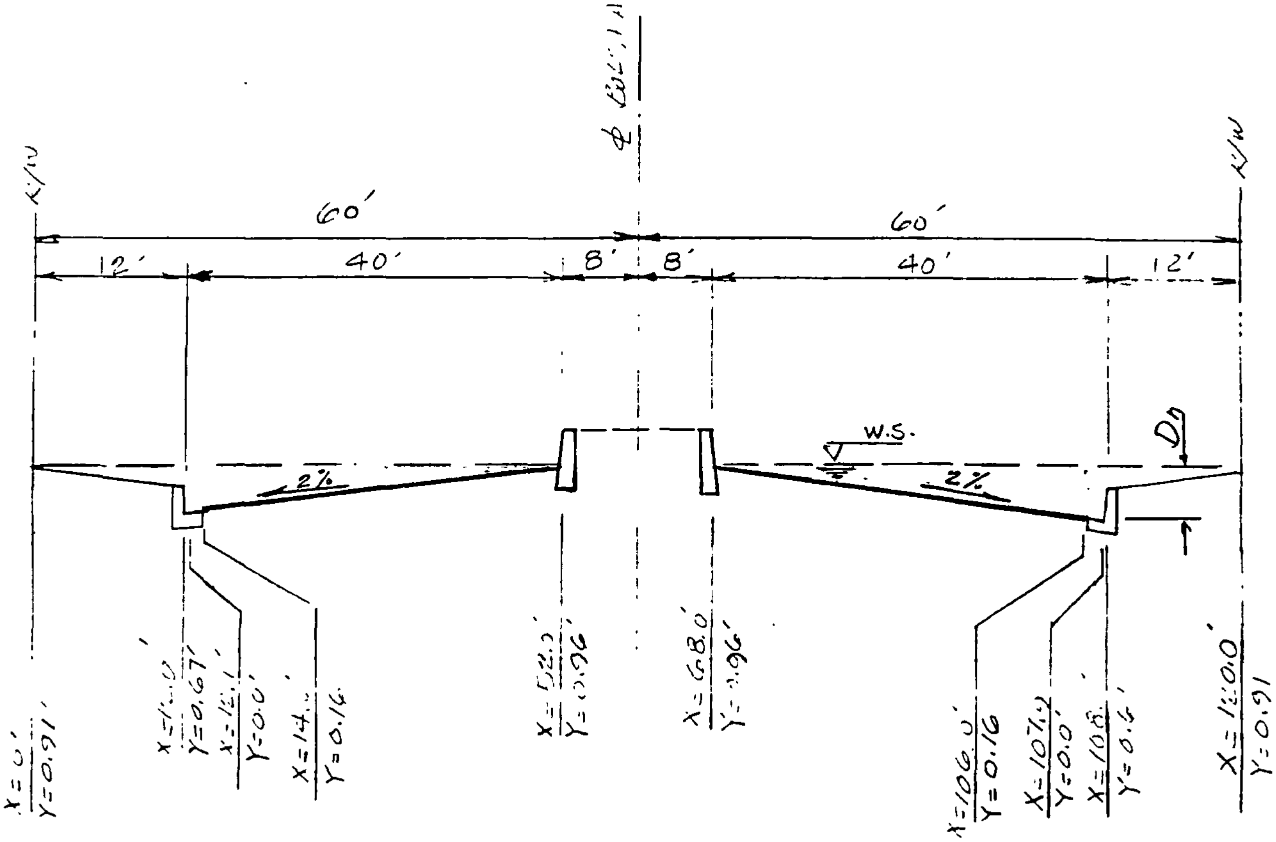
ADAMS · STREETER
CIVIL ENGINEERS INC.

COMPUTATION SHEET

JOB NO. [illegible]
CALC. BY [illegible]
CHECK. BY
DATE [illegible]
SHEET ____ OF ____

BOLSA AVE



SECTION NO.		Q_{100}	D_n	DEPTH ABOVE T.C.
EXIST.	CE	79.3	0.90'	0.23'
	DE	89.6	0.93'	0.26'
	EE	65.6	0.85'	0.18'
ULTIMATE	CU	130.8	1.02'	0.35'
	DU	141.1	1.04'	0.37'
	EU	117.1	0.99'	0.32'

* SEE EXHIBIT FOR 100-YEAR CONDITIONS AT BEGINING OF HYDRAULIC CALCULATIONS SECTION FOR LOCATION OF SECTIONS.

```
==========================================================================
              ** RESULTS OF IRREGULAR CHANNEL ANALYSIS **
                CALCULATIONS BASED ON MANNINGS EQUATION
            WITH ALL DIMENSIONS IN FEET OR FEET AND SECONDS

==========================================================================
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                         Analysis prepared by:

                 ADAMS*STREETER CIVIL ENGIMEERS INC.
                          15 CORPORATE PARK
                           IRVINE, CA 92630
                            (714) 474-2330



************************** DESCRIPTION OF STUDY **************************
* EXISTING 100-YEAR FLOWS                                                *
* BOLSA AVE. AT SECTION "CE"                                             *
*                                                                        *
**************************************************************************

   TIME/DATE OF STUDY: 10:10   3/ 8/1997
--------------------------------------------------------------------------
           * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  1 :
           NODE NUMBER      "X" COORDINATE     "Y" COORDINATE


                1                  .00                .91
                2                12.00                .67
                3                12.10                .00
                4                14.00                .16
                5                52.00                .96
           SUBCHANNEL SLOPE(FEET/FEET) =  .003000
           SUBCHANNEL MANNINGS FRICTION FACTOR =  .015000

..........................................................................
        SUBCHANNEL FLOW(CFS) =       40.8
        SUBCHANNEL FLOW AREA(SQUARE FEET) =      15.94
        SUBCHANNEL FLOW VELOCITY(FEET/SEC.) =    2.558
        SUBCHANNEL FROUDE NUMBER =   .788
        SUBCHANNEL FLOW TOP-WIDTH(FEET) =      48.65
        SUBCHANNEL HYDRAULIC DEPTH(FEET) =     .33

--------------------------------------------------------------------------
--------------------------------------------------------------------------
           * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  2 :
           NODE NUMBER      "X" COORDINATE     "Y" COORDINATE


                1                68.00                .96
```

2	106.00	.16
3	107.90	.00
4	108.00	.67
5	120.00	.91

SUBCHANNEL SLOPE(FEET/FEET) = .003000

SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 40.8

SUBCHANNEL FLOW AREA(SQUARE FEET) = 15.94

SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 2.558

SUBCHANNEL FROUDE NUMBER = .788

SUBCHANNEL FLOW TOP-WIDTH(FEET) = 48.65

SUBCHANNEL HYDRAULIC DEPTH(FEET) = .33

TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED = 79.30

COMPUTED IRREGULAR CHANNEL FLOW(CFS) = 81.57

ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
ELEVATION............................ .90

NOTE: WATER SURFACE IS BELOW EXTREME
LEFT AND RIGHT BANK ELEVATIONS.

************************* DESCRIPTION OF STUDY **************************

* EXISTING 100-YEAR FLOWS *

* BOLSA AVE. AT SECTION "DE" *

*

****

TIME/DATE OF STUDY: 10:11 3/ 8/1997

----

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 1 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	.00	.91
2	12.00	.67
3	12.10	.00
4	14.00	.16
5	52.00	.96

SUBCHANNEL SLOPE(FEET/FEET) = .003000

SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 46.2

SUBCHANNEL FLOW AREA(SQUARE FEET) = 17.44

SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 2.647
SUBCHANNEL FROUDE NUMBER = .794
SUBCHANNEL FLOW TOP-WIDTH(FEET) = 50.57
SUBCHANNEL HYDRAULIC DEPTH(FEET) = .34

---

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 2 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	68.00	.96
2	106.00	.16
3	107.90	.00
4	108.00	.67
5	120.00	.91

SUBCHANNEL SLOPE(FEET/FEET) = .003000
SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 46.2
SUBCHANNEL FLOW AREA(SQUARE FEET) = 17.44
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 2.647
SUBCHANNEL FROUDE NUMBER = .794
SUBCHANNEL FLOW TOP-WIDTH(FEET) = 50.57
SUBCHANNEL HYDRAULIC DEPTH(FEET) = .34

TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED = 89.60
COMPUTED IRREGULAR CHANNEL FLOW(CFS) = 92.31

ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
ELEVATION............................. .93

NOTE: WATER SURFACE IS ABOVE LEFT OR RIGHT
BANK ELEVATIONS.

************************** DESCRIPTION OF STUDY **************************
* EXISITING 100-YEAR FLOWS *
* BOLSA AVE. AT SECTION "EE" *
* *
****

TIME/DATE OF STUDY: 10:13 3/ 8/1997

---

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 1 :
NODE NUMBER "X" COORDINATE "Y" COORDINATE

1	.00	.91
2	12.00	.67
3	12.10	.00
4	14.00	.16
5	52.00	.96

SUBCHANNEL SLOPE(FEET/FEET) = .003000

SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 33.7

SUBCHANNEL FLOW AREA(SQUARE FEET) = 13.63

SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 2.471

SUBCHANNEL FROUDE NUMBER = .780

SUBCHANNEL FLOW TOP-WIDTH(FEET) = 43.77

SUBCHANNEL HYDRAULIC DEPTH(FEET) = .31

----

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 2 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	68.00	.96
2	106.00	.16
3	107.90	.00
4	108.00	.67
5	120.00	.91

SUBCHANNEL SLOPE(FEET/FEET) = .003000

SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 33.7

SUBCHANNEL FLOW AREA(SQUARE FEET) = 13.63

SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 2.471

SUBCHANNEL FROUDE NUMBER = .780

SUBCHANNEL FLOW TOP-WIDTH(FEET) = 43.77

SUBCHANNEL HYDRAULIC DEPTH(FEET) = .31

TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED = 65.60

COMPUTED IRREGULAR CHANNEL FLOW(CFS) = 67.36

ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE

ELEVATION............................. .85

NOTE: WATER SURFACE IS BELOW EXTREME
LEFT AND RIGHT BANK ELEVATIONS.

```
************************** DESCRIPTION OF STUDY **************************
* ULTIMATE 100-YEAR FLOWS                                                *
* BOLSA AVE. AT SECTION "CU"                                             *
*                                                                        *
**************************************************************************

   TIME/DATE OF STUDY: 10:14   3/ 8/1997
--------------------------------------------------------------------------
           * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  1 :
           NODE NUMBER      "X" COORDINATE     "Y" COORDINATE

                1                 .00               .91
                2               12.00               .67
                3               12.10               .00
                4               14.00               .16
                5               52.00               .96
           SUBCHANNEL SLOPE(FEET/FEET) =  .003000
           SUBCHANNEL MANNINGS FRICTION FACTOR =  .015000

..........................................................................
        SUBCHANNEL FLOW(CFS) =       67.2
        SUBCHANNEL FLOW AREA(SQUARE FEET) =      22.09
        SUBCHANNEL FLOW VELOCITY(FEET/SEC.) =    3.044
        SUBCHANNEL FROUDE NUMBER =    .823
        SUBCHANNEL FLOW TOP-WIDTH(FEET) =      52.00
        SUBCHANNEL HYDRAULIC DEPTH(FEET) =     .42

--------------------------------------------------------------------------
--------------------------------------------------------------------------
           * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  2 :
           NODE NUMBER      "X" COORDINATE     "Y" COORDINATE

                1               68.00               .96
                2              106.00               .16
                3              107.90               .00
                4              108.00               .67
                5              120.00               .91
           SUBCHANNEL SLOPE(FEET/FEET) =  .003000
           SUBCHANNEL MANNINGS FRICTION FACTOR =  .015000

..........................................................................
        SUBCHANNEL FLOW(CFS) =       67.2
        SUBCHANNEL FLOW AREA(SQUARE FEET) =      22.09
        SUBCHANNEL FLOW VELOCITY(FEET/SEC.) =    3.044
        SUBCHANNEL FROUDE NUMBER =    .823
        SUBCHANNEL FLOW TOP-WIDTH(FEET) =      52.00
        SUBCHANNEL HYDRAULIC DEPTH(FEET) =     .42

--------------------------------------------------------------------------
--------------------------------------------------------------------------
        TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED =     130.80
        COMPUTED IRREGULAR CHANNEL FLOW(CFS) =     134.49
```

ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
ELEVATION............................ 1.02

NOTE: WATER SURFACE IS ABOVE LEFT OR RIGHT
BANK ELEVATIONS.

************************** DESCRIPTION OF STUDY **************************
ULTIMATE 100-YEAR FLOWS *
* BOLSA AVE. AT SECTION "DU" *
*
****

TIME/DATE OF STUDY: 10:15 3/ 8/1997

----

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 1 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	.00	.91
2	12.00	.67
3	12.10	.00
4	14.00	.16
5	52.00	.96

SUBCHANNEL SLOPE(FEET/FEET) = .003000
SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 72.6
SUBCHANNEL FLOW AREA(SQUARE FEET) = 23.13
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 3.138
SUBCHANNEL FROUDE NUMBER = .829
SUBCHANNEL FLOW TOP-WIDTH(FEET) = 52.00
SUBCHANNEL HYDRAULIC DEPTH(FEET) = .44

----

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 2 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	68.00	.96
2	106.00	.16
3	107.90	.00
4	108.00	.67
5	120.00	.91

SUBCHANNEL SLOPE(FEET/FEET) = .003000
SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 72.6
SUBCHANNEL FLOW AREA(SQUARE FEET) = 23.13
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 3.138
SUBCHANNEL FROUDE NUMBER = .829
SUBCHANNEL FLOW TOP-WIDTH(FEET) = 52.00
SUBCHANNEL HYDRAULIC DEPTH(FEET) = .44

TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED = 141.10
COMPUTED IRREGULAR CHANNEL FLOW(CFS) = 145.21

ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
ELEVATION............................. 1.04

NOTE: WATER SURFACE IS ABOVE LEFT OR RIGHT
BANK ELEVATIONS.

************************** DESCRIPTION OF STUDY **************************
* ULTIMATE 100-YEAR FLOWS *
* BOLSA AVE. AT SECTION "EU" *
* *
****

TIME/DATE OF STUDY: 10:16 3/ 8/1997

----

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 1 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	.00	.91
2	12.00	.67
3	12.10	.00
4	14.00	.16
5	52.00	.96

SUBCHANNEL SLOPE(FEET/FEET) = .003000
SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 59.5
SUBCHANNEL FLOW AREA(SQUARE FEET) = 20.53
SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 2.899
SUBCHANNEL FROUDE NUMBER = .813
SUBCHANNEL FLOW TOP-WIDTH(FEET) = 52.00
SUBCHANNEL HYDRAULIC DEPTH(FEET) = .39

----

* ENTERED INFORMATION FOR SUBCHANNEL NUMBER 2 :

NODE NUMBER	"X" COORDINATE	"Y" COORDINATE
1	68.00	.96
2	106.00	.16
3	107.90	.00
4	108.00	.67
5	120.00	.91

SUBCHANNEL SLOPE(FEET/FEET) = .003000

SUBCHANNEL MANNINGS FRICTION FACTOR = .015000

....

SUBCHANNEL FLOW(CFS) = 59.5

SUBCHANNEL FLOW AREA(SQUARE FEET) = 20.53

SUBCHANNEL FLOW VELOCITY(FEET/SEC.) = 2.899

SUBCHANNEL FROUDE NUMBER = .813

SUBCHANNEL FLOW TOP-WIDTH(FEET) = 52.00

SUBCHANNEL HYDRAULIC DEPTH(FEET) = .39

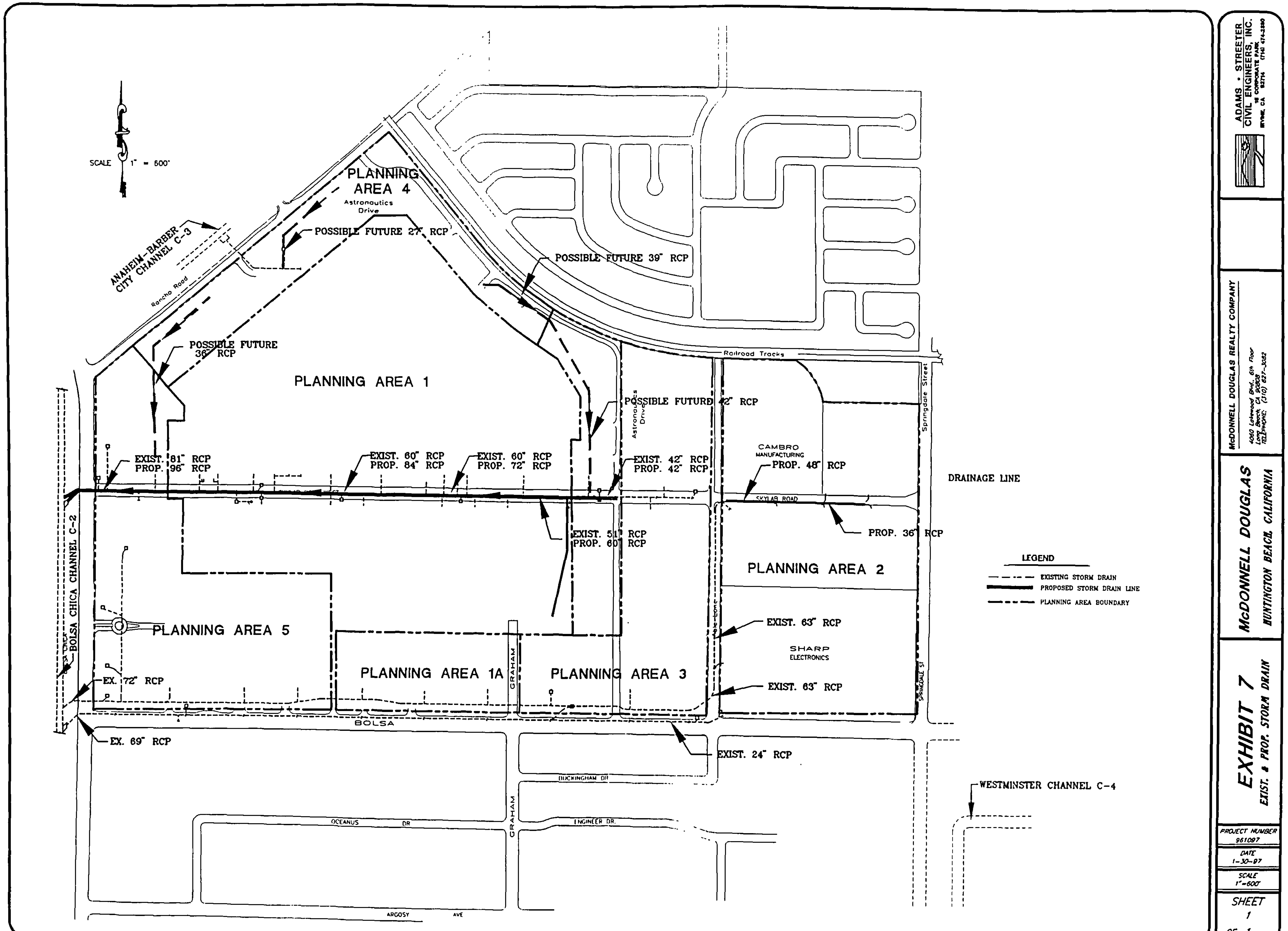
TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED = 117.10

COMPUTED IRREGULAR CHANNEL FLOW(CFS) = 119.04

ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
ELEVATION............................. .99

NOTE: WATER SURFACE IS ABOVE LEFT OR RIGHT
BANK ELEVATIONS.

STORM DRAIN EXHIBITS



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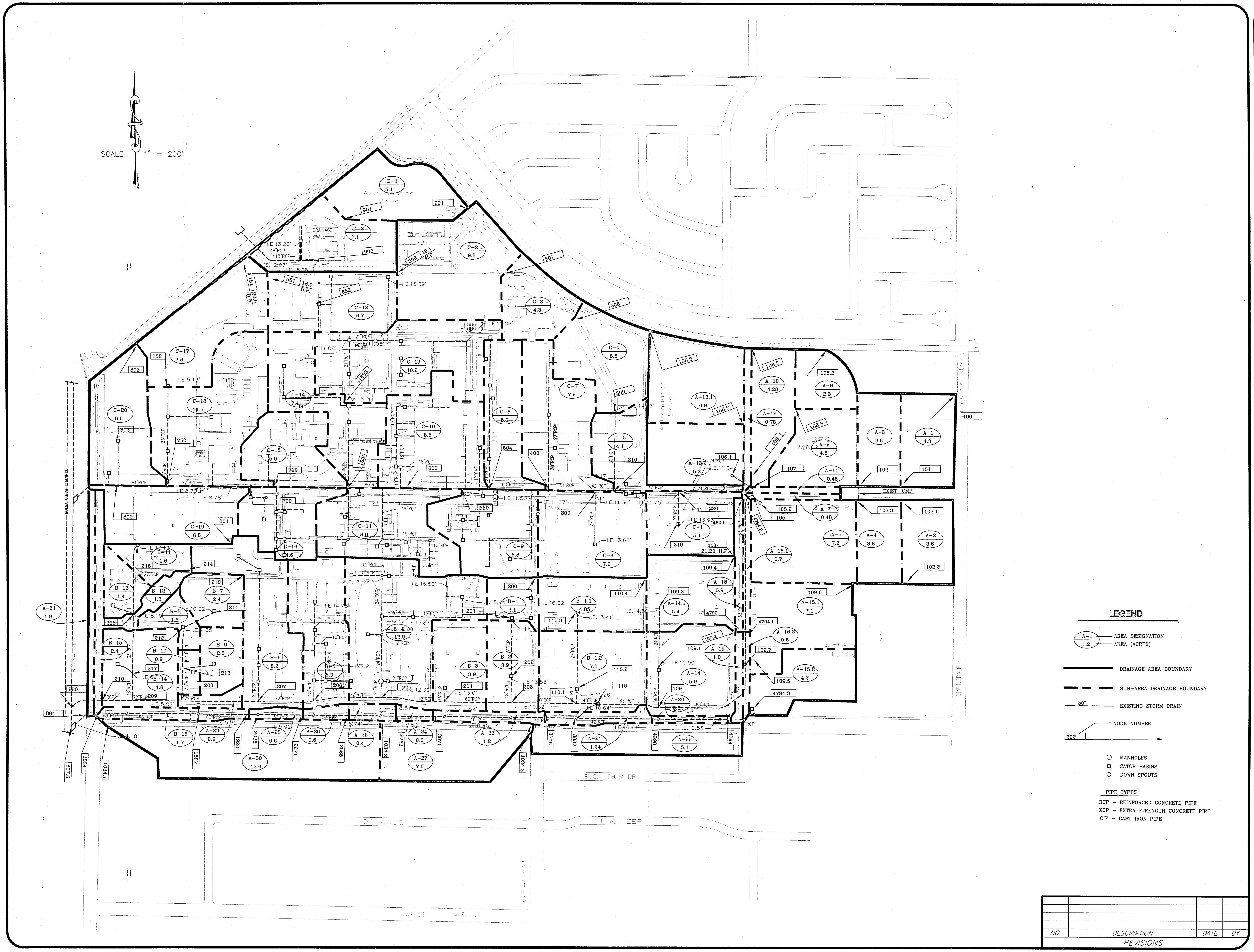
SEE 1"=200' FOLDED MAP FOR MORE DETAIL



NO.	DESCRIPTION	DATE	BY

REVISIONS

ADAMS • STREETER
CIVIL ENGINEERS, INC.
15 CORPORATE PARK
IRVINE, CA 92714 (714) 474-2330

McDONNELL DOUGLAS REALTY COMPANY
4060 Lakewood Blvd., 6th Floor
Long Beach, CA 90808
TELEPHONE: (310) 627-3082

UTILITY MASTER PLAN
McDONNELL DOUGLAS
HUNTINGTON BEACH, CALIFORNIA

EXHIBIT SD-1
EXISTING HYDROLOGY

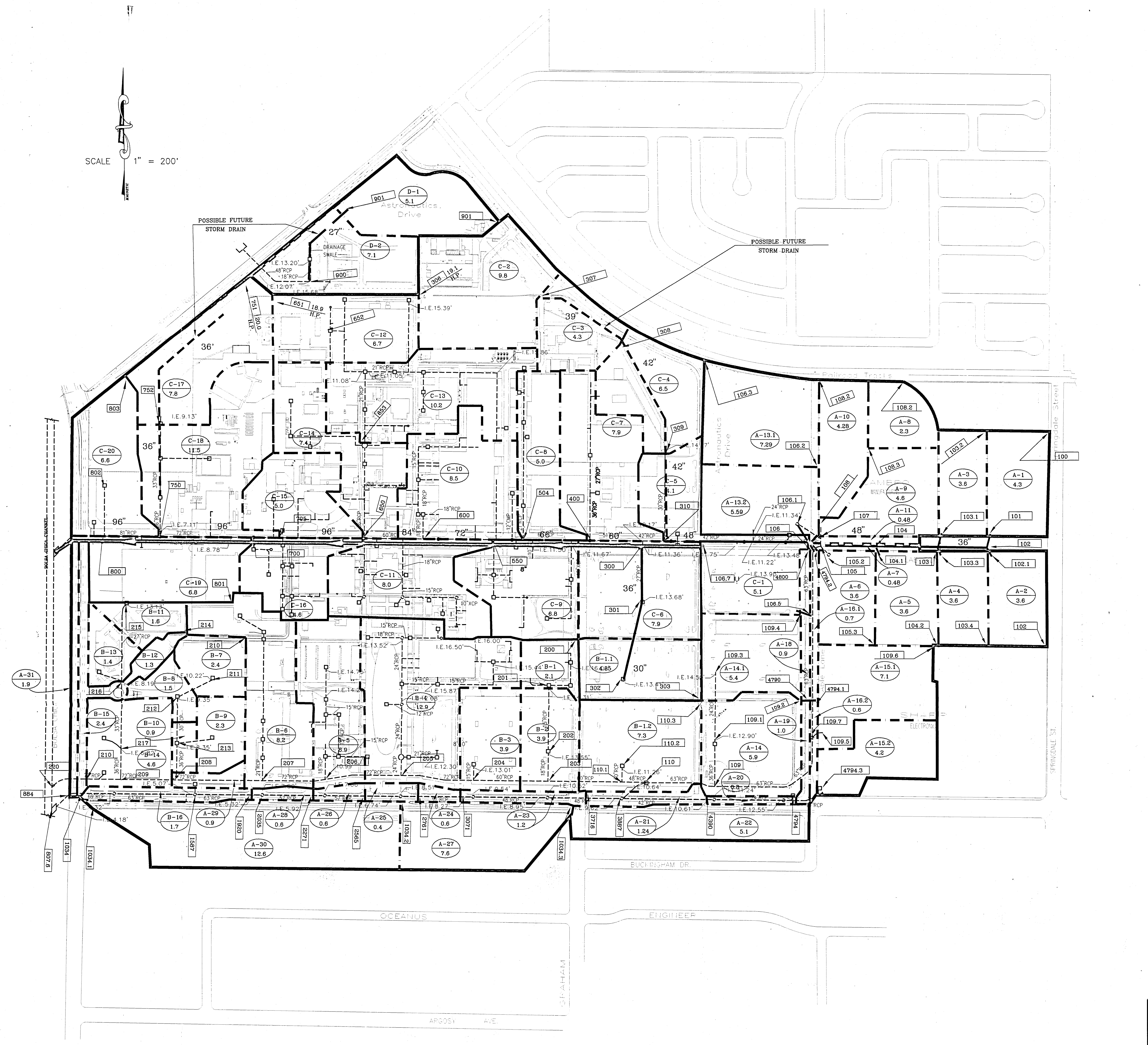
PROJECT NUMBER 961097

DATE 2-3-97

SCALE 1"=200'

SHEET 1 OF 2

J:\961097\NEWEXHIB\REVJAN97\1097SDEX



LEGEND

A-1 / 1.2	AREA DESIGNATION / AREA (ACRES)
	DRAINAGE AREA BOUNDARY
	SUB-AREA DRAINAGE BOUNDARY
30"	EXISTING STORM DRAIN
42"	PROPOSED STORM DRAIN SIZE / PROPOSED STORM DRAIN LINE
	POSSIBLE FUTURE STORM DRAIN
202	NODE NUMBER

- MANHOLES
- CATCH BASINS
- DOWN SPOUTS

PIPE TYPES

- RCP - REINFORCED CONCRETE PIPE
- XCP - EXTRA STRENGTH CONCRETE PIPE
- CIP - CAST IRON PIPE

NO.	DESCRIPTION	DATE	BY

REVISIONS

ADAMS • STREETER
CIVIL ENGINEERS, INC.
15 CORPORATE PARK
IRVINE, CA 92714 (714) 474-2330

McDONNELL DOUGLAS REALTY COMPANY
4060 Lakewood Blvd., 6th Floor
Long Beach, CA 90808
TELEPHONE: (310) 627-3082

UTILITY MASTER PLAN
McDONNELL DOUGLAS
HUNTINGTON BEACH, CALIFORNIA

EXHIBIT SD-2
ULTIMATE HYDROLOGY

PROJECT NUMBER 961097

DATE 2-3-97

SCALE 1"=200'

SHEET 2 OF 2

J:\961097\NEWEXHIB\REVJAN97\1097SDUT

SANITARY SEWER DESIGN CRITERIA

Calculations for sewer flows and capacity of existing and future sewer pipes are presented in this section.

Sewer generation factors city of Huntington Beach std. Plan 500 (page 1 of 7) "Sewer Facility Design Criteria" for all areas except for office building high rise, motel and restaurant which is taken from Orange County Sanitation District "Collection, Treatment, and Disposal Facilities Master Plan".
Generation factors for highrise office building are as follows:

Existing:

floor area 236,000 s.f.
area 18.3 Acres
floor-to-area ratio 236,000/18.3 = 13,038
@ 200 gallon per 1000 s.f. => (13,038/1000)*200 = 2616gpad

USE 3000 gpad

Future:

floor area 370,000 s.f.
area 18.3 Acres
floor-to-area ratio 370,000/18.3 = 20,218
@ 200 gallon per 1000 s.f. => (20,218/1000)*200 = 4044gpad

USE 4200 gpad

Hotel: 150 gal / room / day

Restaurant: 50 gal / seat / day

SEWER FACILITY DESIGN CRITERIA

1.1 SIZE

THE CITY WILL NOT ACCEPT SEWER MAINS SMALLER THAN 8" IN DIAMETER FOR OPERATION AND MAINTENANCE. SEWER MAINS THAT ARE CONSTRUCTED IN A COMMON TRENCH WITH ANOTHER UTILITY WILL NOT BE ACCEPTED BY THE CITY. ADEQUATE HORIZONTAL AND VERTICAL SPACING SHALL BE MAINTAINED IN ACCORDANCE WITH STD. PLAN 501.

1.2 MINIMUM AND MAXIMUM SLOPE

ALL SEWERS SHALL BE DESIGNED AND CONSTRUCTED TO PROVIDE A MEAN VELOCITY OF NOT LESS THAN 2 FEET PER SECOND (FPS) WHEN FLOWING HALF-FULL AT THE ESTIMATED PEAK FLOW AS CALCULATED USING MANNING'S FORMULA USING AN 'n' VALUE OF 0.013 FOR VCP, OR 0.009 FOR P.V.C. THE MAXIMUM ALLOWABLE SLOPE SHALL BE THE SLOPE WHICH GENERATES A MAXIMUM FLOW VELOCITY OF 15 fps AT THE PEAK FLOW RATE AS CALCULATED USING MANNING'S EQUATION AND THE ABOVE 'n' VALUES.

MINIMUM SLOPES ALLOWED:

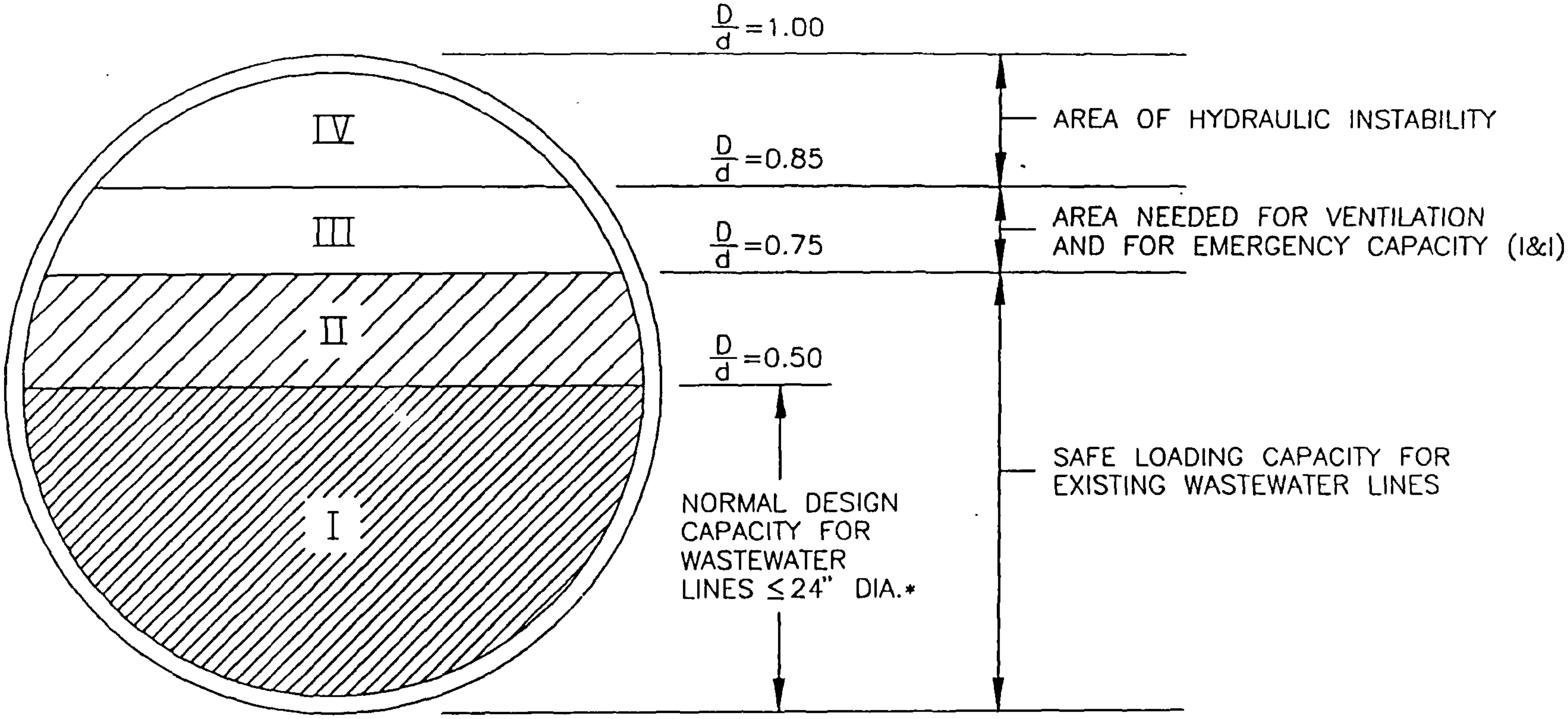
PIPE SIZE	'S'
8"	0.0040
10"	0.0028
12"	0.0022
15"	0.0015
18"	0.0012
21" OR GREATER	0.0010

THESE ARE MINIMUM SLOPES; SEWERS SHOULD BE DESIGNED TO PROVIDE STEEPER SLOPES, WHENEVER POSSIBLE, UP TO THE MAXIMUM SLOPE STATED ABOVE. UNDER SPECIAL CONDITIONS, THE ENGINEER MAY REQUEST SLOPES OF LESS THAN THE MINIMUM STATED. THE ENGINEER MUST SUBMIT THIS REQUEST ALONG WITH BACK-UP DATA AND CALCULATIONS TO SHOW THAT THE DEPTH OF FLOW AT DESIGN AVERAGE FLOW WILL BE 0.3 OF THE PIPE DIAMETER OR GREATER. THE ENGINEER MUST ALSO SUBMIT COMPUTATIONS TO SHOW THE DEPTHS OF FLOW AT MINIMUM AND AVERAGE RATES OF FLOW. THE REQUEST SHALL ALSO DETAIL THE REASONS WHY THE NORMAL MINIMUM SLOPES CANNOT BE ACHIEVED. THE REQUEST AND SUPPORTING DATA MUST BE APPROVED BY THE DIRECTOR OF PUBLIC WORKS.

1.3 FLOW DESIGN CRITERIA

USE THE FOLLOWING TABLE FOR AVERAGE DAILY FLOW CALCULATIONS.

LAND USE	COEFFICIENT GPD PER ACRE
LOW DENSITY RESIDENTIAL	1800
MEDIUM DENSITY RESIDENTIAL	3300
MEDIUM-HIGH DENSITY RESIDENTIAL	3800
HIGH DENSITY RESIDENTIAL	4900
COMMERCIAL AREA	3000
INDUSTRIAL AREA	3900
OPEN SPACE	200
SCHOOL	3600 OR 20 GAL/STUDENT/DAY



TYPICAL PIPELINE LOADING CONDITIONS

* FOR WASTEWATER LINES > 24" DIA. A D/d AS LARGE AS 0.70 IS CONSIDERED SAFE.

Kennedy/Jenks Consultants

City of Huntington Beach
Wastewater Master Plan

TYPICAL PIPELINE LOADING CONDITIONS

K/J 924620.00

Figure 4-3

Figure 4-3

TABLE 4-1

WASTEWATER FLOW GENERATION FACTORS

Land Use Category	Average Wastewater Flow Generation Factor
Residential	
Low Density (0-7 Du/Ac)	1,800 gpad
Medium (8-15 Du/Ac)	3,300 gpad
Medium - High (16-25 Du/Ac)	3,800 gpad
High - (25+ Du/Ac)	4,900 gpad
Commercial	3,000 gpad
Industrial	3,900 gpad
Open Space	200 gpad
Schools	3,600 gpad or 20 g/st/d

Peaking Factor Criteria

Average flows entering the trunk collection systems are assessed by correlating the area of each land use type with its associated wastewater flow generation factors. However, a determination of the adequacy of the wastewater system is based upon, the ability of the system to convey peak flows. Peak flow in any reach of the wastewater system is equivalent to the summation of all average flows upstream of the point in question and converted to peak flow by an empirical peak-to-average relationship. This relationship as expressed in the OCSD 1989 Master Plan Study is as follows:

$$Q_{peak} = 1.78\,(Q_{avg})^{0.92},\ (Q \text{ in mgd})$$

This peaking factor equation was initially developed during preparation of the 1969 Districts No. 3 and No. 7 (Huntington Beach) master plans and was reconfirmed by

TABLE 2-3

SUMMARY COMPARISON OF LAND USE CATEGORIES AND AVERAGE FLOW COEFFICIENTS

	1982 (1)(2) Master Plans (cfs/ac)	District No 2 (3) 1986 Amend. No. 1 (cfs/ac)	CSDOC MASTER PLAN 1989 (cfs/ac)	gal/day/acre [redacted]
Residential				
Estate Density	.0015	.0014	.0014	(~~905~~) say 1000
Low Density	.0024	.0031	.0025	(~~1615~~) 1615
Medium Density	.0060	.0060	.0060	(~~3560~~) 3880
High Density	.0090	.0090	.0090	(~~5520~~) 5880
Very High Density	N/A	.0120	.0123	(~~7950~~) 7945
Commercial/Office	.0050	.0050	.0050	(3230) 3230
Industrial	.0070	.0050	.0070	(4525) 4520
High Intensity Industrial/Commercial	N/A	.0120	.0120**	(7753) 7750
Institutional (4)	N/A	N/A	.0060	(3880) 3880
Open Space/Rec	.0003	.0003	.0003	(200) 200
Restaurants			.0000774	= 50 gal/seat/day
Hotels			.000232	= 150 gal/room/day

** Where FAR ratio is > 1.0, site specific coefficients or point source flows will be used.

(1) "Consolidated Master Plan of Trunk Sewer Facilities, County Sanitation Districts No. 1, North Half of No. 6, and No.7, December 1982," by Boyle Engineering Corporation.

(2) "Updated and Consolidated Master Plan of Trunk Sewers for Districts Nos. 2, 3 and 11, October 1983," by Lowry & Associates.

(3) "Amendment No. 1 to the Consolidated Master Plan of Trunk Sewers for County Sanitation Districts 2, 3, and 11, Euclid/Newhope-Placentia Drainage Area, October 1986," by Willdan Associates.

(4) Institutional - Government, Military, Colleges, High Schools

REPRODUCED FROM COUNTY SANITATION DIST. "COLLECTION, TREATMENT, AND DISPOSAL FACILITIES MASTER PLAN"

Residential Flow Coefficients Derivation

Residential flow coefficients are derived based upon the number of dwelling units per acre, typical housing density and a flow contribution of 85 gallons per capita per day. Table 2-4 summarizes this data. These coefficients were originally developed from metered flow data and have been confirmed from time to time as representative of the CSDOCs service area for master planning purposes.

TABLE 2-4

RESIDENTIAL FLOW COEFFICIENTS

Residential Density	Persons/DU	Unit Average Flow Coefficient (cfs/ac)	Unit Average Flow Coefficient (gpd/ac)
Estate, 0-3 DU/Ac	3.8	.0015	1000
Low, 4-7 DU/Ac	2.8	.0025	1615
Medium, 8-16 DU/Ac	2.9	.0060	3880
Medium-High, 17-25 DU/Ac	2.8	.0091	5880
High, 26-35 DU/Ac	2.7	.0123	7945

Note the trend of persons per dwelling unit tends to decrease as residential density increases.

Other Flow Coefficients Derivation

Past results of metered flow from commercial/industrial developments in the CSDOC service area indicate an average daily flow contribution of 200 gallons per 1,000 square feet of building floor area per day is a reasonable value for master planning flow calculations. Based upon a flow value of 200 gallons per 1000 square feet per day, the following table summarizes coefficients used for various levels of development based on floor to area ratios (FAR):

Floor-to-Area Ratio (FAR)	Square Feet/Acre Limit	Commercial/Industrial Flow Coefficient (cfs/ac)	
.50	21,666	0.0065	≈4,200 gal/day/acre
.54	23,333	.007	
.60	26,666	.008	
.69	30,000	.009	
.77	33,333	.010	
.84	36,666	.011	
.92	40,000	.012	
1.00	43,333	.013	= 8,402, say 8,400 gal/day
1.50	66,666	.020	
2.00	86,666	.260	
2.50	108,900	.032	
3.00	130,700	.039	
3.50	152,500	.046	
4.00	174,300	.052	

SANITARY SEWER FLOW CALCULATIONS

TABLE I
SANITARY SEWER FLOWS

UTLIMATE CONDITIONS

AREA DESIGNATION	LAND USE CATEGORY	AREA (ACRES)	WASTEWATER FLOW GENERATION FACTORS (gpad) (2)	AVERAGE FLOW (mgd) (3)
AREA A	INDUSTRIAL	0.7	3900	0.003
AREA B	INDUSTRIAL	1.2	3900	0.005
AREA C	INDUSTRIAL	1.6	3900	0.006
AREA D	INDUSTRIAL	3.0	3900	0.012
AREA E	INDUSTRIAL	2.9	3900	0.011
AREA F	INDUSTRIAL	3.4	3900	0.013
AREA G	INDUSTRIAL	3.4	3900	0.013
AREA H	INDUSTRIAL	3.7	3900	0.014
AREA I	INDUSTRIAL	4.5	3900	0.018
AREA J	INDUSTRIAL	3.1	3900	0.012
AREA K	INDUSTRIAL	3.2	3900	0.012
AREA L-1	MOTEL	2.2	150 ROOMS AT 150 GPD PER ROOM	0.023
AREA L-1	INDUSTRIAL	1.5	3900	0.006
AREA L-2	RESTAURANT	0.8	150 SEATS AT 50 GPD PER SEAT	0.008
AREA L-2	OFFICE BUILDING	18.1	4200	0.076
AREA M	INDUSTRIAL	12.3	3900	0.048
AREA N	INDUSTRIAL	3.4	3900	0.013
AREA O	INDUSTRIAL	2.0	3900	0.008
AREA P	INDUSTRIAL	4.3	3900	0.017
RESIDENTIAL	RESIDENTIAL R-1 (1)	88.0	1800	0.158
SCHOOL	SCHOOL (1)	9.0	3600	0.032

(1) PER WASTE WATER MASTER PLAN FOR CITY OF HUNTINGTON BEACH, APRIL 1975
(2) WASTE WATER GENERATION FACTORS PER CITY OF HUNTINGTON BEACH STD 500

TABLE I

SANITARY SEWER FLOWS

UTLIMATE CONDITIONS

AREA DESIGNATION	LAND USE CATEGORY	AREA (ACRES)	WASTEWATER FLOW GENERATION	AVERAGE FLOW (mgd) (3)
CAMBRO MANUFACTURING	INDUSTRIAL	11.9	3900	0.046
AREA Q	INDUSTRIAL	6.8	3900	0.027
AREA R	INDUSTRIAL	3.0	3900	0.012
AREA S-1	INDUSTRIAL	4.3	3900	0.017
AREA S-2	INDUSTRIAL	3.6	3900	0.014
AREA T-1	MOTEL	3.6	150 ROOMS AT 150 GPD PER ROOM	0.023
AREA T-1	RESTAURANT	******	150 SEATS AT 50 GPD PER SEAT	0.008
AREA T-2	INDUSTRIAL	3.6	3900	0.014
AREA T-3	INDUSTRIAL	3.6	3900	0.014
SHARP ELECTRONICS	INDUSTRIAL	23.4	3900	0.091
AREA U-1	INDUSTRIAL	2.0	3900	0.008
AREA U-2	INDUSTRIAL	2.0	3900	0.008
AREA V-1	INDUSTRIAL	6.3	3900	0.025
AREA V-2	INDUSTRIAL	3.0	3900	0.012
AREA X-1	INDUSTRIAL	5.0	3900	0.020
AREA X-2	INDUSTRIAL	5.7	3900	0.022
AREA X-3	INDUSTRIAL	4.9	3900	0.019
AREA X-4	INDUSTRIAL	6.9	3900	0.027
AREA X-5	INDUSTRIAL	7.2	3900	0.028
McDONNEL DOUGLAS PLANT AREA	INDUSTRIAL	100.0	3900	0.390
EX-1	INDUSTRIAL	10.0	3900	0.039
AREA L-2 (ALTERNATIVE WITH ONLY ONE OFFICE HIGH RISE)	OFFICE BUILDING	18.1	3000	0.054

(1) PER WASTE WATER MASTER PLAN FOR CITY OF HUNTINGTON BEACH, APRIL 1975
(2) WASTE WATER GENERATION FACTORS PER CITY OF HUNTINGTON BEACH STD 500

TABLE I

SANITARY SEWER FLOWS

EXISTING CONDITIONS

AREA DESIGNATION	LAND USE CATEGORY	AREA (ACRES)	WASTEWATER FLOW GENERATION	AVERAGE FLOW (mgd) (3)
RESIDENTIAL	RESIDENTIAL R-1 (1)	88.0	1800	0.158
SCHOOL	SCHOOL (1)	9.0	3600	0.032
CAMBRO MANUFACTURING	INDUSTRIAL	11.9	3900	0.046
SHARP ELECTRONICS	INDUSTRIAL	23.4	3900	0.091
McDONNEL DOUGLAS PLANT AREA	INDUSTRIAL	214.0	3900	0.835
EXIST. OFFICE BUILDING	COMMERCIAL	9.0	4200	0.038
EX-1 (BOLSA)	INDUSTRIAL	10.0	3900	0.039
EX-2 (GRAHAM)	INDUSTRIAL	27.0	3900	0.105

(1) PER WASTE WATER MASTER PLAN FOR CITY OF HUNTINGTON BEACH, APRIL 1975
(2) WASTE WATER GENERATION FACTORS PER CITY OF HUNTINGTON BEACH STD 500

TABLE II
SEWER SYSTEM MODEL
EXISTING CONDITIONS

SUBAREA REACH	SLOPE (ft/ft)	DIA. (in)	n	FLOWS: AVERAGE FLOW FROM SUBAREA (mgd)	(cfs)	TOTAL FLOW IN REACH: AVERAGE (mgd)	PEAK (mgd)	PEAK (cfs)	DESIGN (d/D) RATIO	DESIGN CAPACITY OF REACH (cfs)	DEPTH TO DIAMETER RATIO (d/D)	FLOW DEPTH (in)	COMMENTS
RESIDENTIAL	0.0010	12	0.015	0.158	0.245	0.158	0.327	0.506	0.75	1.03	0.51	6.12	O.K.
SCHOOL	0.0010	12	0.015	0.032	0.050	0.191	0.388	0.600	0.75	1.03	0.56	6.72	O.K
CAMBRO MANUFACTURING	0.0010	12	0.015	0.046	0.072	0.237	0.474	0.733	0.75	1.03	0.64	7.68	O.K.
SHARP ELECTRONICS	0.0011	12	0.015	0.091	0.141	0.328	0.639	0.989	0.75	1.08	0.79	9.48	DEFICIENT
TOTAL FLOW 1							**0.639**	**0.989**					
McDONNEL DOUGLAS PLANT AREA	0.0020	18	0.015	0.835	1.291	0.835	1.507	2.332	0.75	4.28	0.54	9.72	O.K.
TOTAL FLOW 2							**1.507**	**2.332**					
EXIST. 24" GRAHAM SEWER	0.0011	24	0.015	TOTAL FLOW FROM (1+2)			2.146	3.321	0.75	6.84	0.50	12.00	O.K.
EXIST. 27" GRAHAM SEWER	0.0012	27	0.015	0.105	0.163	0.105	0.224						
TOTAL FLOW IN 27" LINE IN GRAHAM							2.371	0.347	0.75	9.77	0.13	3.51	O.K.
EXIST. OFFICE BUILDING	0.0040	8	0.015	0.038	0.058	0.038	0.087	0.135	0.75	0.70	0.30	2.40	O.K.
EX-1 (BOLSA)	0.0012	12	0.015	0.039	0.060	0.039	0.090	0.139	0.75	1.12	0.24	2.88	O.K.
TOTAL FLOW 3							**0.177**	**0.275**					
EXIST. BOLSA CHICA SEWER	0.0012	12	0.015	TOTAL FLOW 3			0.177	0.275	0.75	1.12	0.34	4.08	O.K.

(1) NORMAL DEPTH CALCULATIONS BASED ON MANNING EQUATION $Q=(K'/n)*D^{8/3}*S^{1/2}$, HANDBOOK OF HYDRAULIC (KINGS BRATER) TABLE 7-14

TABLE III
SEWER SYSTEM MODEL
PROPOSED CONDITIONS

SUBAREA REACH	SLOPE (ft/ft)	DIA. (in)	n	FLOWS: AVERAGE FLOW FROM SUBAREA (mgd)	(cfs)	TOTAL FLOW IN REACH: AVERAGE (mgd)	PEAK (mgd)	PEAK (cfs)	DESIGN (d/D) RATIO	DESIGN CAPACITY OF REACH (cfs)	DEPTH TO DIAMETER RATIO (d/D)	FLOW DEPTH (in)	COMMENTS
AREA A	0.0028	10	0.013	0.003	0.004	0.003	0.008	0.012	0.50	0.58	0.07	0.70	O.K.
AREA B	0.0028	10	0.013	0.005	0.007	0.007	0.020	0.030	0.50	0.58	0.11	1.10	O.K.
AREA C	0.0028	10	0.013	0.006	0.010	0.014	0.034	0.053	0.50	0.58	0.14	1.40	O.K.
AREA D	0.0028	10	0.013	0.012	0.018	0.025	0.061	0.094	0.50	0.58	0.19	1.90	O.K.
AREA E	0.0028	10	0.013	0.011	0.017	0.037	0.085	0.132	0.50	0.58	0.22	2.20	O.K.
AREA F	0.0028	10	0.013	0.013	0.021	0.050	0.113	0.175	0.50	0.58	0.26	2.60	O.K.
AREA G	0.0028	10	0.013	0.013	0.021	0.063	0.140	0.217	0.50	0.58	0.29	2.90	O.K.
AREA H	0.0028	10	0.013	0.014	0.022	0.078	0.169	0.262	0.50	0.58	0.32	3.20	O K.
AREA I	0.0028	10	0.013	0.018	0.027	0.095	0.204	0.316	0.50	0.58	0.35	3.50	O K.
AREA J	0.0028	10	0.013	0.012	0.019	0.107	0.228	0.353	0.50	0.58	0.37	3.70	O.K.
AREA K	0.0028	10	0.013	0.012	0.019	0.120	0.253	0.391	0.50	0.58	0.40	4.00	O K.
TOTAL FLOW 1							**0.253**	**0.391**					
AREA L-1 MOTEL & INDUSTRIAL	0.0040	8	0.013	0.029	0.045	0.029	0.068	0.106	0.50	0.38	0.25	2.00	O.K.
AREA L-2 OFFICE BUILDING	0.0040	8	0.015	0.084	0.130	0.113	0.239	0.370	0.75	0.60	0.53	4.24	O.K.
TOTAL FLOW 2							**0.239**	**0.370**					
EX-1	0.0012	12	0.015	0.039	0.060	0.039	0.090	0.139	0.75	0.97	0.24	2.88	O.K.
TOTAL FLOW 3							**0.090**	**0.139**					
EXIST. BOLSA SEWER	0.0012	12	0.015	TOTAL FLOW FROM (1+2+3)			0.582	0.900	0.75	0.97	0.70	8.40	O.K.
EXIST. BOLSA CHICA SEWER	0.0012	12	0.015				0.582	0.900	0.75	0.97	0.70	8.40	O.K.

(1) NORMAL DEPTH CALCULATIONS BASED ON MANNING EQUATION $Q=(K'/n)*D^{8/3}*S^{1/2}$, HANDBOOK OF HYDRAULICS (KINGS AND BRATER), TABLE 7-14

PROPOSED

TABLE III
SEWER SYSTEM MODEL
PROPOSED CONDITIONS

SUBAREA REACH	SLOPE (ft/ft)	DIA. (in)	n	FLOWS: AVERAGE FLOW FROM SUBAREA (mgd)	AVERAGE FLOW FROM SUBAREA (cfs)	TOTAL FLOW IN REACH: AVERAGE (mgd)	PEAK (mgd)	PEAK (cfs)	DESIGN (d/D) RATIO	DESIGN CAPACITY OF REACH (cfs)	DEPTH TO DIAMETER RATIO (d/D)	FLOW DEPTH (in)	COMMENTS
AREA M	0.0028	10	0.013	0.048	0.074	0.048	0.109	0.168	0.50	0.58	0.25	2.50	O.K.
AREA N	0.0028	10	0.013	0.013	0.021	0.061	0.136	0.211	0.50	0.58	0.28	2.80	O K.
AREA O	0.0028	10	0.013	0.008	0.012	0.069	0.152	0.235	0.50	0.58	0.30	3 00	O.K.
AREA P	0.0028	10	0.013	0.017	0.026	0.086	0.186	0.288	0.50	0.58	0.33	3.30	O.K.
TOTAL FLOW 4							**0.186**	**0.288**					
RESIDENTIAL	0.0010	12	0.015	0.158	0.245	0.158	0.327	0.506	0.75	0.89	0.51	6.12	O.K.
SCHOOL	0.0010	12	0.015	0.032	0.050	0.191	0.388	0.600	0.75	0.89	0.56	6.72	O.K.
AREA V-1	0.0010	12	0.015	0.025	0.038	0.215	0.433	0.671	0.75	0.89	0.60	7.20	O.K.
AREA V-2	0.0010	12	0.015	0.012	0.018	0.227	0.455	0.704	0.75	0.89	0.62	7.44	O.K.
CAMBRO MANUFACTURING	0.0028	12	0.013	0.046	0.072	0.273	0.540	0.835	0.75	1.72	0.46	5.52	O.K.
AREA Q	0.0028	10	0.013	0.027	0.041	0.027	0.063	0.098	0.50	0.58	0.19	1.90	O.K.
AREA R	0.0028	10	0.013	0.012	0.018	0.038	0.088	0.137	0.50	0.58	0.23	2.30	O.K.
AREA X-1	0.0015	15	0.013	0.020	0.030	0.285	0.561	0.867	0.50	1.25	0.40	6.00	O.K.
AREA X-2	0.0015	15	0.013	0.022	0.034	0.307	0.601	0.929	0.50	1.25	0.42	6.30	O.K.
AREA X-3	0.0015	15	0.013	0.019	0.030	0.326	0.635	0.982	0.50	1.25	0.43	6.45	O.K.
AREA X-4	0.0015	15	0.013	0.027	0.042	0.353	0.683	1.057	0.50	1.25	0.45	6.75	O.K.
AREA X-5	0.0015	15	0.013	0.028	0.043	0.381	0.733	1.134	0.50	1.25	0.47	7.05	O.K.
TOTAL FLOW 5							**0.733**	**1.134**					

(1) NORMAL DEPTH CALCULATIONS BASED ON MANNING EQUATION $Q=(K'/n)*D^{8/3}*S^{1/2}$, HANDBOOK OF HYDRAULICS (KINGS AND BRATER), TABLE 7-14

TABLE III
SEWER SYSTEM MODEL
PROPOSED CONDITIONS

SUBAREA REACH	SLOPE (ft/ft)	DIA. (in)	n	FLOWS: AVERAGE FLOW FROM SUBAREA (mgd)	FLOWS: AVERAGE FLOW FROM SUBAREA (cfs)	FLOWS: TOTAL FLOW IN REACH AVERAGE (mgd)	FLOWS: TOTAL FLOW IN REACH PEAK (mgd)	FLOWS: TOTAL FLOW IN REACH PEAK (cfs)	DESIGN (d/D) RATIO	DESIGN CAPACITY OF REACH (cfs)	DEPTH TO DIAMETER RATIO (d/D)	FLOW DEPTH (in)	COMMENTS
AREA S-1	0.0040	8	0.013	0.017	0.026	0.017	0.041	0.064	0.50	0.38	0.19	1.52	O.K.
AREA T-1	0.0040	8	0.013	0.030	0.046	0.047	0.106	0.165	0.50	0.38	0.31	2.48	O.K.
AREA S-2	0.0040	8	0.013	0.014	0.022	0.061	0.135	0.210	0.50	0.38	0.35	2.80	O.K.
AREA T-2	0.0040	8	0.013	0.014	0.022	0.075	0.164	0.254	0.50	0.38	0.39	3.12	O.K.
AREA T-3	0.0040	8	0.013	0.014	0.022	0.089	0.192	0.297	0.50	0.38	0.43	3.44	O.K.
AREA U-1	0.0040	8	0.013	0.008	0.012	0.097	0.207	0.321	0.50	0.38	0.45	3.60	O.K.
AREA U-2	0.0010	12	0.015	0.008	0.012	0.104	0.223	0.345	0.50	0.49	0.41	4.92	O.K.
SHARP ELECTRONICS	0.0010	12	0.015	0.091	0.141	0.196	0.397	0.614	0.75	0.89	0.57	6.84	O.K.
TOTAL FLOW 6							**0.397**	**0.614**					
McDONNEL DOUGLAS PLANT AREA	0.0020	18	0.015	0.390	0.603	0.390	0.749	1.158	0.75	3.71	0.36	6.48	O.K.
TOTAL FLOW 7							**0.749**	**1.158**					
EXIST. 24" GRAHAM SEWER	0.0011	24	0.015	TOTAL FLOW FROM (4+5+6+7)			2.064	3.194	0.75	5.92	0.49	11.76	O.K.
EXIST. 27" GRAHAM SEWER	0.0012	27	0.015	0.105	0.163	0.105	0.224						
TOTAL FLOW IN 27" LINE IN GRAHA							2.289	0.347	0.75	8.47	0.13	3.51	O.K.

(1) NORMAL DEPTH CALCULATIONS BASED ON MANNING EQUATION $Q=(K'/n)*D^{8/3}*S^{1/2}$, HANDBOOK OF HYDRAULICS (KINGS AND BRATER), TABLE 7-14

PROPOSED

TABLE III
SEWER SYSTEM MODEL
PROPOSED CONDITIONS

ALTERNATIVE SEWER CONNECTIONS TO EXISTING 12" BOLSA SEWER

SUBAREA REACH	SLOPE (ft/ft)	DIA. (in)	n	FLOWS: AVERAGE FLOW FROM SUBAREA (mgd)	FLOWS: AVERAGE FLOW FROM SUBAREA (cfs)	FLOWS: TOTAL FLOW IN REACH AVERAGE (mgd)	FLOWS: TOTAL FLOW IN REACH PEAK (mgd)	FLOWS: TOTAL FLOW IN REACH PEAK (cfs)	DESIGN (d/D) RATIO	DESIGN CAPACITY OF REACH (cfs)	DEPTH TO DIAMETER RATIO (d/D)	FLOW DEPTH (in)	COMMENTS
AREA A	0.0028	10	0.013	0.000	0.000	0.000	0.000	0.000	0.50	0.58	0.00	0.00	O.K.
AREA B	0.0028	10	0.013	0.000	0.000	0.000	0.000	0.000	0.50	0.58	0.00	0.00	O.K.
AREA C	0.0028	10	0.013	0.000	0.000	0.000	0.000	0.000	0.50	0.58	0.00	0.00	O.K.
AREA D	0.0028	10	0.013	0.000	0.000	0.000	0.000	0.000	0.50	0.58	0.00	0.00	O.K.
AREA E	0.0028	10	0.013	0.000	0.000	0.000	0.000	0.000	0.50	0.58	0.00	0.00	O.K.
AREA F	0.0028	10	0.013	0.013	0.021	0.013	0.033	0.052	0.50	0.58	0.14	1.40	O.K
AREA G	0.0028	10	0.013	0.013	0.021	0.027	0.063	0.098	0.50	0.58	0.19	1 90	O.K.
AREA H	0.0028	10	0.013	0.014	0.022	0.041	0.094	0.146	0.50	0.58	0.23	2.30	O.K.
AREA I	0.0028	10	0.013	0.018	0.027	0.059	0.131	0.202	0.50	0.58	0.28	2.80	O.K.
AREA J	0.0028	10	0.013	0.012	0.019	0.071	0.155	0.240	0.50	0.58	0.30	3.00	O.K.
AREA K	0.0028	10	0.013	0.012	0.019	0.083	0.180	0.279	0.50	0.58	0.33	3.30	O.K.
TOTAL FLOW 8							**0.180**	**0.279**					
AREA L-1	0.0040	8	0.013	0.029	0.045	0.029	0.068	0.106	0.50	0.38	0.25	2.00	O.K.
AREA L-2	0.0040	8	0.015	0.062	0.096	0.091	0.197	0.304	0.75	0.60	0.47	3.76	O.K.
TOTAL FLOW 9							**0.197**	**0.304**					

(1) NORMAL DEPTH CALCULATIONS BASED ON MANNING EQUATION $Q=(K'/n)*D^{8/3}*S^{1/2}$, HANDBOOK OF HYDRAULICS (KINGS AND BRATER), TABLE 7-14

PROPOSED

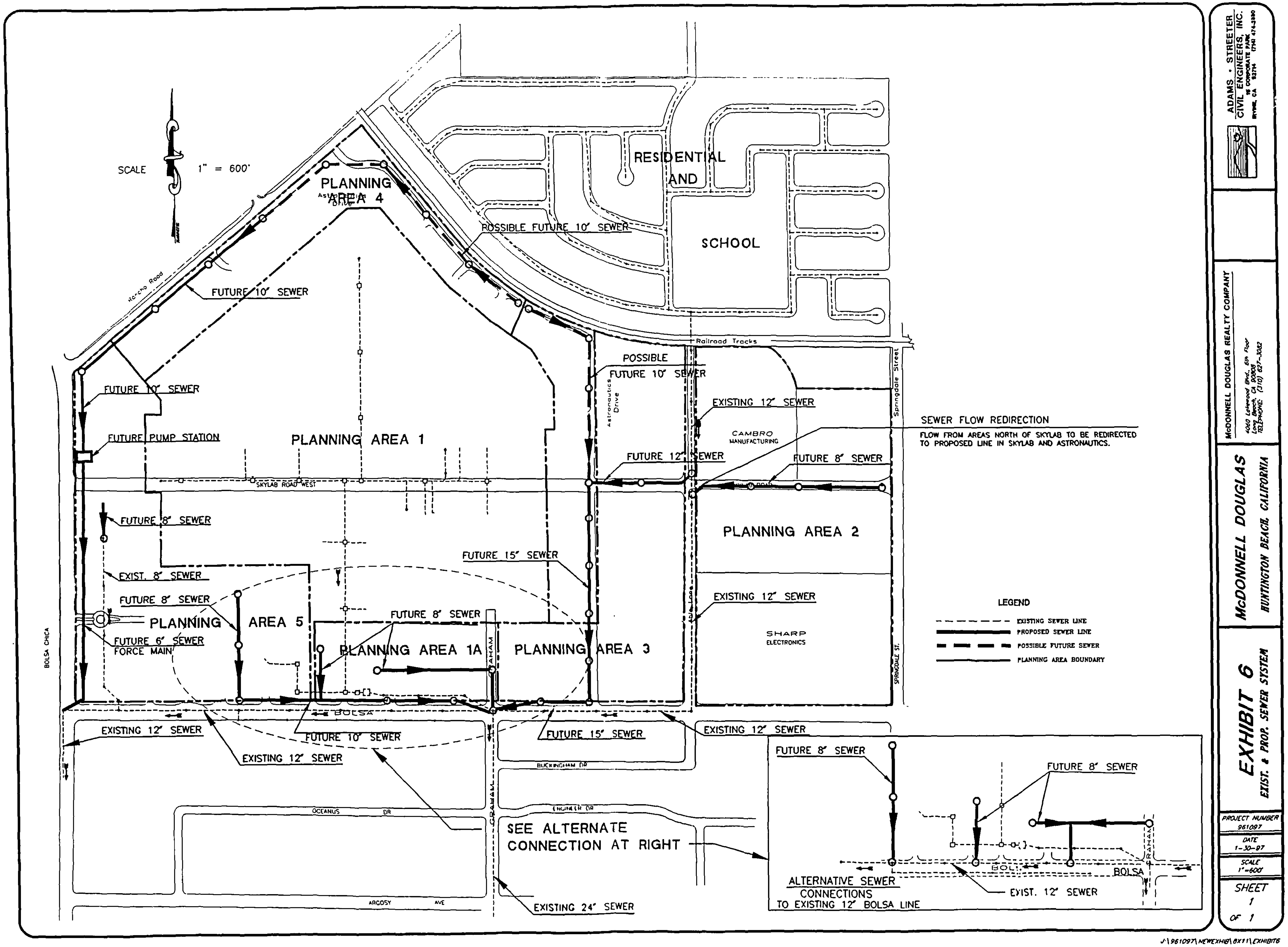
TABLE III
SEWER SYSTEM MODEL
PROPOSED CONDITIONS

ALTERNATIVE SEWER CONNECTIONS TO EXISTING 12" BOLSA SEWER

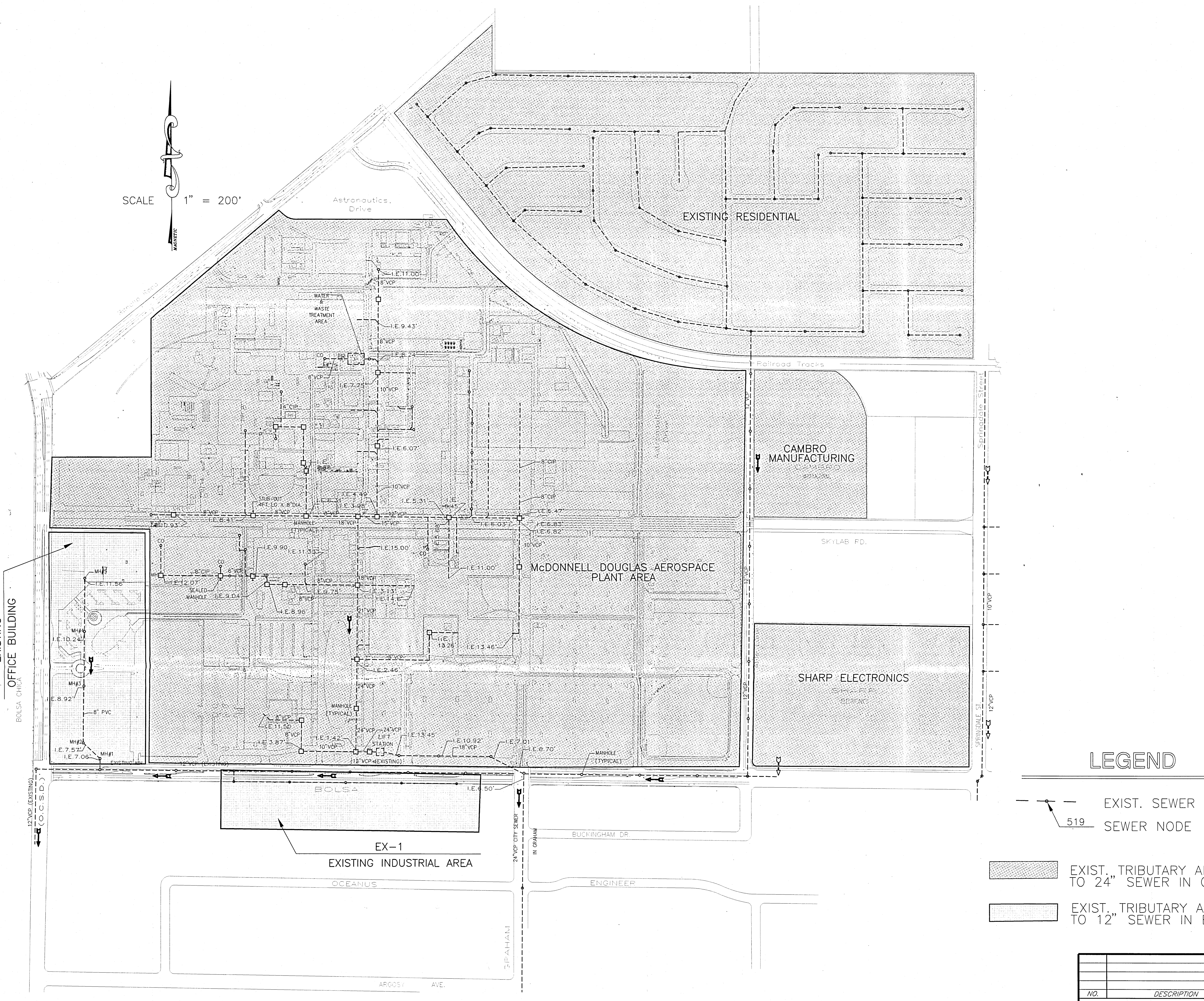
SUBAREA REACH	SLOPE (ft/ft)	DIA. (in)	n	FLOWS: AVERAGE FLOW FROM SUBAREA (mgd)	FLOWS: AVERAGE FLOW FROM SUBAREA (cfs)	FLOWS: TOTAL FLOW IN REACH AVERAGE (mgd)	FLOWS: TOTAL FLOW IN REACH PEAK (mgd)	FLOWS: TOTAL FLOW IN REACH PEAK (cfs)	DESIGN (d/D) RATIO	DESIGN CAPACITY OF REACH (cfs)	DEPTH TO DIAMETER RATIO (d/D)	FLOW DEPTH (in)	COMMENTS
AREA P	0.0012	12	0.015	0.000	0.000	0.017	0.041	0.064	0.50	0.54	0.16	1.92	O.K.
AREA O	0.0012	12	0.015	0.008	0.012	0.025	0.059	0.091	0.50	0.54	0.19	2.28	O.K.
AREA N	0.0012	12	0.015	0.013	0.021	0.038	0.088	0.135	0.50	0.54	0.24	2.88	O.K.
AREA M	0.0012	12	0.015	0.048	0.074	0.086	0.186	0.288	0.50	0.54	0.35	4.20	O.K.
EX-1	0.0012	12	0.015	0.039	0.060	0.125	0.262	0.406	0.75	0.97	0.42	5 04	O.K.
TOTAL FLOW 10							**0.262**	**0.406**					
EXIST. 12" BOLSA SEWER	0.0012	12	0.015	TOTAL FLOW FROM 9 & 10			**0.459**	**0.710**	0.75	0.97	0.59	7.08	O.K.
EXIST. BOLSA CHICA SEWER	0.0012	12	0.015	TOTAL FLOW FROM (8+9+10)			**0.639**	**0.989**	0.75	0.97	0.75	9.00	O K.

(1) NORMAL DEPTH CALCULATIONS BASED ON MANNING EQUATION $Q=(K'/n)*D^{8/3}*S^{1/2}$, HANDBOOK OF HYDRAULICS (KINGS AND BRATER), TABLE 7-14

SANITARY SEWER EXHIBITS



SEE 1"=200' FOLDED MAP FOR MORE DETAIL



LEGEND

EXIST. SEWER

519 SEWER NODE

EXIST. TRIBUTARY AREA TO 24" SEWER IN GRAHAM

EXIST. TRIBUTARY AREA TO 12" SEWER IN BOLSA CHICA

NO.	DESCRIPTION	DATE	BY

REVISIONS

ADAMS • STREETER CIVIL ENGINEERS, INC.
15 CORPORATE PARK
IRVINE, CA 92714 (714) 474-2330

McDONNELL DOUGLAS REALTY COMPANY
4060 Lakewood Blvd., 6th Floor
Long Beach, CA 90808
TELEPHONE: (310) 627-3082

UTILITY MASTER PLAN
McDONNELL DOUGLAS
HUNTINGTON BEACH, CALIFORNIA

EXHIBIT SW-1
EXISTING SEWER SYSTEM

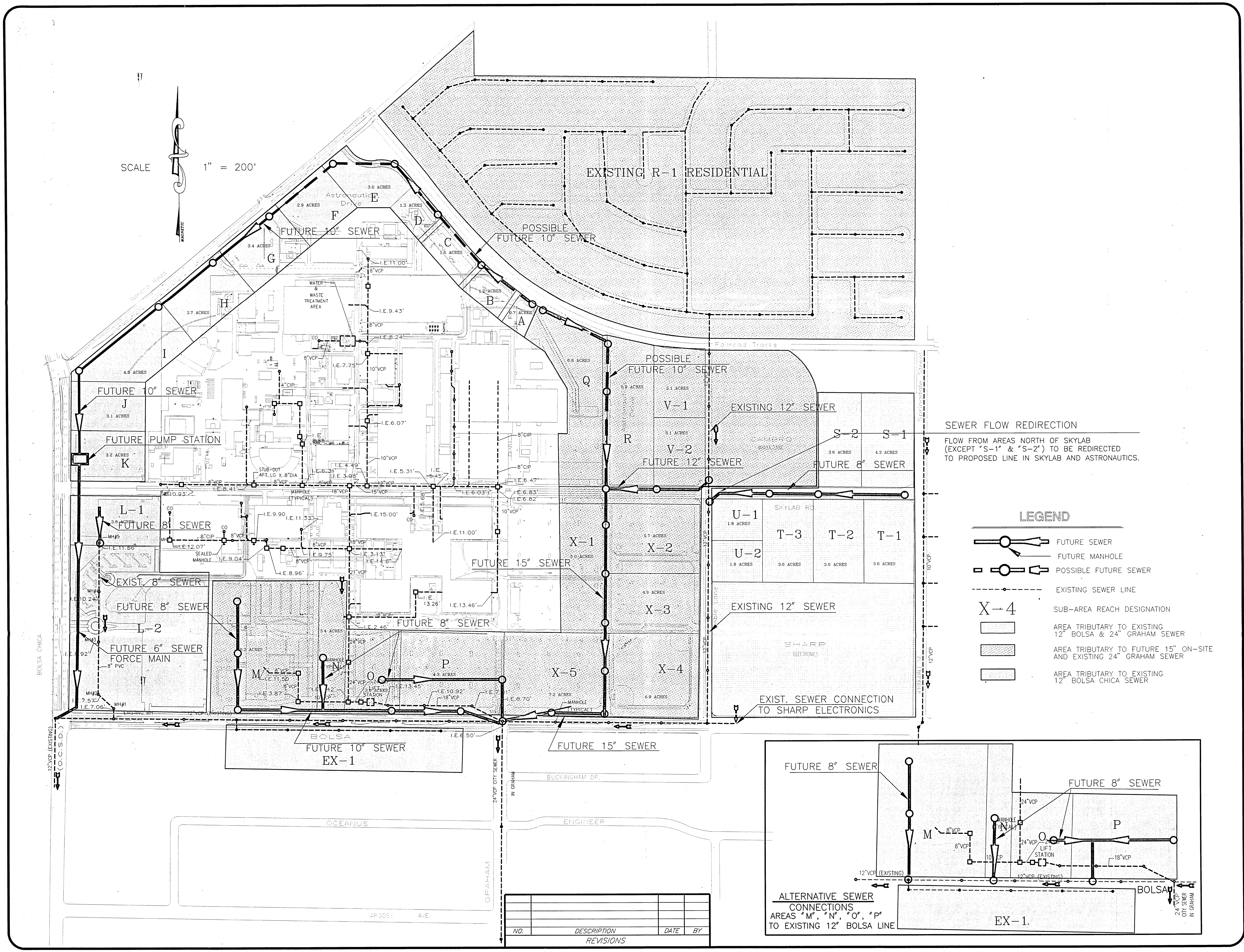
PROJECT NUMBER 961097

DATE 2-3-97

SCALE 1"=200'

SHEET 1 OF 2

J:\961097\NEWEXHIB\REVJAN97\1097SWEX



ADAMS • STREETER
CIVIL ENGINEERS, INC.
15 CORPORATE PARK
IRVINE, CA 92714 (714) 474-2330

McDONNELL DOUGLAS REALTY COMPANY
4060 Lakewood Blvd., 6th Floor
Long Beach, CA 90808
TELEPHONE: (310) 627-3082

UTILITY MASTER PLAN
McDONNELL DOUGLAS
HUNTINGTON BEACH, CALIFORNIA

EXHIBIT SW-2
ULTIMATE SEWER SYSTEM

PROJECT NUMBER 961097
DATE 2-3-97
SCALE 1"=200'
SHEET 2 OF 2

J:\961097\NEWEXHIB\REVJAN97\1097SWUT

WATER SYSTEM ANALYSIS

CITY OF HUNTINGTON BEACH

McDONNELL DOUGLAS MASTER PLAN

WATER SYSTEM ANALYSIS

SUBMITTED TO:

ADAMS STREETER CIVIL ENGINEERS

APRIL 1997

PREPARED BY:

SIDAWI & ASSOCIATES
CONSULTING ENGINEERS
3184-K AIRWAY AVENUE
COSTA MESA, CA 92626
PHONE (714) 966-1416 ◆ FAX (714) 966-1502

CITY OF HUNTINGTON BEACH

MCDONNELL DOUGLAS MASTER PLAN

WATER SYSTEM ANALYSIS

SUBMITTED TO:
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(714) 966-1416 ◆ FAX (714)966-1502

CITY OF HUNTINGTON BEACH

MCDONNELL DOUGLAS MASTER PLAN

WATER SYSTEM ANALYSIS

TABLE OF CONTENTS

CITY OF HUNTINGTON BEACH

MCDONNELL DOUGLAS MASTER PLAN

WATER SYSTEM ANALYSIS

PURPOSE

The purpose of this report is to present the results of the water system analysis that was performed to determine the required pipe sizes for the McDonnell Douglas Master Plan water distribution lines that will meet the City of Huntington Beach criteria.

CRITERIA USED IN THE ANALYSIS

Estimates of water consumption rates for the Master Plan area water system were based on values obtained from the City. These values were in turn derived from the "City of Huntington Beach 1988 Water Master Plan" Table 3-8. They are as follows:

Planning Area	Acres	Future use	Average Day Demand/gpm
1 & 1A	120	Manufacturing	444
2: Cambro	11.9	Manufacturing	44
2: Sharp	23.8	Warehse/Comm	31
2: Vacant Phase I	8	Manufacturing	30
2: Vacant Phase II	14.7	Manufacturing	54
3: Vacant Phase IIIa	36	Manufacturing	133
4: Vacant Phase IIIb	35	Manufacturing	130
5: Phase I	9	Commercial	12
5: Phase II	31	Commercial	40
5: Future Potential	16.11	Hi Density Res.	44

The domestic water demands were proportioned to the various nodes based on the values given in the table above. For the area south of Bolsa Avenue the flow allocations for residential areas were based on 1.2 gpm/acre and for commercial 1.3 gpm/acre.

Peaking factors were also based on the City's Water Master Plan. They are as follows :

Maximum day demand = 2.43 x average annual day demand

Peak hour demand = 4.00 x average annual day demand

The control hydraulic grade line (HGL) elevation of 185.60 that was used in the analysis was based on the 70 psi discharge pressure of the Peck Reservoir booster pump station. See Table 5-2 of the 1988 "City of Huntington Beach Water System Master Plan". The derivation of the HGL elevation is based on a ground elevation at the booster station of 23.90 plus the discharge pressure: 23.90 + 70 X 2.31 = 185.60.

A hydraulic network analysis incorporating the various elements of the water system was performed to assist in sizing the water lines that will meet ultimate flow conditions and the following criteria:

1) Provide maximum day demand plus 4,000 gpm fire flow with a minimum residual pressure of 20 psi at critical fire hydrants.

2) Provide peak hour demand with a minimum service pressure of 40 psi.

3) Head loss shall not exceed 5'/1000' for max day demand or 10'/1000' for peak hour, or maximum day plus fire flow, whichever is greater .

4) Hazen-Williams friction "C" value used in the analysis was 130

<u>COMPUTER ANALYSIS</u>

Cybemet Version 2.18 hydraulic network analysis program by Haestad Methods Inc. was used for the analysis. Four sets of network simulation runs were made; one for maximum day demand with no fire flow; the second for maximum day demand with 4,000 gpm fire flow taken at Nodes 14 and 16; the third for maximum day demand with 4,000 gpm fire flow taken at Nodes 9 and 10; and the fourth for peak hour demand.

The computer printouts resulting from the analysis show that the residual pressure requirements for the fire flow runs met the required minimum 20 psi residual pressure with the pipe sizes indicated on the attached schematic diagram. For the peak hour demand, the minimum residual pressure of 40 psi was also met. Headloss criteria were met in all areas except for the existing line in Skylab between Springdale and Able Lane where the headloss slightly exceeded the criteria.

McDONNELL DOUGLAS MASTER PLAN
WATER SYSTEM ANALYSIS
MAXIMUM DAY DEMAND

U N I T S   S P E C I F I E D

FLOWRATE .... = gallons/minute
HEAD (HGL) .... = feet
PRESSURE .... = psig

O U T P U T   O P T I O N   D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

S Y S T E M   C O N F I G U R A T I O N

NUMBER OF PIPES ....(p) = 50
NUMBER OF JUNCTION NODES ....(j) = 36
NUMBER OF PRIMARY LOOPS ....(l) = 14
NUMBER OF BOUNDARY NODES ....(f) = 1
NUMBER OF SUPPLY ZONES ....(z) = 1

****
S I M U L A T I O N   R E S U L T S
****

The results are obtained after 5 trials with an accuracy = 0.00369

S I M U L A T I O N   D E S C R I P T I O N

CyberNet Version 2.18. Copyright 1991,92 Haestad Methods Inc.

Run Description: Maximum Day Demand

Drawing: MD_WATER

P I P E L I N E   R E S U L T S

STATUS CODE: XX -CLOSED PIPE BN -BOUNDARY NODE PU -PUMP LINE
CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1	#2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/ 1000 (ft/ft)
1-BN	0	1	3347.32	0.09	0.00	0.00	1.06	0.11
2	1	2	2278.50	0.08	0.00	0.00	0.72	0.06
3	3	2	-843.33	2.42	0.00	0.00	2.39	1.85
4	4	3	-575.23	0.58	0.00	0.00	1.63	0.91
5	5	4	-260.13	0.13	0.00	0.00	0.74	0.21
6	6	5	-159.62	0.16	0.00	0.00	0.45	0.08
7	7	6	-87.13	0.02	0.00	0.00	0.25	0.03
8	8	7	-156.00	0.05	0.00	0.00	0.44	0.08
9	9	8	-112.26	0.02	0.00	0.00	0.32	0.04
10	10	9	-15.06	0.00	0.00	0.00	0.04	0.00

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.02	0.00
12	11	12	-82.14	0.01	0.00	0.00	0.13	0.01
13	12	13	-82.14	0.00	0.00	0.00	0.13	0.01
14	13	14	-441.78	0.30	0.00	0.00	0.70	0.14
15	4	14	261.63	0.08	0.00	0.00	0.42	0.05
16	15	14	957.75	0.37	0.00	0.00	1.53	0.58
17	15	1	-913.31	2.79	0.00	0.00	2.59	2.14
18	15	3	-253.42	0.29	0.00	0.00	0.72	0.20
19	14	16	729.00	0.19	0.00	0.00	1.16	0.35
20	2	17	1398.71	0.00	0.00	0.00	0.44	0.02
21	17	18	659.74	0.01	0.00	0.00	0.21	0.01
22	19	18	-620.14	1.15	0.00	0.00	1.76	1.05
23	20	19	-617.61	1.56	0.00	0.00	1.75	1.04
24	21	20	-241.22	0.29	0.00	0.00	0.68	0.18
25	22	21	-148.43	0.20	0.00	0.00	0.61	0.18
26	23	22	-125.59	0.05	0.00	0.00	0.36	0.05
27	24	23	-133.33	0.04	0.00	0.00	0.38	0.06
28	7	24	-68.86	0.02	0.00	0.00	0.20	0.02
29	24	25	-4.06	0.00	0.00	0.00	0.03	0.00
30	25	26	-66.21	0.24	0.00	0.00	0.42	0.12
31	25	27	-6.38	0.00	0.00	0.00	0.04	0.00
32	6	27	-15.00	0.00	0.00	0.00	0.10	0.01
33	27	28	-67.07	0.23	0.00	0.00	0.43	0.12
34	29	28	-161.99	0.03	0.00	0.00	0.46	0.09
35	5	29	-227.53	0.05	0.00	0.00	0.65	0.16
36	28	26	-83.95	0.01	0.00	0.00	0.24	0.03
37	26	20	-263.40	0.32	0.00	0.00	0.75	0.21
38	28	31	-235.26	1.68	0.00	0.00	1.50	1.25
39	29	30	-155.70	0.72	0.00	0.00	0.99	0.58
40	30	3	77.65	0.05	0.00	0.00	0.50	0.16
41	30	35	-272.23	2.18	0.00	0.00	1.74	1.64
42	31	34	-191.25	1.04	0.00	0.00	1.22	0.85
43	31	32	-82.89	0.24	0.00	0.00	0.53	0.18
44	32	19	37.08	0.03	0.00	0.00	0.24	0.04
45	32	33	-158.85	0.64	0.00	0.00	1.01	0.61
46	34	33	197.73	0.15	0.00	0.00	0.56	0.13
47	35	34	427.86	0.15	0.00	0.00	1.21	0.53
48	35	17	-738.97	0.18	0.00	0.00	2.10	1.45
49	36	21	-69.95	0.11	0.00	0.00	0.45	0.13
50	23	36	-31.07	0.13	0.00	0.00	0.35	0.12

J U N C T I O N   N O D E   R E S U L T S

JUNCTION NUMBER	JUNCTION TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	JUNCTION ELEVATION (ft)	PRESSURE HEAD (ft)	JUNCTION PRESSURE (psi)
1-1		155.52	185.51	22.50	163.01	70.64
2-1		36.45	185.43	18.20	167.23	72.46
3-1		92.34	183.01	19.50	163.51	70.85
4-1		53.46	182.43	18.80	163.63	70.90
5-1		328.05	182.29	17.50	164.79	71.41
6-1		87.48	182.13	14.80	167.33	72.51
7-1		0.00	182.11	14.30	167.81	72.72
8-1		43.74	182.06	15.10	166.96	72.35
9-1		97.20	182.04	15.60	166.44	72.12
10-1		0.00	182.04	17.20	164.84	71.43
11-1		97.20	182.04	18.30	163.74	70.95
12-1		0.00	182.04	19.10	162.94	70.61
13-1		359.64	182.05	20.70	161.35	69.92
14-1		48.60	182.35	18.50	163.85	71.00

[illegible]	208.98	182.72	21.80	160.92	69.73
16-1	729.00	182.16	18.80	163.36	70.79
17-1	0.00	185.42	18.00	167.42	72.55
18-1	39.61	185.41	15.00	170.41	73.84
19-1	39.61	184.26	14.90	169.36	73.39
20-1	113.00	182.70	13.30	169.40	73.41
21-1	22.84	182.41	13.00	169.41	73.41
22-1	22.84	182.22	12.00	170.22	73.76
23-1	23.33	182.17	14.40	167.77	72.70
24-1	68.53	182.13	14.80	167.33	72.51
25-1	68.53	182.14	14.90	167.24	72.47
26-1	113.24	182.38	16.00	166.38	72.10
27-1	45.68	182.14	15.10	167.04	72.38
28-1	90.15	182.36	17.00	165.36	71.66
29-1	90.15	182.34	17.00	165.34	71.65
30-1	38.88	183.06	19.00	164.06	71.09
31-1	38.88	184.05	19.00	165.05	71.52
32-1	38.88	184.29	15.90	168.39	72.97
33-1	38.88	184.93	16.40	168.53	73.03
34-1	38.88	185.09	18.00	167.09	72.40
35-1	38.88	185.24	18.00	167.24	72.47
36-1	38.88	182.30	14.90	167.40	72.54

SUMMARY OF INFLOWS AND OUTFLOWS

(+) INFLOWS INTO THE SYSTEM FROM BOUNDARY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO BOUNDARY NODES

PIPE NUMBER	FLOWRATE (gpm)
1	3347.32

NET SYSTEM INFLOW = 3347.32
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 3347.32

MCDONNELL DOUGLAS MASTER PLAN
WATER SYSTEM ANALYSIS
MAXIMUM DAY DEMAND + 2000 GPM EACH @ NODES 14 & 16

U N I T S   S P E C I F I E D

FLOWRATE .... = gallons/minute
HEAD (HGL) .... = feet
PRESSURE .... = psig

O U T P U T   O P T I O N   D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

S Y S T E M   C O N F I G U R A T I O N

NUMBER OF PIPES ....(p) = 50
NUMBER OF JUNCTION NODES ....(j) = 36
NUMBER OF PRIMARY LOOPS ....(l) = 14
NUMBER OF BOUNDARY NODES ....(f) = 1
NUMBER OF SUPPLY ZONES ....(z) = 1

****
S I M U L A T I O N   R E S U L T S
****

The results are obtained after 4 trials with an accuracy = 0.00465

S I M U L A T I O N   D E S C R I P T I O N

CyberNet Version 2.18. Copyright 1991,92 Haestad Methods Inc.

Run Description: Max. Day + 2000 GPM @ Nodes 14 & 16

Drawing: MD_WATER

P I P E L I N E   R E S U L T S

STATUS CODE: XX -CLOSED PIPE BN -BOUNDARY NODE PU -PUMP LINE
CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1	#2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/1000 (ft/ft)
1-BN	0	1	7347.33	0.40	0.00	0.00	2.32	0.48
2	1	2	4906.77	0.33	0.00	0.00	1.55	0.23
3	3	2	-2021.53	12.20	0.00	0.00	5.73	9.34
4	4	3	-1385.87	2.97	0.00	0.00	3.93	4.64
5	5	4	448.07	0.37	0.00	0.00	1.27	0.57
6	6	5	-189.73	0.22	0.00	0.00	0.54	0.12
7	7	6	-261.00	0.17	0.00	0.00	0.74	0.21
8	8	7	-673.33	0.77	0.00	0.00	1.91	1.22
9	9	8	-629.59	0.55	0.00	0.00	1.79	1.08
10	10	9	-532.39	0.82	0.00	0.00	1.51	0.79

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00	0.00	0.85	0.19
12	11	12	435.19	0.14	0.00	0.00	0.69	0.13
13	12	13	435.19	0.10	0.00	0.00	0.69	0.13
14	13	14	75.55	0.01	0.00	0.00	0.12	0.01
15	4	14	1780.47	2.64	0.00	0.00	2.84	1.82
16	15	14	2921.57	2.91	0.00	0.00	4.66	4.55
17	15	1	-2285.04	15.23	0.00	0.00	6.48	11.72
18	15	3	-845.51	2.69	0.00	0.00	2.40	1.86
19	14	16	2729.00	2.17	0.00	0.00	4.35	4.01
20	2	17	2848.79	0.02	0.00	0.00	0.90	0.08
21	17	18	1338.14	0.05	0.00	0.00	0.42	0.02
22	19	18	-1298.54	4.53	0.00	0.00	3.68	4.11
23	20	19	-1371.50	6.83	0.00	0.00	3.89	4.55
24	21	20	-554.20	1.33	0.00	0.00	1.57	0.85
25	22	21	-392.69	1.20	0.00	0.00	1.60	1.09
26	23	22	-369.85	0.34	0.00	0.00	1.05	0.40
27	24	23	-446.31	0.36	0.00	0.00	1.27	0.57
28	7	24	-412.33	0.55	0.00	0.00	1.17	0.49
29	24	25	-34.55	0.02	0.00	0.00	0.22	0.04
30	25	26	-158.63	1.23	0.00	0.00	1.01	0.60
31	25	27	55.56	0.06	0.00	0.00	0.35	0.09
32	6	27	-158.76	0.35	0.00	0.00	1.01	0.60
33	27	28	-148.88	1.00	0.00	0.00	0.95	0.54
34	29	28	-748.77	0.43	0.00	0.00	2.12	1.48
35	5	29	-965.84	0.70	0.00	0.00	2.74	2.38
36	28	26	-432.43	0.28	0.00	0.00	1.23	0.54
37	26	20	-704.30	1.98	0.00	0.00	2.00	1.32
38	28	31	-555.37	8.25	0.00	0.00	3.54	6.15
39	29	30	-307.23	2.53	0.00	0.00	1.96	2.05
40	30	3	302.20	0.63	0.00	0.00	1.93	1.99
41	30	35	-648.30	10.88	0.00	0.00	4.14	8.19
42	31	34	-407.17	4.22	0.00	0.00	2.60	3.46
43	31	32	-187.08	1.10	0.00	0.00	1.19	0.82
44	32	19	112.57	0.26	0.00	0.00	0.72	0.32
45	32	33	-338.53	2.62	0.00	0.00	2.16	2.46
46	34	33	377.41	0.51	0.00	0.00	1.07	0.42
47	35	34	823.46	0.51	0.00	0.00	2.34	1.77
48	35	17	-1510.65	0.68	0.00	0.00	4.29	5.44
49	36	21	-138.67	0.40	0.00	0.00	0.89	0.47
50	23	36	-99.79	1.14	0.00	0.00	1.13	1.04

J U N C T I O N   N O D E   R E S U L T S

JUNCTION NUMBER	JUNCTION TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	JUNCTION ELEVATION (ft)	PRESSURE HEAD (ft)	JUNCTION PRESSURE (psi)
1-1		155.52	185.20	22.50	162.70	70.50
2-1		36.45	184.87	18.20	166.67	72.22
3-1		92.34	172.66	19.50	153.16	66.37
4-1		53.46	169.69	18.80	150.89	65.39
5-1		328.05	170.06	17.50	152.56	66.11
6-1		87.48	169.84	14.80	155.04	67.18
7-1		0.00	169.67	14.30	155.37	67.33
8-1		43.74	168.90	15.10	153.80	66.65
9-1		97.20	168.36	15.60	152.76	66.19
10-1		0.00	167.54	17.20	150.34	65.15
11-1		97.20	167.30	18.30	149.00	64.57
12-1		0.00	167.17	19.10	148.07	64.16
13-1		359.64	167.07	20.70	146.37	63.43
14-1		2048.60	167.06	18.50	148.56	64.37

[illegible]	[illegible]	[illegible]	21.80	148.17	64.21
16-1	2729.00	164.89	18.80	146.09	63.31
17-1	0.00	184.85	18.00	166.85	72.30
18-1	39.61	184.80	15.00	169.80	73.58
19-1	39.61	180.27	14.90	165.37	71.66
20-1	113.00	173.45	13.30	160.15	69.40
21-1	22.84	172.12	13.00	159.12	68.95
22-1	22.84	170.92	12.00	158.92	68.86
23-1	23.33	170.57	14.40	156.17	67.68
24-1	68.53	170.22	14.80	155.42	67.35
25-1	68.53	170.25	14.90	155.35	67.32
26-1	113.24	171.47	16.00	155.47	67.37
27-1	45.68	170.19	15.10	155.09	67.20
28-1	90.15	171.18	17.00	154.18	66.81
29-1	90.15	170.76	17.00	153.76	66.63
30-1	38.88	173.29	19.00	154.29	66.86
31-1	38.88	179.43	19.00	160.43	69.52
32-1	38.88	180.53	15.90	164.63	71.34
33-1	38.88	183.15	16.40	166.75	72.26
34-1	38.88	183.66	18.00	165.66	71.78
35-1	38.88	184.17	18.00	166.17	72.01
36-1	38.88	171.72	14.90	156.82	67.95

S U M M A R Y   O F   I N F L O W S   A N D   O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM BOUNDARY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO BOUNDARY NODES

PIPE NUMBER	FLOWRATE (gpm)
1	7347.33

NET SYSTEM INFLOW = 7347.33
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 7347.32

WATER SYSTEM ANALYSIS
MAXIMUM DAY DEMAND + 2000 GPM EACH @ NODES 9 & 10

U N I T S   S P E C I F I E D

FLOWRATE .... = gallons/minute
HEAD (HGL) .... = feet
PRESSURE .... = psig

O U T P U T   O P T I O N   D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

S Y S T E M   C O N F I G U R A T I O N

NUMBER OF PIPES ....(p) = 50
NUMBER OF JUNCTION NODES ....(j) = 36
NUMBER OF PRIMARY LOOPS ....(l) = 14
NUMBER OF BOUNDARY NODES ....(f) = 1
NUMBER OF SUPPLY ZONES ....(z) = 1

****
S I M U L A T I O N   R E S U L T S
****

The results are obtained after 4 trials with an accuracy = 0.00322

S I M U L A T I O N   D E S C R I P T I O N

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Run Description: Max. Day + 2000 GPM @ Nodes 9 & 10

Drawing: MD_WATER

P I P E L I N E   R E S U L T S

STATUS CODE: XX -CLOSED PIPE   BN -BOUNDARY NODE   PU -PUMP LINE
CV -CHECK VALVE   RV -REGULATING VALVE   TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1	#2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/ 1000 (ft/ft)
1-BN	0	1	7347.32	0.40	0.00	0.00	2.32	0.48
2	1	2	5033.39	0.35	0.00	0.00	1.59	0.24
3	3	2	-1981.11	11.76	0.00	0.00	5.62	9.00
4	4	3	-1466.35	3.30	0.00	0.00	4.16	5.15
5	5	4	-591.75	0.61	0.00	0.00	1.68	0.96
6	6	5	-940.96	4.22	0.00	0.00	2.67	2.27
7	7	6	-1093.50	2.39	0.00	0.00	3.10	2.99
8	8	7	-1966.59	5.59	0.00	0.00	5.58	8.87
9	9	8	-1922.85	4.34	0.00	0.00	5.45	8.51
10	10	9	174.35	0.10	0.00	0.00	0.49	0.10

11	10	11	-2174.[illegible]	3.16	0.00	0.00	3.47	2.63
12	11	12	-2271.55	2.88	0.00	0.00	3.62	2.85
13	12	13	-2271.55	2.14	0.00	0.00	3.62	2.85
14	13	14	-2631.19	8.25	0.00	0.00	4.20	3.75
15	4	14	821.14	0.63	0.00	0.00	1.31	0.43
16	15	14	2587.64	2.33	0.00	0.00	4.13	3.63
17	15	1	-2158.41	13.71	0.00	0.00	6.12	10.54
18	15	3	-638.21	1.60	0.00	0.00	1.81	1.10
19	14	16	729.00	0.19	0.00	0.00	1.16	0.35
20	2	17	3015.84	0.02	0.00	0.00	0.95	0.09
21	17	18	1453.34	0.06	0.00	0.00	0.46	0.02
22	19	18	-1413.73	5.30	0.00	0.00	4.01	4.82
23	20	19	-1515.43	8.21	0.00	0.00	4.30	5.48
24	21	20	-789.46	2.56	0.00	0.00	2.24	1.64
25	22	21	-576.70	2.45	0.00	0.00	2.36	2.22
26	23	22	-553.85	0.72	0.00	0.00	1.57	0.85
27	24	23	-681.57	0.78	0.00	0.00	1.93	1.25
28	7	24	-873.10	2.19	0.00	0.00	2.48	1.97
29	24	25	-260.06	0.93	0.00	0.00	1.66	1.51
30	25	26	-301.15	4.04	0.00	0.00	1.92	1.98
31	25	27	-27.43	0.02	0.00	0.00	0.18	0.02
32	6	27	-240.01	0.74	0.00	0.00	1.53	1.30
33	27	28	-313.13	3.96	0.00	0.00	2.00	2.13
34	29	28	-380.34	0.12	0.00	0.00	1.08	0.42
35	5	29	-677.26	0.36	0.00	0.00	1.92	1.23
36	28	26	-198.59	0.07	0.00	0.00	0.56	0.13
37	26	20	-612.98	1.53	0.00	0.00	1.74	1.02
38	28	31	-585.03	9.08	0.00	0.00	3.73	6.77
39	29	30	-387.07	3.89	0.00	0.00	2.47	3.15
40	30	3	215.80	0.34	0.00	0.00	1.38	1.07
41	30	35	-641.75	10.68	0.00	0.00	4.10	8.03
42	31	34	-435.10	4.78	0.00	0.00	2.78	3.91
43	31	32	-188.81	1.12	0.00	0.00	1.21	0.83
44	32	19	141.32	0.39	0.00	0.00	0.90	0.49
45	32	33	-369.01	3.07	0.00	0.00	2.36	2.88
46	34	33	407.89	0.59	0.00	0.00	1.16	0.48
47	35	34	881.87	0.58	0.00	0.00	2.50	2.01
48	35	17	-1562.50	0.72	0.00	0.00	4.43	5.80
49	36	21	-189.92	0.72	0.00	0.00	1.21	0.84
50	23	36	-151.04	2.46	0.00	0.00	1.71	2.24

JUNCTION NODE RESULTS

JUNCTION NUMBER	JUNCTION TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	JUNCTION ELEVATION (ft)	PRESSURE HEAD (ft)	JUNCTION PRESSURE (psi)
1-1		155.52	185.20	22.50	162.70	70.50
2-1		36.45	184.85	18.20	166.65	72.22
3-1		92.34	173.09	19.50	153.59	66.56
4-1		53.46	169.80	18.80	151.00	65.43
5-1		328.05	169.18	17.50	151.68	65.73
6-1		87.48	164.96	14.80	150.16	65.07
7-1		0.00	162.57	14.30	148.27	64.25
8-1		43.74	156.97	15.10	141.87	61.48
9-1		2097.20	152.63	15.60	137.03	59.38
10-1		2000.00	152.74	17.20	135.54	58.73
11-1		97.20	155.90	18.30	137.60	59.63
12-1		0.00	158.78	19.10	139.68	60.53
13-1		359.64	160.92	20.70	140.22	60.76
14-1		48.60	169.17	18.50	150.67	65.29

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16-1	729.00	168.98	18.80	150.18	65.08
17-1	0.00	184.83	18.00	166.83	72.29
18-1	39.61	184.77	15.00	169.77	73.57
19-1	39.61	179.48	14.90	164.58	71.32
20-1	113.00	171.26	13.30	157.96	68.45
21-1	22.84	168.70	13.00	155.70	67.47
22-1	22.84	166.26	12.00	154.26	66.84
23-1	23.33	165.53	14.40	151.13	65.49
24-1	68.53	164.75	14.80	149.95	64.98
25-1	68.53	165.69	14.90	150.79	65.34
26-1	113.24	169.73	16.00	153.73	66.62
27-1	45.68	165.70	15.10	150.60	65.26
28-1	90.15	169.67	17.00	152.67	66.16
29-1	90.15	169.54	17.00	152.54	66.10
30-1	38.88	173.43	19.00	154.43	66.92
31-1	38.88	178.75	19.00	159.75	69.22
32-1	38.88	179.87	15.90	163.97	71.05
33-1	38.88	182.94	16.40	166.54	72.17
34-1	38.88	183.52	18.00	165.52	71.73
35-1	38.88	184.11	18.00	166.11	71.98
36-1	38.88	167.99	14.90	153.09	66.34

S U M M A R Y   O F   I N F L O W S   A N D   O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM BOUNDARY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO BOUNDARY NODES

PIPE NUMBER	FLOWRATE (gpm)
1	7347.32

NET SYSTEM INFLOW = 7347.32
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 7347.32

WATER SYSTEM ANALYSIS
PEAK HOUR DEMAND

U N I T S   S P E C I F I E D

FLOWRATE .... = gallons/minute
HEAD (HGL) .... = feet
PRESSURE .... = psig

O U T P U T   O P T I O N   D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

S Y S T E M   C O N F I G U R A T I O N

NUMBER OF PIPES ....(p) = 50
NUMBER OF JUNCTION NODES ....(j) = 36
NUMBER OF PRIMARY LOOPS ....(l) = 14
NUMBER OF BOUNDARY NODES ....(f) = 1
NUMBER OF SUPPLY ZONES ....(z) = 1

****
S I M U L A T I O N   R E S U L T S
****

The results are obtained after 5 trials with an accuracy = 0.00203

S I M U L A T I O N   D E S C R I P T I O N

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Run Description: Peak Hour Demand

Drawing: MD_WATER

P I P E L I N E   R E S U L T S

STATUS CODE: XX -CLOSED PIPE   BN -BOUNDARY NODE   PU -PUMP LINE
CV -CHECK VALVE   RV -REGULATING VALVE   TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1	#2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/ 1000 (ft/ft)
1-BN	0	1	5510.00	0.24	0.00	0.00	1.74	0.28
2	1	2	3750.58	0.20	0.00	0.00	1.18	0.14
3	3	2	-1388.24	6.08	0.00	0.00	3.94	4.66
4	4	3	-946.92	1.47	0.00	0.00	2.69	2.29
5	5	4	-428.45	0.34	0.00	0.00	1.22	0.53
6	6	5	-263.21	0.40	0.00	0.00	0.75	0.21
7	7	6	-139.09	0.05	0.00	0.00	0.39	0.07
8	8	7	-256.99	0.13	0.00	0.00	0.73	0.20
9	9	8	-184.99	0.06	0.00	0.00	0.52	0.11
10	10	9	-24.99	0.00	0.00	0.00	0.07	0.00

	[illegible]	[illegible]	[illegible]	[illegible]	0.00	0.00	0.04	0.00
12	11	12	-135.01	0.02	0.00	0.00	0.22	0.02
13	12	13	-135.01	0.01	0.00	0.00	0.22	0.02
14	13	14	-727.01	0.76	0.00	0.00	1.16	0.35
15	4	14	430.46	0.19	0.00	0.00	0.69	0.13
16	15	14	1576.55	0.93	0.00	0.00	2.52	1.45
17	15	1	-1503.41	7.01	0.00	0.00	4.26	5.40
18	15	3	-417.13	0.73	0.00	0.00	1.18	0.50
19	14	16	1200.00	0.47	0.00	0.00	1.91	0.88
20	2	17	2302.35	0.01	0.00	0.00	0.73	0.06
21	17	18	1085.94	0.03	0.00	0.00	0.34	0.01
22	19	18	-1020.74	2.90	0.00	0.00	2.90	2.63
23	20	19	-1016.54	3.92	0.00	0.00	2.88	2.61
24	21	20	-396.57	0.72	0.00	0.00	1.12	0.46
25	22	21	-243.93	0.50	0.00	0.00	1.00	0.45
26	23	22	-206.33	0.12	0.00	0.00	0.59	0.14
27	24	23	-218.97	0.10	0.00	0.00	0.62	0.15
28	7	24	-117.89	0.05	0.00	0.00	0.33	0.05
29	24	25	-11.73	0.00	0.00	0.00	0.07	0.00
30	25	26	-108.97	0.62	0.00	0.00	0.70	0.30
31	25	27	-15.56	0.01	0.00	0.00	0.10	0.01
32	6	27	-19.88	0.01	0.00	0.00	0.13	0.01
33	27	28	-110.64	0.58	0.00	0.00	0.71	0.31
34	29	28	-266.85	0.06	0.00	0.00	0.76	0.22
35	5	29	-374.76	0.12	0.00	0.00	1.06	0.41
36	28	26	-138.60	0.03	0.00	0.00	0.39	0.07
37	26	20	-433.97	0.81	0.00	0.00	1.23	0.54
38	28	31	-387.28	4.23	0.00	0.00	2.47	3.15
39	29	30	-256.31	1.81	0.00	0.00	1.64	1.47
40	30	3	127.81	0.13	0.00	0.00	0.82	0.40
41	30	35	-448.12	5.49	0.00	0.00	2.86	4.13
42	31	34	-314.82	2.62	0.00	0.00	2.01	2.15
43	31	32	-136.46	0.61	0.00	0.00	0.87	0.46
44	32	19	61.00	0.08	0.00	0.00	0.39	0.10
45	32	33	-261.47	1.62	0.00	0.00	1.67	1.52
46	34	33	325.47	0.39	0.00	0.00	0.92	0.32
47	35	34	704.28	0.38	0.00	0.00	2.00	1.32
48	35	17	-1216.41	0.46	0.00	0.00	3.45	3.64
49	36	21	-115.04	0.28	0.00	0.00	0.73	0.33
50	23	36	-51.04	0.33	0.00	0.00	0.58	0.30

J U N C T I O N   N O D E   R E S U L T S

JUNCTION NUMBER	JUNCTION TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	JUNCTION ELEVATION (ft)	PRESSURE HEAD (ft)	JUNCTION PRESSURE (psi)
1-1		256.00	185.36	22.50	162.86	70.57
2-1		60.00	185.16	18.20	166.96	72.35
3-1		152.00	179.08	19.50	159.58	69.15
4-1		88.00	177.61	18.80	158.81	68.82
5-1		540.00	177.27	17.50	159.77	69.23
6-1		144.00	176.87	14.80	162.07	70.23
7-1		0.00	176.82	14.30	162.52	70.43
8-1		72.00	176.69	15.10	161.59	70.02
9-1		160.00	176.64	15.60	161.04	69.78
10-1		0.00	176.63	17.20	159.43	69.09
11-1		160.00	176.63	18.30	158.33	68.61
12-1		0.00	176.65	19.10	157.55	68.27
13-1		592.00	176.66	20.70	155.96	67.58
14-1		80.00	177.42	18.50	158.92	68.87

[illegible]	541.00	178.35	21.80	156.55	67.84
16-1	1200.00	176.95	18.80	158.15	68.53
17-1	0.00	185.15	18.00	167.15	72.43
18-1	65.20	185.12	15.00	170.12	73.72
19-1	65.20	182.22	14.90	167.32	72.51
20-1	186.00	178.30	13.30	165.00	71.50
21-1	37.60	177.58	13.00	164.58	71.32
22-1	37.60	177.09	12.00	165.09	71.54
23-1	38.40	176.97	14.40	162.57	70.45
24-1	112.80	176.87	14.80	162.07	70.23
25-1	112.80	176.88	14.90	161.98	70.19
26-1	186.40	177.49	16.00	161.49	69.98
27-1	75.20	176.88	15.10	161.78	70.11
28-1	148.40	177.46	17.00	160.46	69.53
29-1	148.40	177.39	17.00	160.39	69.50
30-1	64.00	179.21	19.00	160.21	69.42
31-1	64.00	181.69	19.00	162.69	70.50
32-1	64.00	182.30	15.90	166.40	72.11
33-1	64.00	183.92	16.40	167.52	72.59
34-1	64.00	184.31	18.00	166.31	72.07
35-1	64.00	184.70	18.00	166.70	72.23
36-1	64.00	177.30	14.90	162.40	70.37

S U M M A R Y   O F   I N F L O W S   A N D   O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM BOUNDARY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO BOUNDARY NODES

PIPE NUMBER	FLOWRATE (gpm)
1	5510.00

NET SYSTEM INFLOW = 5510.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 5510.00

****
S U M M A R Y   O F   O R I G I N A L   D A T A
****

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Run Description: Maximum Day Demand

Drawing: MD_WATER

P I P E L I N E   D A T A

STATUS CODE: XX -CLOSED PIPE   BN -BOUNDARY NODE   PU -PUMP LINE
CV -CHECK VALVE   RV -REGULATING VALVE

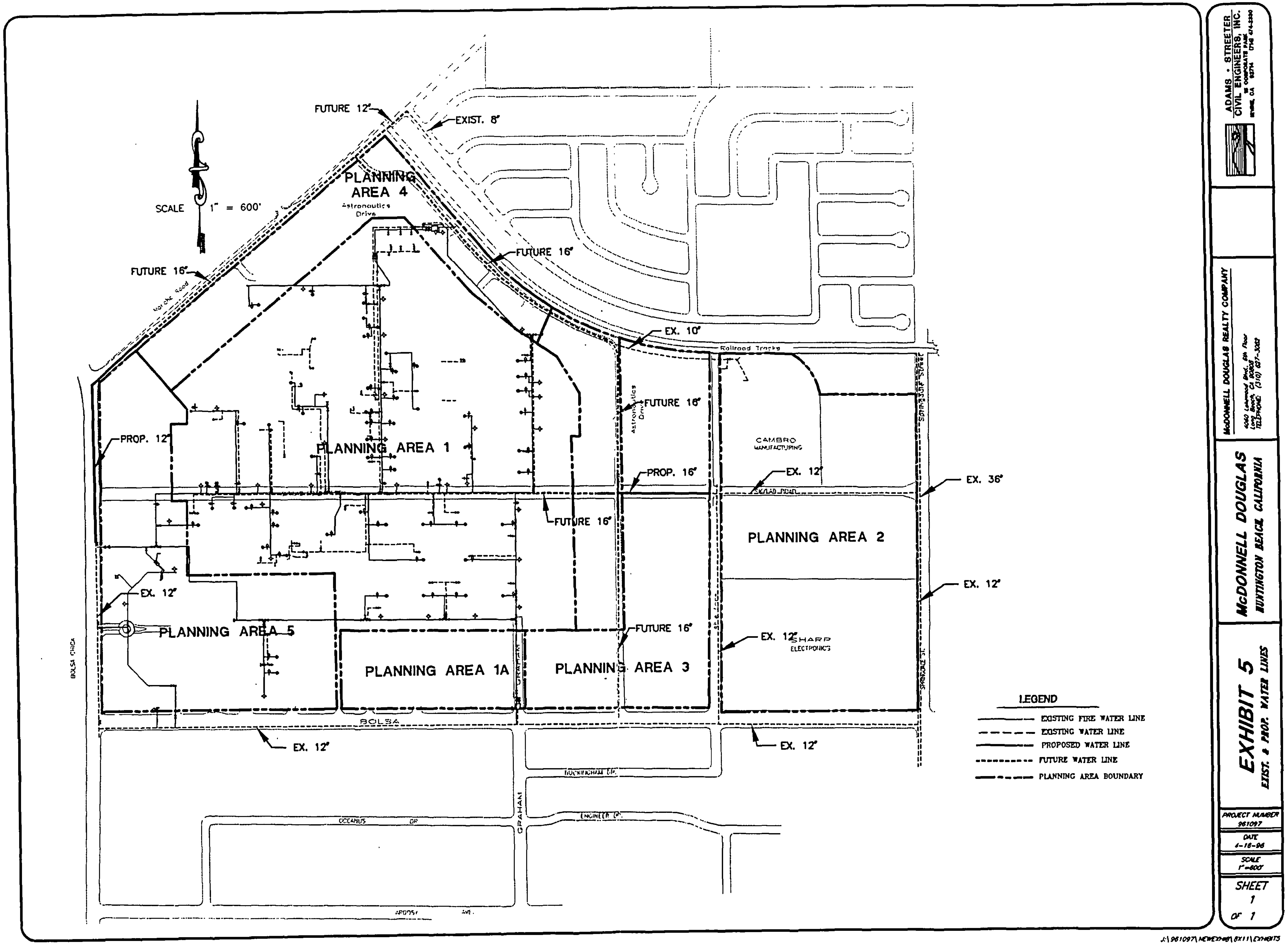
PIPE NUMBER	NODE NOS. #1	#2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.	BND-HGL (ft)
1-BN	0	1	830.0	36.0	130.00	0.00	185.60
2	1	2	1450.0	36.0	130.00	0.00	
3	3	2	1307.0	12.0	130.00	0.00	
4	4	3	640.0	12.0	130.00	0.00	
5	5	4	640.0	12.0	130.00	0.00	
6	6	5	1864.0	12.0	130.00	0.00	
7	7	6	800.0	12.0	130.00	0.00	
8	8	7	630.0	12.0	130.00	0.00	
9	9	8	510.0	12.0	130.00	0.00	
10	10	9	1040.0	12.0	130.00	0.00	
11	10	11	1200.0	16.0	130.00	0.00	
12	11	12	1010.0	16.0	130.00	0.00	
13	12	13	750.0	16.0	130.00	0.00	
14	13	14	2200.0	16.0	130.00	0.00	
15	4	14	1450.0	16.0	130.00	0.00	
16	15	14	640.0	16.0	130.00	0.00	
17	15	1	1300.0	12.0	130.00	0.00	
18	15	3	1450.0	12.0	130.00	0.00	
19	14	16	540.0	16.0	130.00	0.00	
20	2	17	200.0	36.0	130.00	0.00	
21	17	18	2400.0	36.0	130.00	0.00	
22	19	18	1100.0	12.0	130.00	0.00	
23	20	19	1500.0	12.0	130.00	0.00	
24	21	20	1565.0	12.0	130.00	0.00	
25	22	21	1100.0	10.0	130.00	0.00	
26	23	22	850.0	12.0	130.00	0.00	
27	24	23	626.0	12.0	130.00	0.00	
28	7	24	1110.0	12.0	130.00	0.00	
29	24	25	620.0	8.0	130.00	0.00	
30	25	26	2044.0	8.0	130.00	0.00	
31	25	27	718.0	8.0	130.00	0.00	
32	6	27	572.0	8.0	130.00	0.00	
33	27	28	1864.0	8.0	130.00	0.00	
34	29	28	289.0	12.0	130.00	0.00	
35	5	29	293.0	12.0	130.00	0.00	
36	28	26	528.0	12.0	130.00	0.00	
37	26	20	1494.0	12.0	130.00	0.00	
38	28	31	1342.0	8.0	130.00	0.00	
39	29	30	1234.0	8.0	130.00	0.00	
40	30	3	315.0	8.0	130.00	0.00	
41	30	35	1329.0	8.0	130.00	0.00	

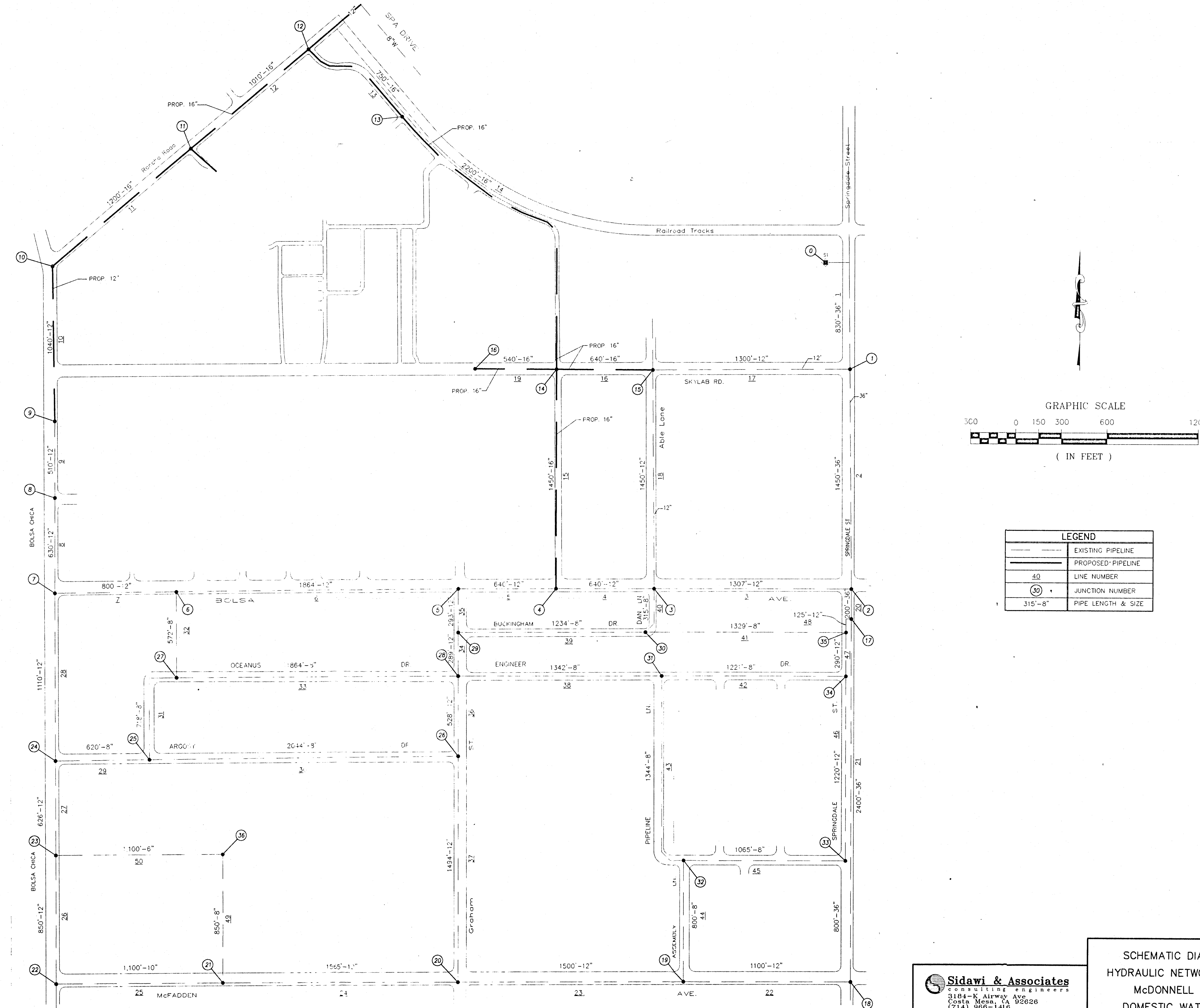
[illegible]	[illegible]	[illegible]	1221.0	8.0	130.00	0.00
43	31	32	1344.0	8.0	130.00	0.00
44	32	19	800.0	8.0	130.00	0.00
45	32	33	1065.0	8.0	130.00	0.00
46	34	33	1220.0	12.0	130.00	0.00
47	35	34	290.0	12.0	130.00	0.00
48	35	17	125.0	12.0	130.00	0.00
49	36	21	850.0	8.0	130.00	0.00
50	23	36	1100.0	6.0	130.00	0.00

JUNCTION NODE DATA

JUNCTION NUMBER	JUNCTION TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	CONNECTING PIPES			
1-1		155.52	22.50	1	2	17	
2-1		36.45	18.20	2	3	20	
3-1		92.34	19.50	3	4	18	40
4-1		53.46	18.80	4	5	15	
5-1		328.05	17.50	5	6	35	
6-1		87.48	14.80	6	7	32	
7-1		0.00	14.30	7	8	28	
8-1		43.74	15.10	8	9		
9-1		97.20	15.60	9	10		
10-1		0.00	17.20	10	11		
11-1		97.20	18.30	11	12		
12-1		0.00	19.10	12	13		
13-1		359.64	20.70	13	14		
14-1		48.60	18.50	14	15	16	19
15-1		208.98	21.80	16	17	18	
16-1		729.00	18.80	19			
17-1		0.00	18.00	20	21	48	
18-1		39.61	15.00	21	22		
19-1		39.61	14.90	22	23	44	
20-1		113.00	13.30	23	24	37	
21-1		22.84	13.00	24	25	49	
22-1		22.84	12.00	25	26		
23-1		23.33	14.40	26	27	50	
24-1		68.53	14.80	27	28	29	
25-1		68.53	14.90	29	30	31	
26-1		113.24	16.00	30	36	37	
27-1		45.68	15.10	31	32	33	
28-1		90.15	17.00	33	34	36	38
29-1		90.15	17.00	34	35	39	
30-1		38.88	19.00	39	40	41	
31-1		38.88	19.00	38	42	43	
32-1		38.88	15.90	43	44	45	
33-1		38.88	16.40	45	46		
34-1		38.88	18.00	42	46	47	
35-1		38.88	18.00	41	47	48	
36-1		38.88	14.90	49	50		

WATER SYSTEM EXHIBITS


SCALE 1" = 600'
FUTURE 12"
EXIST. 8"
PLANNING AREA 4
Astronautics Drive
FUTURE 16"
FUTURE 16"
EX. 10"
Railroad Tracks
FUTURE 16"
PROP. 12"
PLANNING AREA 1
PROP. 16"
EX. 12"
CAMBRO MANUFACTURING
EX. 36"
FUTURE 16"
PLANNING AREA 2
EX. 12"
EX. 12"
PLANNING AREA 5
FUTURE 16"
EX. 12"
SHARP ELECTRONICS
PLANNING AREA 1A
PLANNING AREA 3
BOLSA CHICA
GRAHAM
BOLSA
EX. 12"
EX. 12"
OCEANUS DR
ENGINEER DR.
ARGOSY AVE.
LEGEND
EXISTING FIRE WATER LINE
EXISTING WATER LINE
PROPOSED WATER LINE
FUTURE WATER LINE
PLANNING AREA BOUNDARY
ADAMS · STREETER
CIVIL ENGINEERS, INC.
McDONNELL DOUGLAS REALTY COMPANY
4060 Lakewood Blvd., 6th Floor
Long Beach, CA 90808
TELEPHONE: (310) 627-3062
McDONNELL DOUGLAS
HUNTINGTON BEACH, CALIFORNIA
EXHIBIT 5
EXIST. & PROP. WATER LINES
PROJECT NUMBER 961097
DATE 4-16-96
SCALE 1"=600'
SHEET 1 OF 1
J:\961097\NEWEXHIB\8X11\EXHIBITS



Sidawi & Associates
consulting engineers
3184-K Airway Ave
Costa Mesa, CA 92626
(714) 966-1416

SCHEMATIC DIAGRAM FOR
HYDRAULIC NETWORK ANALYSIS
McDONNELL DOUGLAS
DOMESTIC WATER SYSTEM

County of Orange

Public Facilities & Resources Department

John W. Sibley, Director

March 13, 1997

97-00516FT

Mr. Donald P. Karpinen
Adams - Streeter, Civil Engineers
15 Corporate Park
Irvine, CA 92714

RECEIVED
MAR 17 1997

Dear Mr. Karpinen:

This is in response to your letter on behalf of McDonnell Douglas Realty Company requesting determination on the removal of a wooden bridge across Orange County Flood Control District's (OCFCD) Bolsa Chica Channel (C02) at Bolsa Avenue at Bolsa Avenue.

Although the bridge is not owned by OCFCD it is frequently used by Operations and Maintenance staff for access to the westerly bank of the channel. O&M reports that they repair and maintain the structure. Removal of the bridge would require OCFCD crews to travel 2-3 miles to the next access point.

Consequently, OCFCD can not endorse removal of the bridge.

If you have any questions, please telephone George Rakas at 714-834-5707 or call me at 714-834-2366.

Very truly yours,

Al Vásquez

A. L. Vasquez, Manager
County Property Permits Division

7031314502102

cc: Gene Holum

CITY OF HUNTINGTON BEACH

2000 Main Street P.O.Box 190 California 92648

Les M. Jones II
Director

Public Works Department
(714) 536-5431

Brief Meeting Notes

McDonnell Douglas EIR

Meeting at EMA Flood Control
Date: November 15, 1996 2:00 PM
Prepared By: David Webb

ATTENDEES:

Bryan Mckinney -- EMA
Al Nestlinger -- EMA (brief appearance)
Don Karpinen -- Adams Streeter
Merle Pautsch -- McDonnell Douglas
Dick Harlow -- RHA
Lance Nasusahara -- EMA
David Webb -- City of Huntington Beach
Mo Abadi -- Adams Streeter
Ted Fisher - McDonnell Douglas

EMA, in response to the EIR, identified two items that should be accomplished as part of the development of the McDonnell Douglas Master Planned development. The first item is a flood plain analysis of the Bolas Chica Channel (C02) adjacent to the project site. The second item is to mitigate the impacts of additional runoff to the C02 channel from this project.

First Item: Flood Plain Analysis

Regarding this item, EMA staff discussed that no adequate hydrology data for the C02 channel existed for the reach between the 405 freeway and the outlet. There was also discussion and general agreement by all that such a flood plain analysis study would be both very costly and require many months of development and processing time. EMA staff also estimated that the storm flows were well over 100 year levels in the C02 channel on January 4, 1995, however there was also a very low tide at the time. The general feeling was that the channel would have overtopped had the tide been in.

It was also discussed that a requirement to perform a flood plain analysis of the lower reach of the C02 (which includes two major confluence's) would be rather excessive for this development. The adjacent flood plain level could perhaps be approximated (on the conservative side) based on past storm data. All parties indicated that this would be an acceptable means to identify flood plain levels to protect structures.

Second Item: Mitigating Impacts of Additional Runoff to the CO2 Channel

Regarding this item, EMA staff identified (from a past report on C02 channel) two restrictions in the channel that should be either removed or modified to improve the hydraulics of the channel. These restrictions were the Navy owned bridges at Bolsa Avenue and at Saybrook. McDonnell Douglas and the City will contact the Navy and explore what would be allowed with regard to the bridges.

If there are any questions regarding these notes, please call me at (714) 375-5077

cc: Robert Eichblatt, City Engineer
Herb Fauland, Senior Planner
Jayna Morgan, EDAW
File

ADAMS • STREETER
CIVIL ENGINEERS, INC.

Date: December 3, 1996

JUST THE FAX

To:	Jayna Morgan	Job No. 96-1097
Company:	EDAW	FAX No. 714/660-1046
From:	Don Karpinen	Total Pages Including This Page: 12
Re:	McDonnell Douglas Business Centre	

Transmitted herewith are letters of findings regarding the Bolsa Chica Flood Control Channel as sent to Dave Webb, City of Huntington Beach:

1. Discussion letter - 4 Sheets.
2. County's Exhibit (January 4, 1995 Storm) - 2 Sheet.
3. Department of the Navy request for confirmation/acknowledgement - 3 Sheets.

Additionally, Adams Streeter have prepared an engineer's cost estimate for the Master Planned Area broken down into Phases (I-IV) for the infrastructure, and a recommendation of building pad grade elevations for the Extended Stay America building site.

The EIR Master Plan report transmitted to your office on November 19, 1996 is the final report as was submitted to all interested parties. No changes have been made since.

Based upon our meetings and discussions with the City of Huntington Beach, Department of Public Works, the County of Orange Flood Control Division, and with historical and physical evidence supporting the actual storm runoff flows within the Bolsa Chica Flood Channel, we believe that a floodplain analysis is not warranted as part of the Master Plan EIR study and its subsequent approval. We are waiting for the City of Huntington Beach to recommend their findings and final decision thereto.

If you do not receive all pages, please call 714/474-2330.

15 CORPORATE PARK - IRVINE - CALIFORNIA 92606
TELEPHONE 714/474-2330 - FAX 714/474-0251

ADAMS • STREETER
CIVIL ENGINEERS, INC.

Date: November 22, 1996

JUST THE FAX

To: Dave Webb

Company: City of Huntington Beach FAX No. 714/374-1573

From: Don Karpinen Total Pages Including This Page: 5

Transmitted herewith is a draft of:

1. Discussion letter regarding Flood Control Analysis, prepared by Adams Streeter.

2. Copy of the County Flood Control's findings exhibit for Bolsa Chica Channel, storm dated January 4, 1995. For your information, I spoke with Mr. Paul Morrison, Department of the Navy, at the Naval Weapons Station in Seal Beach 310/646-7925 regarding the bridge (opposite Bolsa Av.). This bridge is no longer used by the Navy and would be considered only a formality in requesting its removal. However, the Orange County EMA (Floor Control) does use it for accessing the westerly shoulder of the Bolsa Chica Channel. I also spoke with Mr. Al Vasquez, manager of the Orange County Public Property Permits Division regarding the bridge disposition. Mr. Vasquez would request a letter of inquiry describing the reasons for possible removal or other bridge remedial improvement. They would then process this request for :omments and response. Mr. Vasquez' telephone number is 714/834-2366. am awaiting a response from Channel 13TV in Huntington Beach (Kelly hamley/Greg Furlong at 714/536-5559) for any videotape they may have vailable. Should you have any questions, please contact me.

If you do not receive all pages, please call 714/474-2330.

15 CORPORATE PARK - IRVINE - CALIFORNIA 92606
TELEPHONE 714/474-2330 • FAX 714/474-0251

ADAMS · STREETER
CIVIL ENGINEERS INC.
Jan A. Adams · Randal L. Streeter

96-1097

MC DONNELL DOUGLAS BUSINESS PARK
ENVIRONMENTAL IMPACT REPORT
Flood Plain Analysis - Bolsa Chica Channel (CO-2)

Pursuant to the letter submitted by the Orange County Environmental Management Agency Flood Programs Division regarding their review of the subject report, the consultant, Adams Streeter Civil Engineers, Inc. have initiated the following:

1. Discussion with EDAW, Jayna Morgan and Sally Mirabella regarding comments made by the Flood Program Division in their letter dated July 9, 1996. Based upon the minimal impacts on the Bolsa Chica Channel 100-year storm drain runoff quantities by the subject parcel, it was concluded that a meeting be held with the Flood Program Division and the City of Huntington Beach Public Works Department to discuss the County's comments.

2. A meeting was held on November 15, 1996 with the above mentioned parties and McDonnell Douglas representatives. The County of Orange, while holding to their floodplain analysis recommendation, concluded along with the City of Huntington Beach representative, that the analysis would be a lengthy process, and they acknowledged that the drainage impacts from the subject project would be negligible. Further, it was presented by Mr. Alan J. Nestlinger, Chief of the Hydrology Section, that the Bolsa Chica Channel did not overflow its banks during the January 4, 1995, 200-year+ storm and that the volume of runoff was measured at approximately 14,454 cfs at the height of the storm. The present, accepted hydrology analysis and studies made by the County Flood Program Division show the volume of runoff at 9,400 cfs based upon the 1983 report and findings. There are other critical factors that impact the Bolsa Chica Channel such as expected value versus high confidence flow determinations and upstream constrictions at the 405 Freeway and constrictions downstream, eg. the Navy bridge (just opposite Bolsa Avenue) which crosses the Channel.

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3. It was further concluded that physical evidence would be taken into consideration, along with the Flood Program Division's water surface elevation control at the Channel, in determining acceptable mitigation leading to approval for the Environmental Impact Report by the City of Huntington Beach. Several efforts have been undertaken, as follows:

   a. McDonnell Douglas Aerospace Facility operations personnel have been contacted in determination of physical evidence during the January 4, 1995 storm. The findings are presented as: No storm waters within Bolsa Chica Channel flowed onto Bolsa Chica Street within the reach of Bolsa Avenue to Rancho Road; no storm waters collected within Bolsa Chica Street overflowed the easterly curb onto the parkway or into the MDA facilities nor at the intersection of Bolsa Avenue and Bolsa Chica Street; the high rise office building's basement did not become flooded at any time during the storm.

   b. The City of Huntington Beach Public Works Department field personnel are being contacted in determination of their records and recollection of storm runoff events during the January 4, 1995 storm, in the vicinity of the McDonnell Douglas Aerospace Facility.

   c. The City of Huntington Beach (Channel 13 TV) has been contacted in an effort to determine if any video tape is available of flooding during the storm of January 4, 1995 for the specific area of the MDA facility and downstream on Bolsa Chica Street southerly of Edinger Avenue toward Heil Avenue.

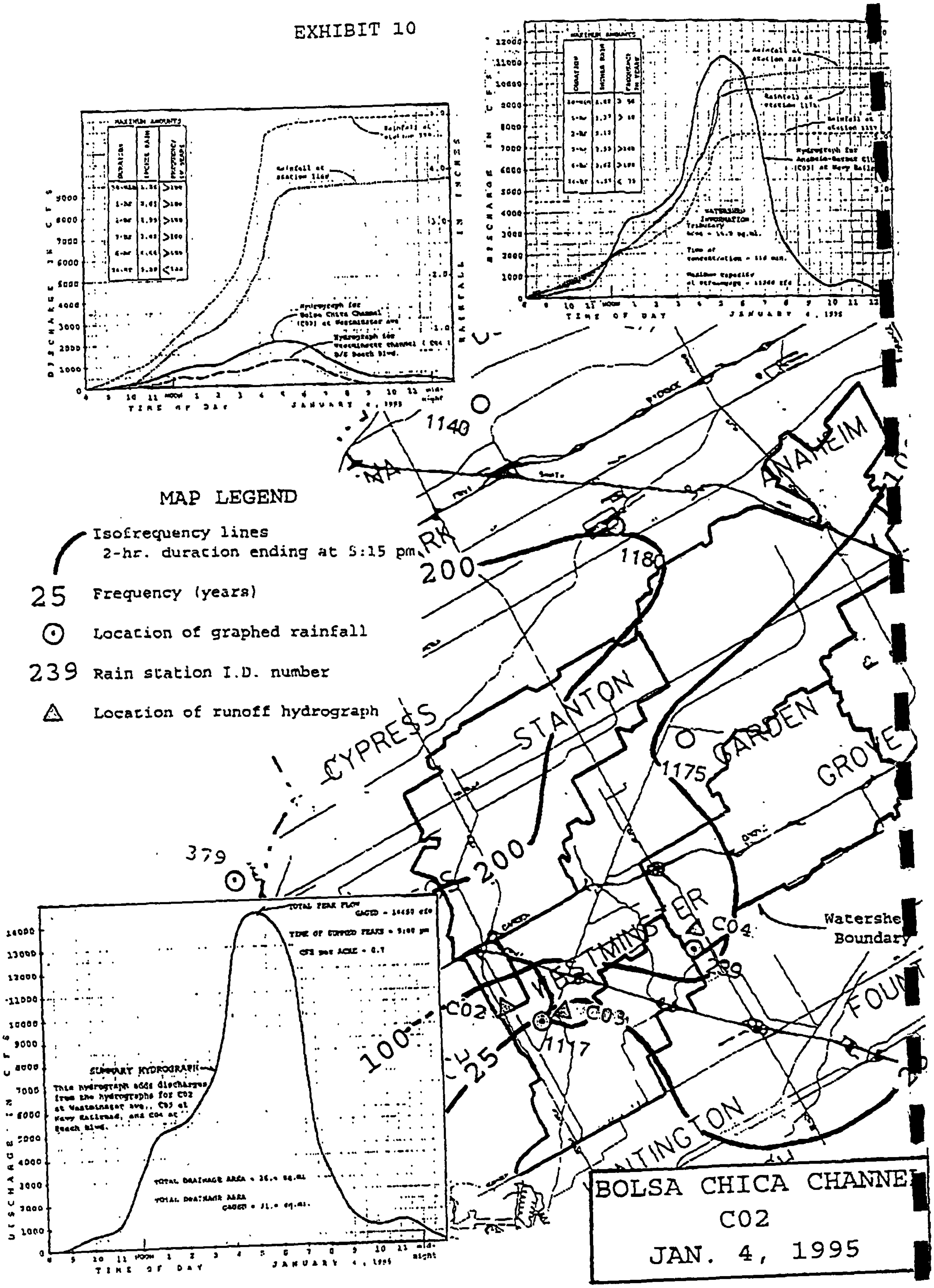
4. We are also attempting to contact the Department of the Navy about the future disposition of the existing bridge crossing (opposite Bolsa Avenue) and its potential removal (in entirety) or possible widening outside of the flood control channel slopes. The existing foundation and bridge columns create a constriction of storm water flowage during peak runoff conditions, impairing the full capability of the channel efficiency.

5. Upon findings of the above items, it was suggested that an approximate water surface elevation then be established within the Bolsa Chica Channel in agreement with the physical and historical data for the storm event of January 4, 1995. Setting of the proposed pad elevations and guidelines for the development sites adjacent to Bolsa Chica Street between Bolsa Avenue and Rancho Road can then be established.

6. County of Orange Flood Control has issued letters previously which establishes the hydraulic grade line in Bolsa Chica Channel at 13.5 feet and 14.4 feet, at storm drain entrances into Bolsa Chica Channel at Bolsa Avenue and Skylab Drive West, respectively. These committed water surface elevations are normally adhered to by the County Flood Control when existing channels are improved (i.e., new designs will keep the water surface elevations within the established hydraulic grade line).

7. The City of Huntington Beach would be the responsible entity to review these findings and set the guidelines for future development within the proposed project area.

EXHIBIT 10


MAP LEGEND
Isofrequency lines
2-hr. duration ending at 5:15 pm
25 Frequency (years)
Location of graphed rainfall
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Location of runoff hydrograph
TIME OF DAY
JANUARY 4, 1995
SUMMARY HYDROGRAPH
ANAHEIM
STANTON
CYPRESS
GARDEN
GROVE
WESTMINSTER
HUNTINGTON
1140
1180
1175
1117
379
200
100
25
C02
C03
C04
Watershed Boundary
BOLSA CHICA CHANNEL
C02
JAN. 4, 1995

ADAMS · STREETER
CIVIL ENGINEERS INC.
Jan A. Adams · Randal L. Streete

96-1097

November 22, 1996

Mr. Paul Morrison
Department of the Navy
Naval Weapons Station
Seal Beach, California 90740-5000

Subject: Bridge Crossing Bolsa Chica Channel

Dear Mr. Morrison:

This letter is to confirm our telephone discussion this date regarding the disposition of the subject bridge which is located directly opposite the westerly terminus of Bolsa Avenue (location map enclosed). As discussed, McDonnell Douglas Realty Company is currently proposing a master planned business park and an Environmental Impact Report for the area now occupied by the McDonnell Douglas Aerospace Facility (comprised of 306 acres).

As part of this process, ultimate storm drainage into the Bolsa Chica Flood Control channel is being addressed. Possible mitigation opportunities are being investigated, one of which is that the subject bridge could be removed in its entirety, or by remedial improvements to the structure/foundation and piers which would allow smoother flows at the channel embankments.

Based upon our discussion, the Department of the Navy no longer utilizes this bridge at their Naval Weapons Station in Seal Beach and would allow removal if so requested by the responsible party. The Orange County Flood Control District of the Environmental Management Agency does use the bridge to gain access to the westerly channel shoulder under an easement with the Naval Weapons Station, and would be the responsible party in this circumstance, we believe.

At this time, we are not requesting a formal letter from the Naval Weapons Station or the Department of the Navy to allow removal of the bridge, but of your confirmation of our discussion and concurrence of the understanding that the Naval Weapons Station in Seal Beach would allow removal of the bridge if formally requested.

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May we request a separate written response or, if appropriate, a confirmation acknowledgement signed on the space herein provided?

Should you have any questions, please do not hesitate to contact me.

Sincerely,

Donald P. Karpinen

Donald P. Karpinen
Civil Engineer

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Acknowledged By:

Date:______________________

cc City of Huntington Beach
McDonnell Douglas Realty Company

enclosure

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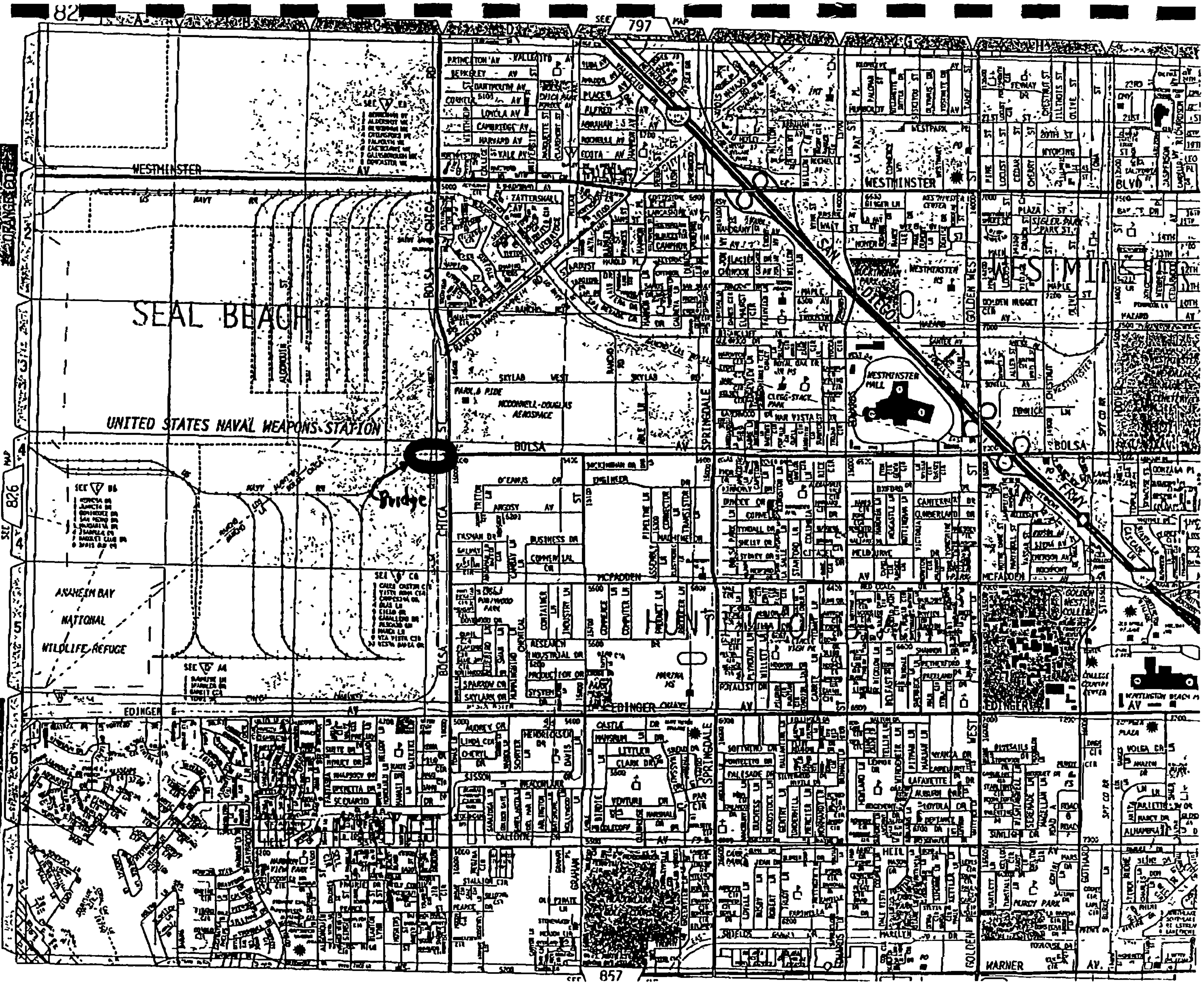
SEAL BEACH
UNITED STATES NAVAL WEAPONS STATION
ANAHEIM BAY
NATIONAL
WILDLIFE REFUGE
WESTMINSTER
BOLSA
CHICA
EDINGER
SPRINGDALE
GOLDEN WEST
MCFADDEN
WARNER
WESTMINSTER MALL
MCDONNELL-DOUGLAS AEROSPACE
Bridge
SEE 797 MAP
SEE 826 MAP
857
827