

CITY OF LA HABRA

STORM DRAIN MASTER PLAN 2018

PREPARED FOR

THE CITY OF LA HABRA
DEPARTMENT OF PUBLIC WORKS
621 W. LA HABRA BOULEVARD
LA HABRA, CA 90631

DATE: MAY 2019

PREPARED BY
WILLDAN ENGINEERING
2401 E. KATELLA AVENUE, SUITE 300
ANAHEIM, CA 92806

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ABBREVIATIONS/ACRONYMS

ACP	Asbestos Cement Pipe
BMP	Best Management Practice
CCW	Coyote Creek Watershed
CFD	Community Facilities District
CIP	Capital Improvement Program or Plan
CIPP	Cast in Place Pipe
CMP	Corrugated Metal Pipe
DAMP	Drainage Area Management Plan
DEM	Digital Elevation Model
DIP	Ductile Iron Pipe
ENR-CCI	Engineering News-Record – Construction Cost Index
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GIS	Geographical Information System
HCDA	Housing and Community Development Act
HDPE	High Density Polyethylene Pipe
ICW	Imperial Creek Watershed
LMCW	La Mirada Creek Watershed
OCDPW	Orange County Department of Public Works
OCFCD	Orange County Flood Control District
MPD	Master Plan of Drainage
NFIP	National Flood Insurance Program
NPDES	National Pollutant Discharge Elimination System
NRCS STATSGO	National Resource Conservation Services – General Soils Data
PVC	Polyvinyl Chloride (pipe)
RCB	Reinforced Concrete Box
RPMP	Reinforced Plastic Mortar Pipe
R/W	Right of Way
RWQCB	Regional Water Quality Control Board (Santa Ana Region)
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
USGS	United States Geological Survey
WMS	Watershed Modeling System

EXECUTIVE SUMMARY

In March 2015, the City of La Habra (City) authorized Willdan Engineering to develop a city-wide Storm Drain Master Plan (SDMP). In accordance with the approved scope of work, this report presents the SDMP and identifies existing drainage deficient facilities that are not in conformance with current design practices. These capacity deficient facilities may contribute to localized flooding in the future. This report also recommends drainage improvements to reduce to a level of insignificance or eliminate existing deficiencies within the City's storm drain system. The recommended drainage improvements are ranked from higher to lower risk for failure or localized flooding and have budget level cost figures for each ranked segment.

To determine those locations that may require drainage improvements, extensive records search and discovery of existing drainage system features were conducted. During this activity a geographical information system (GIS) base map of the drain system was compiled. Utilizing the GIS map, a hydrologic analysis was completed for the entire City, and planning level hydraulic analyses were performed for existing and recommended drainage improvements. These analyses were based on the Orange County ten-year, twenty four-hour, fourth-day storm event which is an accepted, basic planning level approach. The criteria for determining deficiencies in the existing storm drain pipes are outlined in Section 4 of this report.

Based on studies and investigations made for this report, it has been determined that most of the storm drain systems have inadequate capacity to convey the storm water runoff produced by a ten-year design storm event (described in Section 4). Although several of these storm drains were possibly designed for a 10-year storm event prior to 1986, it was at that time the hydrology methods and criteria were substantially updated countywide to more accurately match experienced conditions.

Based on the results of the capacity analyses, seventeen (17) drainage areas and corresponding storm drain systems were identified as over capacity to some degree. Further evaluation to determine the degree of capacity exceedance revealed only limited pipe segments and their system components may not fully contain the design storm event.

These findings contributed to the identified drainage deficiencies that have been prioritized and recommended for design and construction in a capital improvement project (CIP) plan. For definitive information on the deficient pipe reaches, please refer to Sections 4 and 5 of this report. Also, please refer to Appendix 'G' for a general description and cost breakdown for each project and to Table 5-A for the CIP Ranking criteria. The estimated total cost for the recommended improvement projects is approximately 46.9 million in 2018 dollars, excluding potential access issues that may occur with existing storm drains located within easements.

This SDMP is a conceptual (planning level) study, which identifies facilities needed to effectively control and convey storm runoff in the City of La Habra. This document will be a beneficial guide for planning and undertaking future storm drain facility improvements and ensuring private development activities are built to be compatible with the community drainage needs. This plan does not contain all the detail data necessary for final design purposes, and it should be updated periodically to reflect: construction of new facilities, changes in watershed development, revised facility locations, changes in rainfall-runoff data, and changes in hydraulic modeling.

It is recommended that the City adopt the comprehensive SDMP as its drainage planning and system CIP guide. It is further recommended that an implementation program be initiated, which includes an internal investigation of those pipes that have exceeded half (50%) of their expected service life, and appropriate financing methods be pursued as presented in Section 6.

SECTION 1 – INTRODUCTION AND HISTORY

1.1 Authorization and Scope

The City of La Habra has an existing system of drainage pipes and facilities, some of which may be undersized for the volume of storm water runoff emanating from the developed community and the abutting jurisdictions. In order to evaluate the current drainage conditions and pipe capacities, on March 16, 2015 the City retained Willdan Engineering to prepare a comprehensive Storm Drain Master Plan for the City.

The project scope of services was presented in the written proposal dated January 20, 2015 and consisted of the following key tasks:

- Task 1 – Review and Compile Existing Watershed and Drainage Facility Data
- Task 2 – Evaluation of Existing Storm Drain Master Plan Document
- Task 3 – Prepare CAD and GIS Watershed/Drainage Facility Base Map
- Task 4 – Review Adequacy of Existing Watershed Models and Boundaries
- Task 5 – Qualitative Hydrology Analysis
- Task 6 – Existing Municipal Storm Drain/Channel System – Hydraulic Model Preparation and Hydraulic Deficiency Identification
- Task 7 – Deficiency Removal and Alternatives Analysis
- Task 8 – Update Preliminary Drainage Facilities Quantity and Construction Cost
- Task 9 – Implementation Program Report and CIP Schedule

1.2 Description of Study Area and Facilities

Location

The City of La Habra is located along the northern border of Orange County, California and is bordered by La Habra Heights on the north, Brea on the east, Fullerton on the south and southeast, La Mirada on the west and southwest and East Whittier on the west, Whittier on the northwest and a small unnamed section of incorporated Los Angeles County on the northeast. The City was incorporated January 20, 1925 and currently encompasses 7.4 square miles. The land area is approximately 98 percent developed, in accordance with the Land Use “Zoning” Map dated 12/10/91 as included in Appendix ‘A’.

Land Use & Zoning

The City of La Habra General Plan Land Use policy establishes a comprehensive community vision focused on balancing housing, circulation, safety, open space / conservation, noise, growth management, and economic development. The City is comprised of Rural, Low, Medium, High, and Mobile Home Density Residential, Neighborhood Commercial, Business / Employment, Mixed Use, Public / Institutional, Public Open Space, and Private Open Space Land Use. The City’s Zoning Map was obtained from the City web site, and a copy is provided for reference. See Watershed Land Uses in Appendix ‘A’.

Climate

The climate in the area has mild temperatures (62°F is the mean temperature). The average annual precipitation for the City is 11-inches, with nearly all (95%) of the precipitation occurring during the months of October through April. Periodic major storms consist of one or more frontal systems originating in the North Pacific and occasionally last two days or longer. Precipitation during summer months is infrequent and rainless periods of several months are common.

Topography

The City elevations, above mean sea level, vary from a minimum of 200 feet to a maximum elevation of 560 feet. The southern area of the City is generally flatter terrain with increasingly steeper hillside areas in the northern area. Three regional watersheds overlie the City's boundaries. These include: La Mirada Creek, Coyote Creek, and Imperial Creek. In the higher elevations (northerly), runoff is characterized by overland flow in hilly terrain, whereas runoff in lower elevations occurs in a suburban setting through streets and constructed storm drain conduits and trapezoidal channels. Within the developed areas of the City, storm water is conveyed within curbs and gutters to catch basins prior to entering storm drain conduits.

This master plan used topography derived by importing terrain surface contours from Google Earth in Civil 3d to model the existing ground.

Geology and Soils

The soil types used in this study are based on the soil group classifications derived from the NRCS STATSGO database developed for the State of California. This data guided the development of Impervious area percentages for land use types as defined in Table 4-A in this report.

The major factor affecting infiltration of water is the nature of the soil itself. The soil surface characteristics, its ability to transmit water to subsurface layers and total storage capacity are all major factors in the infiltration capabilities of each soil. WMS uses the soil group classification infiltration rates (loss parameters) or the impervious fraction based upon land use (as was employed in this analysis) in combination with the computed rainfall intensity to calculate runoff from the various soil permeability classes in the watershed areas.

Drainage Patterns & Regional Facilities

A large portion of the storm water flowing through the City originates in the City of La Habra Heights. Three (3) separate drainage boundaries (OC Watersheds) overlie the City and adjacent areas and were incorporated in the mapped area for modeling (analysis) purposes. Storm runoff from these areas and the City flows into OCFCD facilities of La Mirada Creek, Coyote Creek and Imperial Channel. The drainage boundaries as determined from this review and the drainage boundaries previously submitted in the 1992 SDMP were compared. Several areas had significant changes to their drainage areas. The southern portion of the City along the southern city boundary was developed with new housing complexes and commercial development along Beach Blvd and Imperial Hwy. The other area is the Harbor Blvd corridor on the northeast side of the city. Harbor Blvd was realigned and widened. The remaining areas have minor differences most of which is due to a higher detailed field review of the drainage areas and a more detailed division of the drainage areas to individual storm drain systems. The

boundaries are shown on the Current SDMP drainage areas and 1992 SDMP drainage areas exhibit in Appendix 'B'.

City Drainage Facilities

According to the record drawings received, the majority of existing storm drain improvements were constructed between the years 1960 and 1990. See Existing Drainage Facilities exhibit in Appendix "C". According to those same drawings, there are ten (10) different types of pipe material utilized within the storm drain system. Most of the pipe appears to be reinforced concrete pipe (RCP). The design life for the typical RCP material is between 50 and 90 years, depending upon construction placement, adjacent or crossing utility work, constituency of drainage flows, quality of initial pipe materials, etc. For this report evaluation we selected a 75-year service life for RCP, and a 45-year service life for CMP. Therefore, a portion of the storm drain facilities in the City are approaching the later stages of their design life which may be reflected in the maintenance service condition. Hence, consideration should be given to developing a scheduled internal inspection program, such as CCTV investigations and personal inspection reports, followed by a drainage asset rehabilitation and/or replacement plan as findings indicate. This plan should then be incorporated into the next MPD update or as a supplement.

SECTION 2 - RESEARCH DESCRIPTIONS

2.1 Available Records

City provided copies of the January 1992 master plan system maps and digital file copies of available record drawings of constructed storm drain facilities within the city. We also obtained County flood control facility maps which were used to define the regional system features. Where system information was not located, reasonable assumptions of probable facilities were made, based on adjacent known abutting data, thereby allowing capacity analysis calculations to be accomplished. The regional, local and assumed system information was placed into a new geographic information system (GIS) file developed as part of this master plan report. The GIS mapping and data files were used for system analysis and will provide a system reference library for subsequent use by the city personnel.

2.2 Field Visits, Drainage Boundary/Pattern Observation

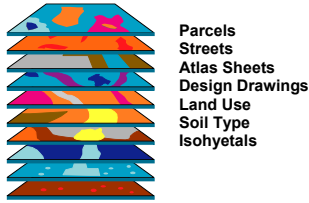
Two field reconnaissance reviews were conducted where initial mapping information and hydrology subareas were not fitting together to verify existing drainage patterns and locations of visible surface drainage facilities in some areas of the City. In some areas more, facilities were observed than were identified from available as-built drawings. The additional facilities and observed existing conditions were also considered in making further reasonable assumptions as described in Section 4 of this report.

SECTION 3 - GIS BASE MAPPING AND FEATURES

3.1 Base Map

The County's GIS street and parcel level base map was obtained and used for the master plan rights-of-way in which to locate drainage system pipelines.

3.2 Storm Drain Database



Parcels
Streets
Atlas Sheets
Design Drawings
Land Use
Soil Type
Isohyetals

The storm drain database was developed, using the base map, by including data from available storm drain design drawings and records received. Pipes included the main storm drain lines, any open pipe inlets and outlets, connections to regional drain facilities, and the pipe material. The system structures included manholes, junction structures, inlets, outlets and transition structures.

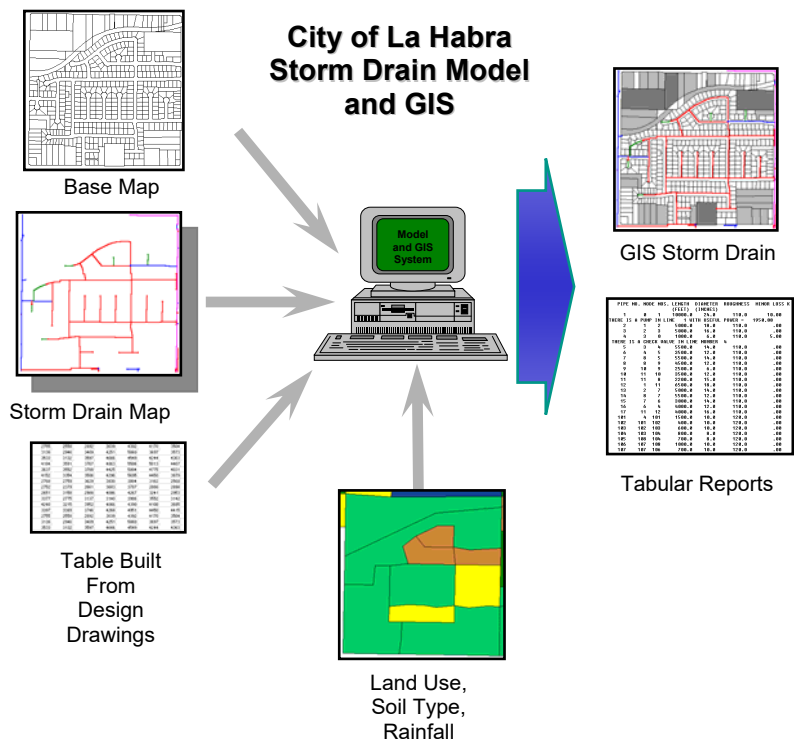
3.3 Location Data

To produce an accurate map of the system, the locations of system structures were determined using as-built plans, and some focused field visits.

Existing street maps or design drawings were used to determine the placement locations of the pipelines and structures. This method is the least expensive and meets the GIS mapping criteria and requirements for hydraulic modeling of the system. Since the base map is only a right-of-way map, the placement accuracy of pipelines shown is to the nearest plus or minus five feet of actual pipe location. Catch basins files provided by the City show the basins at the right-of-way line since that is the common method of display in a GIS system. Unique manhole and pipe codes were used to join the drawing entities to the database. By clicking on the pipe segments, the attached source drawing file can be viewed for technical features and details as may be needed.

3.4 Hydraulic Modeling GIS Data

As mentioned in the section on collecting the data, a GIS feature class contains the pipes and all the hydraulic properties. The hydrologic model uses some of the storm drain layout that also serves as the GIS features for the pipes. The modeling results were saved as a database table and linked to the pipes and nodes (manholes and junctions).



SECTION 4 - HYDROLOGY STUDY DATA AND HYDRAULIC CALCULATIONS

4.1 Introduction

The objective of the Master Plan of Drainage is to analyze existing storm water runoff handling systems, specifically the conduits, and develop a comprehensive set of prioritized project segments to meet storm runoff criteria to the benefit of the community.

Since a large percentage of existing storm drain segments in the City were constructed prior to 1986, those drains may not meet the current drainage design standards. Although the storm drain system does function, a portion of the system was identified as being capacity deficient by current standards for storm runoff handling and area protection.

Analyzing the system involved using the currently approved Orange County standards for hydrology and hydraulic analysis and design practices in identifying drainage deficiencies throughout the City. In developing the comprehensive MPD, the general practices, design criteria, and research and analysis findings were compiled into a set of prioritized solutions for improving storm drain capacity needs. A corresponding estimate of implementation costs was prepared, including design, construction and administration necessary for correcting the capacity deficiencies

4.2 Assumptions Utilized

Missing pipe data - In those locations where physical system information/data were not available of record (e.g. pipe size, slope, material, length, depth below ground), assumed pipe data was inserted to establish system continuity. This was done by considering pipe information from the next known upstream and downstream pipes, and then assuming a technically reasonable connection to infill where system data was missing. This method was employed in many locations throughout the system to establish system continuity for modeling and evaluation purposes.

4.3 Flood Frequency

In determining the level of protection from storm water runoff (flooding) desired for a community, it is essential to understand the term "flood frequency." Or in other words: "how often will we experience the risk of flooding." One such definition of flood frequency is as follows:

"Flood events (frequencies) of magnitude which are expected to be equaled or exceeded once on the average during any 10-, 25-, 50-, 100-, and 200-year storm event, have a 10, 4, 2, 1, and 0.5 percent chance, respectively of being equaled or exceeded during any year. Although the recurrence interval statistically is long term for the larger event storms, the actual period between floods could occur in shorter term intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered."

10-year Recurring Frequency Design Storm Application

Drainage facilities are typically designed to provide capacity for storm runoff of a specified intensity. The analysis used in this study was based on the storm intensity of a ten (10) year event and twenty-five (25) year event for sumps as specified in the Orange

County Drainage Manual. These time periods are a common practice for community system facilities planning in Orange County with its southwestern coastal climate and the smaller drainage subareas common to suburban and urban development.

4.4 Criteria for the Hydrology and Hydraulics Evaluation

Methodology

The approach used to study the existing City drainage system is based upon the hydrology and hydraulic criteria and methods defined in the Orange County Flood Control District adopted practice documents. The study area consists of all acreage within the incorporated City limits plus those drainage areas beginning outside the City's limits which drain into the City. Data on land use, drainage patterns, drainage areas (Watersheds), rainfall intensities, and existing topography were input into the hydrologic computer model.

Watershed models of each major watershed were developed based on the Orange County Rational Method using the Watershed Modeling System (WMS) version 10.1, a pre- and post- processor for Orange County hydrology methods. The 10-year rainfall recurrence interval for non-sump areas and 25-year rainfall recurrence interval for sump areas was analyzed. Cumulative peak flow rates at each sub-watershed outlet were routed through reaches consisting of open channels, standard street cross-sections, and subsurface pipes. The WMS then uses computed peak flow rates. Watershed drainage map is in Appendix D and Hydrology calculations are in Appendix G.

The existing drainage systems were analyzed using WSPG. WSPG is a hydraulic program originally developed by Los Angeles County Flood Control and is the accepted hydraulic analysis program for Orange County. Hydraulic calculations are in Appendix H.

Model Setup

Watershed boundaries were developed using a combination of aerial imagery, digital elevation data and original watershed boundaries established in the 1992 Storm Drain Master Plan maps. In accordance with Orange County methods (Orange County, 1986), all sub-watersheds were less than 640 acres in size. Final sub-watershed boundaries for each major watershed are shown in Appendix D.

Loss Parameters (Runoff Coefficients)

The runoff coefficient is a factor relating the quantity of storm water runoff to the quantity of rainfall striking the earth. The runoff coefficient is a function of several factors, the most significant of which is the type of overlying development and the infiltration capacity of the soil. The type of overlying development affects the runoff coefficient since the percentage of impervious area varies significantly with the type of development.

Loss parameters for the Orange County Rational method consist of a modified runoff coefficient that accounts for soil infiltration rates (F_p) and impervious and pervious area fractions (a_i and a_p). Infiltration rates for pervious areas are a function of hydrologic soil group, which was derived from the NRCS STATSGO database developed for the State of California. Impervious area percentages were derived from a high-resolution land use shapefile developed in 2005 by Aerial Information Systems, Inc. on behalf of the

Southern California Association of Governments (SCAG). The percent impervious values used for each land use are shown in Table 4-A.

Table 4-A. Impervious Fractions based on Land Use

Land Use ID	Description	Impervious Fraction
1111	High-Density Single Family Residential	0.55
1112	Low-Density Single Family Residential	0.2
1122	Duplexes, Triplexes, Condos and Townhouses	0.65
1123	Low-Rise Apartments, Condos, and Townhouses	0.65
1124	Medium-Rise Apartments and Condos	0.9
1131	Trailer Parks and Mobile Home Courts, High Density	0.85
1140	Mixed Residential	0.45
1152	Rural Residential, Low-Density	0.2
1211	Low- and Medium-Rise Major Office Use	0.8
1221	Regional Shopping Center	1
1222	Retail Centers (Non-Strip with Parking Lot)	1
1223	Modern Strip Development	1
1224	Older Strip Development	1
1231	Commercial Storage	1
1232	Commercial Recreation	0.8
1233	Hotels and Motels	0.9
1241	Government Offices	0.9
1242	Police and Sheriff Stations	0.9
1243	Fire Stations	0.9
1244	Major Medical Health Care Facilities	0.9
1245	Religious Facilities	0.9
1246	Other Public Facilities	0.9
1247	Non-Attended Public Parking Facilities	1
1252	Special Care Facilities	0.9
1253	Other Special Use Facilities	0.9
1261	Pre-Schools/Day Care Centers	0.5
1262	Elementary Schools	0.5
1263	Junior or Intermediate High Schools	0.4
1264	Senior High Schools	0.3
1265	Colleges and Universities	0.3
1311	Manufacturing, Assembly, and Industrial Services	1
1313	Packing Houses and Grain Elevators	1
1314	Research and Development	1
1323	Open Storage	1
1325	Chemical Processing	1
1332	Mineral Extraction - Oil and Gas	0
1340	Wholesaling and Warehousing	1

Land Use ID	Description	Impervious Fraction
1412	Railroads	1
1413	Freeways and Major Roads	1
1414	Park-and-Ride Lots	1
1415	Bus Terminals and Yards	1
1416	Truck Terminals	1
1420	Communication Facilities	1
1431	Electrical Power Facilities	0.5
1432	Solid Waste Disposal Facilities	0
1434	Water Storage Facilities	1
1435	Natural Gas and Petroleum Facilities	0.5
1436	Water Transfer Facilities	1
1437	Improved Flood Waterways and Structures	0
1440	Maintenance Yards	1
1450	Mixed Transportation	1
1460	Mixed Transportation and Utility	1
1500	Mixed Commercial and Industrial	1
1700	Under Construction	1
1810	Golf Courses	0
1821	Developed Local Parks and Recreation	0
1822	Undeveloped Local Parks and Recreation	0
1831	Developed Regional Parks and Recreation	0
1832	Undeveloped Regional Parks and Recreation	0
1840	Cemeteries	0
1880	Other Open Space and Recreation	0
2110	Irrigated Cropland and Improved Pasture Land	0
2120	Non-Irrigated Cropland and Improved Pasture Land	0
2200	Orchards and Vineyards	0
2300	Nurseries	0
2600	Other Agriculture	0
2700	Horse Ranches	0
3100	Vacant Undifferentiated	0
3300	Vacant With Limited Improvements	0
4100	Water, Undifferentiated	1

Rainfall Intensity (Precipitation)

Rainfall intensity is expressed in inches per hour and is developed by statistical methods from 75 years of recorded rainfall records. Rainfall intensity rates are the result of many factors, the most significant of which is the duration of the storm and the statistical average recurrence interval (10-, 25-, 50-, and 100-year). A 10-year rainfall return period was analyzed in the study. In accordance with Orange County Hydrology Manual Addendum No. 1 (Orange County, 1996), expected value (50% confidence interval)

criteria were applied for the models. As stated in Addendum No. 1, expected value discharges should be used for evaluating protection level provided by existing facilities.

Channel Routing

Several channel routing options are available within the Orange County Rational Method. Those most commonly used for this study included trapezoidal channels, V-gutters, street cross-sections, and subsurface conduits such as circular pipes or rectangular boxes.

Time of Concentration

Time of concentration (T_c) refers to the time it takes for rainfall to travel from the most hydraulically remote part of the watershed to the concentration point. The T_c is a function of many variables in addition to the travel distance including the slope(s) of the area, the type of development within the area, and the infiltration rates of the soils. For Orange County Rational studies, one of the most significant factors leading to the T_c computation of a watershed is the T_c computed for the initial sub-area. In accordance with Orange County 1996 requirements for initial subareas, all initial subareas were determined to be less than 10 acres with flow lengths of less than 300 feet. Computed T_c 's used by the model are contained in the results tables in Appendix G.

Modeling Results and Maps

A Rational Method Confluence analysis was conducted for each watershed using the parameter inputs described above. The confluence analysis reports cumulative peak flow rates at each sub-watershed outlet. The complete system map showing the deficient drainage facilities is in Appendix I. A listing of improvements for each deficient drainage system is described below.

Area 01;

Area 01 is tributary to Coyote Creek via (TR NO. 2594) and (TR NO. 3986). The storm drain is in Sturbridge Drive from north of Waverly Terrace to the cul-de-sac south of Greenbrier Lane to Imperial Highway then east towards Beach Blvd. The system is inadequate for the 25-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	CB Sturbridge to N/O Waverly Terrace	42" RCP	1720 FT
2	Manholes/Junction Structures		6

Area 06;

Area 06 is tributary to Leffingwell Creek via Project No. 532, Line C. This storm drain system is in the City of Whittier. The capacity analysis was only performed on the storm drain system within the City of La Habra. The system is inadequate for the 5-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	75' west of Valley Home Ave to Valley Home Ave	42" RCP	70 FT
2	RCB across Valley Home Ave	2Hx3.5W Dbl RCB	60 FT
3	Russell Ave, Valley Home Ave to Roanoke and Roanoke St to 335' n/o Russell Ave	48" RCP	860 FT
4	Roanoke St from 335' n/o Russell Ave to 110' n/o Ganfield Dr	39" RCP	490 FT
5	Manholes/Junction Structures		5 EA

Area 08;

Area 08 is tributary to Coyote Creek via (S-D-148) and (D-158). The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	Coyote Creek to La Habra Blvd (Does not include the RCB at Lorella Ave. and RR)	96" RCP	3790 FT
2	Lorella Ave RCB and RR Crossing	5Hx10W Dbl RCB	270 FT
3	La Habra Blvd to 400' East on La Habra Blvd	8Hx5W Rect	350 FT
4	400' East to 535' east on La Habra Blvd	4Hx6W Triple RCB	150 FT
5	535' east to 663' east on La Habra Blvd	8Hx12W Rect	130 FT
6	663' east on La Habra to 100' north behind homes	6Hx12W Rect	200 FT
7	behind homes at La Habra Blvd to Hanline Way	5H8W Rect	1040 FT
8	Hanline Way	5Hx6W Rect	180 FT
9	Manholes/Junction Structures		16 EA

Area 11;

Area 11 is tributary to Coyote Creek via the Monte Vista Storm Drain system (D-93) (A01P01-101-1A) (A01P01-701-2A). The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	Outlet at Coyote Creek to South of Railroad Tracks	6Hx4.25W Dbl RCB	960 FT
2	South of Railroad Tracks to 360' South of La Habra Blvd	96" RCP	870 FT
3	360' South of La Habra Blvd to Greenwood Ave	84" RCP	2450 FT
4	Greenwood Ave to Ryan Ave	75" RCP	1550 FT
5	Ryan Ave to La Serna Ave	54" RCP	1230 FT
6	La Serna Ave to 400' N/O La Serna Avenue	42" RCP	350 FT
7	Manholes/Junction Structures		30 EA

Area 12

Area 12 is tributary to Coyote Creek via the Walnut Street Storm Drain system (I-D-73). The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	System Outlet at Coyote Creek to Portola Ave	5.5Hx6.5W RCB	1050 FT
2	Portola Ave to Florence Ave	72" RCP	1670 FT
3	Florence Ave to Highlander Ave	60" RCP	500 FT
4	Manholes/Junction Structures		14 EA

Area 13

Area 13 is tributary to Coyote Creek via the Euclid Street Storm Drain system (I-D-126) and the Orange Street Storm Drain system (S-D-94). The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	System Outlet at Coyote Creek to La Habra Blvd	72" RCP	1500 FT
2	La Habra Blvd to Florence Ave	66" RCP	810 FT
3	Florence Ave to Pinehurst Ave at Main St	48" RCP	1700 FT
4	Manholes/Junction Structures		16 EA

Area 14

Area 14 is tributary to Coyote Creek via the Cypress Street Storm Drain system (D-296). The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	System Outlet at Coyote Creek to E. 1st Ave	6Hx9W RCB	2020 FT
2	E. 1st Ave to La Habra Blvd	5Hx7W RCB	310 FT
3	La Habra Blvd to CB on E. Francis Ave	84" RCP	1270 FT
4	CB on E. Francis Ave to End	78" RCP	2520 FT
5	Manholes/Junction Structures		28 EA

Area 15

Area 15 is tributary to Coyote Creek via the Colfax Storm Drain system (A01P22-101-1A) and the Whittier Blvd Storm Drain (D-253) and (D-303) and (TR NO. 10702) and (TR NO. 5051). The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;
Bedford Street SD

	Segment	Prop	Length
1	Bedford St from Superior Ave to La Habra Blvd	102" RCP	1840 FT
2	La Habra Blvd to Stearns Ave at Colfax St	96" RCP	780 FT
3	Colfax St from Stearns Ave to Whitter Blvd and Whittier Blvd from Colfax St to Ellie St	84" RCP	3580 FT
4	Rody St from Brookdale Ave to Arbolita Dr, Arbolita Dr from Roddy Dr to Harbor Blvd, and Harbor Blvd from Arbolita Dr to North City Limit	42" RCP	1630 FT
5	Manholes/Junction Structures		31 EA

The following table lists the recommended improvements;
Lateral 1 Rockinghorse SD

	Segment	Prop	Length
1	100' North of Whittier Blvd to 810' North of Whittier Blvd	54" RCP	860 FT
2	Southerly Property Line of 1230 Carmela Ln to Rockinghorse Ln at Arblita Dr	54" RCP	1480 FT
3	Manholes/Junction Structures		10 EA

The following table lists the recommended improvements;
Lateral 2 Stearn Avenue SD

	Segment	Prop	Length
1	Stearns Ave from Colfax St to 70' East of Colfax Street	72" RCP	70 FT
2	70' East of Colfax St to Laura St at Dot Ave	66" RCP	2980 FT
3	Laura St to Palm St at System Inlet	54" RCP	300 FT
4	Manholes/Junction Structures		11 EA

Area 21

Area 21 is tributary to Imperial Channel via the Idaho Street Storm Drain system (TR NO. 9590). The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	Outlet to Olive Tree Dr	66" RCP	1540 FT
2	Olive Tree Dr to 100' east	36" RCP	100 FT
3	100' east of Olive Tree Dr to Driveway nearest Right-Turn Lane	24" RCP	700 FT
4	Manholes/Junction Structures		8 EA

Area 22

Area 22 is tributary to Imperial Channel via the Idaho Street Storm Drain system (W-D-22 and TR NO. 9590). The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	Auburn Way to Olive Tree Dr	54" RCP	1150 FT
2	Olive Tree Dr to Sandlewood Ave	42" RCP	1180 FT
3	Risner Way to Southerly City Limit	24" RCP	530 FT
4	Manholes/Junction Structures		11 EA

Area 24

Area 24 is tributary to Imperial Channel via the Dorwood Street Storm Drain system (TR NO. 4110) (TR NO. 3948). The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	System Outlet to Transitional Structure	3.5Hx6W RCB	110 FT
2	50' South of Parkwood Ave to 130' South of Gwynwood Ave	66" RCP	1000 FT
3	Manholes/Junction Structures		2 EA

Area 27

Area 27 is tributary to Imperial Channel via the Euclid Street Storm Drain system (TR NO 3947) . The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	System Outlet Imperial Channel to Manhole on Euclid St	48" RCP	640 FT
2	Manhole on Euclid St to Avenida Santa Anita	42" RCP	850 FT
3	Manholes/Junction Structures		5 EA

Area 61

Area 61 is tributary to Coyote Creek via the Lambert Street Storm Drain system (TR NO 8424) . The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	System Outlet to Westerly Property Line of 762 Lambert Rd	60" RCP	750 FT
2	Westerly Property Line of 762 Lambert Rd to Walnut St	48" RCP	1080 FT
3	Manholes/Junction Structures		7 EA

Area 62

Area 62 is tributary to Coyote Creek via the Mountain View Storm Drain system (D 275 and D 185) . The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	System Outlet at Coyote Creek to 50' East of Outlet	24" RCP	50 FT
2	Junction Structures		1 EA

Area 73

Area 73 is tributary to Coyote Creek via the College Street Storm Drain system (I D 280)
. The system is inadequate for the 10-year storm.

The following table lists the recommended improvements;

	Segment	Prop	Length
1	System Outlet at Coyote Creek to 160' South of 3 rd Ave	60" RCP	1000 FT
3	160' South of 3 rd Ave to Stearns Ave	54" RCP	1830 FT
6	Manholes/Junction Structures		12 EA

4.5 Drainage Summary

Evaluation of the various existing system elements involved using the City's three primary watershed areas as the basis of segmenting of the study. Each watershed area has multiple sub-drainage areas based upon existing topography and constructed systems to reasonably define the systems flow carrying performance. Please refer to the watershed drainage exhibit in Appendix 'D'.

Our analyses of the hydrology and hydraulic calculation results, and extent of the improvements and cost associated with those improvements necessary to convey the 10-year runoff volumes, are presented in Section 5 of this report (Capital Improvement Program Development). Should the estimated cost be beyond the City's current CIP budgetary resources, we've also included Section 6 – Financial Strategy Plan showing funding options and sources for City consideration.

When storm drain design is to be pursued, detailed final hydrologic studies should be conducted in conjunction with each final design of storm drain facilities. Final hydrologic studies should include such items as catch basin hydrology, detailed field investigation of drainage patterns, and determination of impacting physical details and any changes in criteria as used in this planning level study.

REFERENCES

Reports pertinent to the City of La Habra Storm Drain Master Plan Hydrology Study are as follows:

1. Orange County Hydrology Manual, prepared by Orange County Environmental Management Agency, October 1986
2. Orange County Hydrology Manual Addendum No. 1, prepared by Orange County Environmental Management Agency, 1996

SECTION 5 – CAPITAL IMPROVEMENT PROGRAM DEVELOPMENT

5.1 Deficiency Causes and Solutions

There are several causes for a deficient storm drain system: undersized catch basin inlets, undersized catch basin lateral, undersized mainlines, and storm drain/street slopes flatter than the desired minimum value. To correct such deficiencies, the recommended improvement projects within this Section are necessary to protect properties and reduce street flooding during a 10-year frequency storm event.

5.2 Basis of Prioritizing Projects

Each capacity deficient storm drain system was categorized using the following factors to establish scheduling priorities (see Table 5-A):

1. Level of deficiency
2. Need to prevent damage to public and private property due to flooding
3. Identified by City maintenance crews as a recurring problem area. (need to be discussed with City staff to finalize the priority of projects)
4. Conduit age based upon construction date.
5. Conduit material.

Table 5-A

La Habra Storm Drains - Capacity Deficient						
Rank	System No.	Location	Capacity	Maintenance	Age	Material
1	13	Euclid Street	>5 year	TBD	1967	RCP
2	11	Monte Vista	>5 year	TBD	1959, 1968 1972	RCP
3	12	Walnut Street	>5 year	TBD	1969 1979	RCP
4	73	College Street	>5 year	TBD	1983	RCP RCB Trap
5	6	Roanoke	>5 year	TBD	1955	RCP
6	15a	Bedford	>10 year	TBD	1975	RCP
7	15c	Stearn	>10 year	TBD		RCP
8	15b	Rockinghorse	>10 year	TBD	1963	RCP
9	14	Cypress	>10 year	TBD	1984 1985 1987	RCP
10	8	La Plaza Drive	>10 year	TBD	1962 1964	RCP RCB
11	24	Dorwood	>10 year	TBD	1962	CMP
12	22	Idaho	>5 year	TBD	1967	RCP
13	1	Sturbridge	>25 year	TBD	1959	RCP
14	21	Imperial	>5 year	TBD		RCP
15	27	Euclid	>5 year	TBD	1961	RCP
16	61	Lambert	>5 year	TBD	1977	RCP
17	62	Mountain View	>5 year	TBD	1985	RCP

5.3 Mitigation Measures and Design Alternatives

Storm Drain Extensions

The extension of an existing storm drain system is an acceptable mitigation measure when excessive flooding/ponding is identified upstream of an existing storm drain system, as long as the receiving system has available flow carrying capacity.

Parallel Storm Drain Systems

The addition of a parallel storm drain system is an acceptable mitigation measure when excessive flooding (or potential) is identified in the vicinity of an existing storm drain system, and pipe slope or grade or adjacent buried facilities are a challenge in accomplishing upsizing of a single pipe

Upsizing Existing Catch Basin Inlets and/or Connector Pipes

Upsizing of existing catch basin inlets and/or connector pipes can also be used as a mitigation measure when excessive flooding is identified in the vicinity of existing storm drain inlets. This is a detail usually addressed during the design phase.

Coordination with Other CIP Projects

Whenever possible, storm drain improvement projects should be scheduled such that either the overlying street/alley improvement project follows or is undertaken concurrently with the storm drain improvement project. This planning approach leads to a complete, efficient project that maximizes the community resources, and can reduce maintenance impacts. It is critical that future storm drain improvement project schedules consider any pavement cut moratorium policy that restricts utility cuts on recently paved streets.

5.4 Countywide Drainage Handling Criteria

City drainage projects are subject to the OCFCD Drainage Area Management Plan (DAMP) and the Local Implementation Plan (LIP). The DAMP provides the guidelines for compliance with the current county National Pollution Discharge Elimination System (NPDES) permit with the Water Quality Control Board – Santa Ana Region (WQCB-SAR). The LIP is a collectively developed and more specific local implementation guideline that supplements the DAMP. Each CIP project and development application approval within the City must incorporate the appropriate non-structural and structural Best Management Practices (BMP's) into the contract specification special provisions. It is the City's obligation to enforce compliance with the DAMP for all new projects and developments within the City.

5.5 National Pollution Discharge Elimination System (NPDES)

The City must enforce compliance with the NPDES criteria/regulations applicable to each CIP project and land development project within the City. The appropriate Notices of Intent (NOI) must be filed with the SWRCB, and Storm Water Pollution Prevention

Plans (SWPPP's) must be reviewed and kept on file at the City as well as at the project sites by the builder/contractor.

5.6 Proposed Storm Drain System Improvements - CIP

The goal of the Capital Improvement Program (CIP) is to provide the City with a planning tool for scheduling and financing future storm drain capacity improvement projects. The proposed CIP has ranked/scheduled the design and construction of the capacity improvement projects in a priority sequence.

Recommendations are ranked and presented to mitigate each of the identified capacity constraints within the drainage system. Each project includes a summary of the recommended improvements accompanied by cost estimates based on recent experiences with similar projects and cost data. Cost estimating sheets for each CIP project are in Appendix F.

TABLE 5-B

Capital Improvement Program (CIP) Total Cost			
			5/13/2019
Rank	Project No.	Title	Cost Estimate
1	13	Euclid Street	2,059,490
2	11	Monte Vista	7,061,319
3	12	Walnut Street	2,645,589
4	73	College Street	1,762,000
5	6	Roanoke Street; Improvements within the City only. Does not include the cost for improvements within the City of Whittier.	794,417
6	15a	Bedford	7,463,152
7	15c	Lateral 2, Stearn Ave SD	2,765,473
8	15b	Lateral 1, Rockinghorse Lane SD	1,780,500
9	14	Cypress	6,387,156
10	8	La Plaza Drive	7,790,983
11	24	Dorwood	768,146
12	22	Idaho	1,440,829
13	1	Sturbridge	874,710
14	21	Imperial	1,366,086
15	27	Euclid	749,780
16	61	Lambert	1,093,017
17	62	Mountain View	29,601
		Budget Total:	46,832,247

The CIP projects for pipe capacity improvements totals \$46.9 million as presented above in Table 5-B. Costs were estimated for the proposed improvements based on construction pricing as of 2018. The unit costs provided for cost estimates were derived using a combination of recent bid results posted on the Caltrans Contract Cost Database and the Los Angeles County Public Works Bid Price History Database. Cost estimate prices may vary from the posted bid results due to variations on quantity amount.

[Note: This time period was selected due to availability of completed project and available bid results in the limited construction activity marketplace]. Local impact fees, available program revenues, and construction costs should be reviewed prior to project scheduling for potential escalation or reduction of costs based on the Engineering News Record's Construction Cost Index (ENR-CCI). Because most of the recommended facilities are in the existing public rights-of-way (including easements), right-of-way acquisition costs were not included.

The engineering design, and construction administration and inspection were estimated at 17% of the construction cost, and an additional 15% contingency added for other bidding unknowns such as, utility relocation, permitting expenses, and materials pricing variance.

SECTION 6 - FINANCIAL STRATEGY ALTERNATIVES

6.1 General Discussion

Funding of capital facility improvements can take separate or mixed approaches to accomplish the needed result. A responsible evaluation of the options available can result in a structured and cost-effective plan with long-term service benefits. Depending upon the timing and scope of the project need, funding options can vary from *pay-as-you-go* financing whereby a certain portion of annual operating revenues (usually fees and tax revenues) would be allocated each year to the accomplishment of specific capital improvements. When timing and/or scope do not allow for funding accumulation, the options can involve use of *issuing debt* (typically bonds, notes, certificates) backed by a secure revenue stream to raise the funds necessary to finance construction of a project. A more recently used option involves the attraction of *private sector funds* whereby the project involves a design-build-purchase or design-build-operate agreement that is again secured by a guaranteed revenue stream and within a statutory term of time.

While drainage fees, the Mello-Roos Act (CFD), assessment districts, and general obligation bonds could possibly account for a sizable portion of drainage system funding, these sources of financing are each subject to community debate and discussion. Drainage fees, for example, may be collected from developments as they occur, but must be placed in accounts specifically designated for facilities to serve the drainage basin in which the development is located. The number and timing of development projects is largely beyond the control of the permitting agency and, thus, the availability of funds from this source is by no means assured. Assessment districts are challenging to implement when developed properties are involved, and CFD's, assessment districts and general obligation bonds all require either property owner or electorate balloting action.

Given the high cost identified with capital drainage improvements, it is probable that no single method will be sufficient to provide the funding to implement the Master Plan. Although a detailed financial plan is beyond the scope of this report, possible methods of funding for the required drainage facilities have been identified and described below. Therefore, it is recommended that the City consider various combinations of methods when implementing the local program.

Once the master plan is adopted, pursuit of a feasible funding program to assure adequate monies are available to construct the identified facilities, within a reasonable

time frame, should be the next process undertaken. The following descriptions outline several possible funding methods. Many of these methods are commonly known and, consequently, are discussed only briefly. More lengthy narratives are devoted to those methods, which may be most appropriate for the City.

6.2 Funding Programs

General Fund

A traditional source of funds, which can be used for drainage facility construction and maintenance, is the City's General Fund. This fund consists of revenues generated from a variety of sources, which are generally not restricted for use in just certain manners. However, this fund experiences significant demands due to the varied public services that are typically funded in whole or in part by these revenues.

Drainage Fees

Under the provisions of Government Code section 66483 et seq. (the Subdivision Map Act), cities and counties may adopt a program for the collection of drainage fees. The code enables the City to enact a drainage fee program after certain prerequisites have been satisfied. The requirements for the drainage fee program include:

1. Adoption of a master drainage plan for each local drainage area;
2. Certification of the master drainage plan by the legislative body of the Public Agency having a county-wide and/or district-wide drainage plan;
3. Adoption of a fee structure based on the cost of the required facilities for each drainage area and equitably proportioned to all affected properties; and
4. Establishment of local drainage facilities funds.

Following adoption of appropriate local ordinances, drainage fees can be collected from developers as a condition of approval of final subdivision maps. Funds are then deposited in the appropriate local drainage facilities fund where they may be expended for engineering, administration, and construction of drainage facilities within a particular drainage area.

This financing method is usually of benefit to the public agency that has developable land area where subdivisions can occur and needed capital facilities in the related drainage area can be accomplished. Otherwise the resulting generation of revenue is minimal.

Federal Housing and Community Development Act of 1974

The Housing and Community Development Act of 1974 (HCDA) provides federal grant funds for community development programs. Storm drains are among the projects eligible for funding.

Construction grant funds could be used to implement portions of the Master Plan of Drainage if the City can demonstrate that construction of such facilities is part of a

program designed to meet community development needs and objectives and to provide for a new or continued supply of housing for low and moderate income families.

In applying for HCDA funds, the City can determine annually, at its option, to either:

1. File a joint application with the County under the Urban Counties Program; or
2. File an independent application to compete for monies from HCDA's discretionary fund when the minimum population requirement of 50,000 can be met.

In either case, the City must demonstrate that funding assistance for storm drain facilities is not available from other federal programs. Since no other federal agency presently provides assistance for drainage facilities, it would appear that the HCDA program has some potential as a source of funding for drainage facilities in some parts of the City. If HCDA funding is received, the City will be required to establish a housing assistance program. Similar programs have been successfully implemented throughout the nation.

Special Assessments

Special assessments allow for the financing and construction or acquisition of public works improvements, including storm drains, by assessing the cost of such improvements to all benefiting properties. Such assessments create a lien (obligation) on the benefiting properties which are used to pay the debt service over time. Proceeds from the authorized debt are used to construct or acquire the specific improvements. The assessment liens are incurred and payable over time until the debt is fully repaid (usually a period of about twenty years). Assessments thus provide the advantage to property owners of a loan to accomplish the capital improvements and deferred payments while obtaining the benefits of the improvements.

Assessment district proceedings may be initiated by a petition of the property owners within the boundaries of the proposed assessment district, or by direct action of the City Council using the steps and provisions of the Special Assessment Investigation, Limitation, and Majority Protest Act of 1931, which requires a public hearing. Also, proceedings may be initiated by the City Council where a County Health Officer's letter has been obtained recommending that assessment district proceedings be instituted to install storm drains as a health measure.

With the passage of Proposition 218 by California voters on November 5, 1996, all new or increasing assessments that are parcel-based must now be submitted to benefiting property owners in an assessment ballot proceeding whereby property owners can approve or defeat the imposition of the assessment. Assessments are considered approved with a simple majority of ballots cast in favor of the assessment as measured by the dollar value of the assessments. A public meeting and a public hearing are also required in addition to a mailed notice to each affected property owner of record.

Municipal Improvement Act of 1913

The most commonly used procedural act for formation of an assessment district is the Municipal Improvement Act of 1913. The 1913 Act is most often used in conjunction with the Improvement Bond Act of 1915. Under the 1915 Act, all or a portion of the

assessment is payable each year in an amount sufficient to pay the principal and interest on the bonds when due. The assessment is most often included on the property tax bill which is payable in the same manner and time as the general taxes of the public agency.

Formation of an assessment district may be difficult where properties have already developed. Therefore, prior to undertaking the formation of an assessment district, the City should test property owner support.

Benefit Assessment Act of 1982

The Benefit Assessment Act of 1982 (beginning with Section 54703 of the Government Code) authorizes local agencies to impose assessments on benefited property to finance the operation and maintenance of drainage, flood control, and street lighting services, and the installation and improvement of drainage and flood control facilities. The act provides for the creation of a special assessment district which can be, if necessary, divided into zones. Zones can be exempted from the district or assessed differently depending on the type of service to be provided. In the case of an assessment for flood control services, the 1982 Act provides that the benefit may be determined on the basis of the proportionate storm water runoff from each parcel.

The proposed assessment must be submitted to the eligible voters within the area of benefit, and be approved by a majority of those voting. The amount of the assessment must be evaluated and re-imposed annually.

Highway Improvement Projects

A potential source of funding for at least a portion of the storm drain facilities is gas tax monies which are allocated by Federal and State statutes and come directly to the City and may be used for roadway improvement drainage facilities. All proposed highway projects should be carefully reviewed with regard to the possibility of incorporating portions of the storm drain system, mainly catch basins and connector pipes, in their design. One major provision would be that such drainage elements render the highway free from excess flooding during major storms.

Mello-Roos Community Facilities Act of 1982

On January 2, 1983, the Mello-Roos Community Facilities Act of 1982 became law as Government Code Sections 53311 et seq. This statute enables cities, counties, special districts, and school districts to establish community facilities districts (CFD's) to provide certain public services or facilities, including storm drains, to be financed through elector-approved special taxes.

Facilities which can be financed by a CFD include the purchase, construction, expansion, or rehabilitation, of any governmental facilities the legislative body is authorized to construct, own, or operate.

The question of a special tax levy must be submitted to each registered voter within the proposed district. Approval requires a two-thirds affirmative vote.

If long-term bonded indebtedness is required, a resolution and public hearing is also required on the necessity to incur the debt. Bonds are secured by the voted special

taxes within the CFD and this special tax is levied in the same manner as general taxes with the funds paid to the CFD.

General Obligation Bonds

General obligation bonds are a source of capital improvement funds and can be issued if the City's financial position and projections for its future revenues (e.g., sales taxes) support the proposed bond debt service without the power to levy ad valorem property taxes, or other special taxes prohibited under Article XIII A of the California Constitution. General obligation bonds must be approved by two-thirds of the electorate.

Appendix A
Watershed Land Use

Appendix B

Current SDMP Drainage Areas and 1992 SDMP Drainage Areas

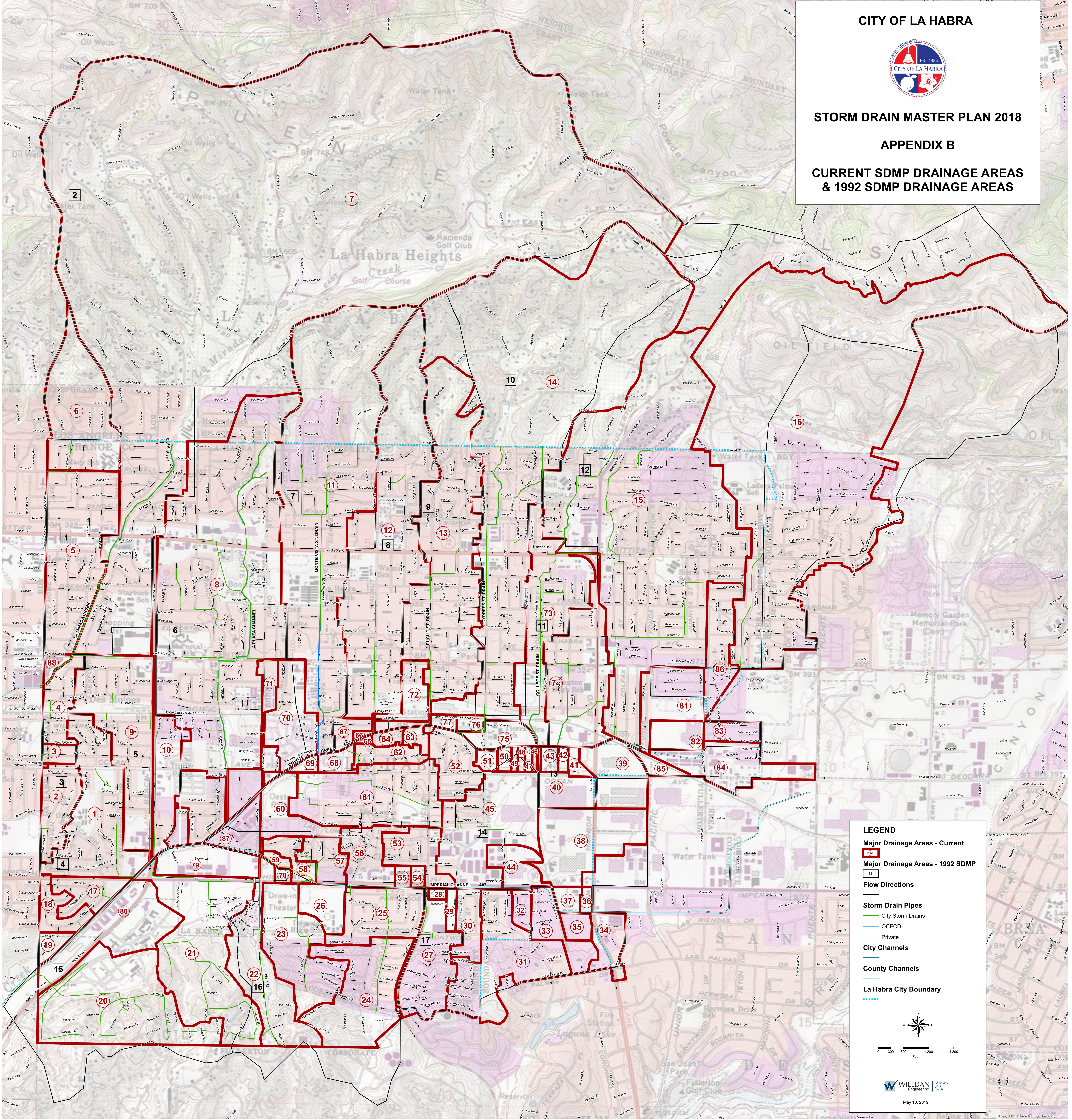
CITY OF LA HABRA



STORM DRAIN MASTER PLAN 2018

APPENDIX B

CURRENT SDMP DRAINAGE AREAS
& 1992 SDMP DRAINAGE AREAS



LEGEND

- Major Drainage Areas - Current (Red outline)
- Major Drainage Areas - 1992 SDMP (Black outline)
- Flow Directions (Arrow symbol)
- Storm Drain Pipes
 - City Storm Drains (Green line)
 - OCFCD (Blue line)
 - Private (Yellow line)
- City Channels (Cyan line)
- County Channels (Light blue line)
- La Habra City Boundary (Dotted blue line)

0 300 600 1,200 1,800 Feet

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May 10, 2019

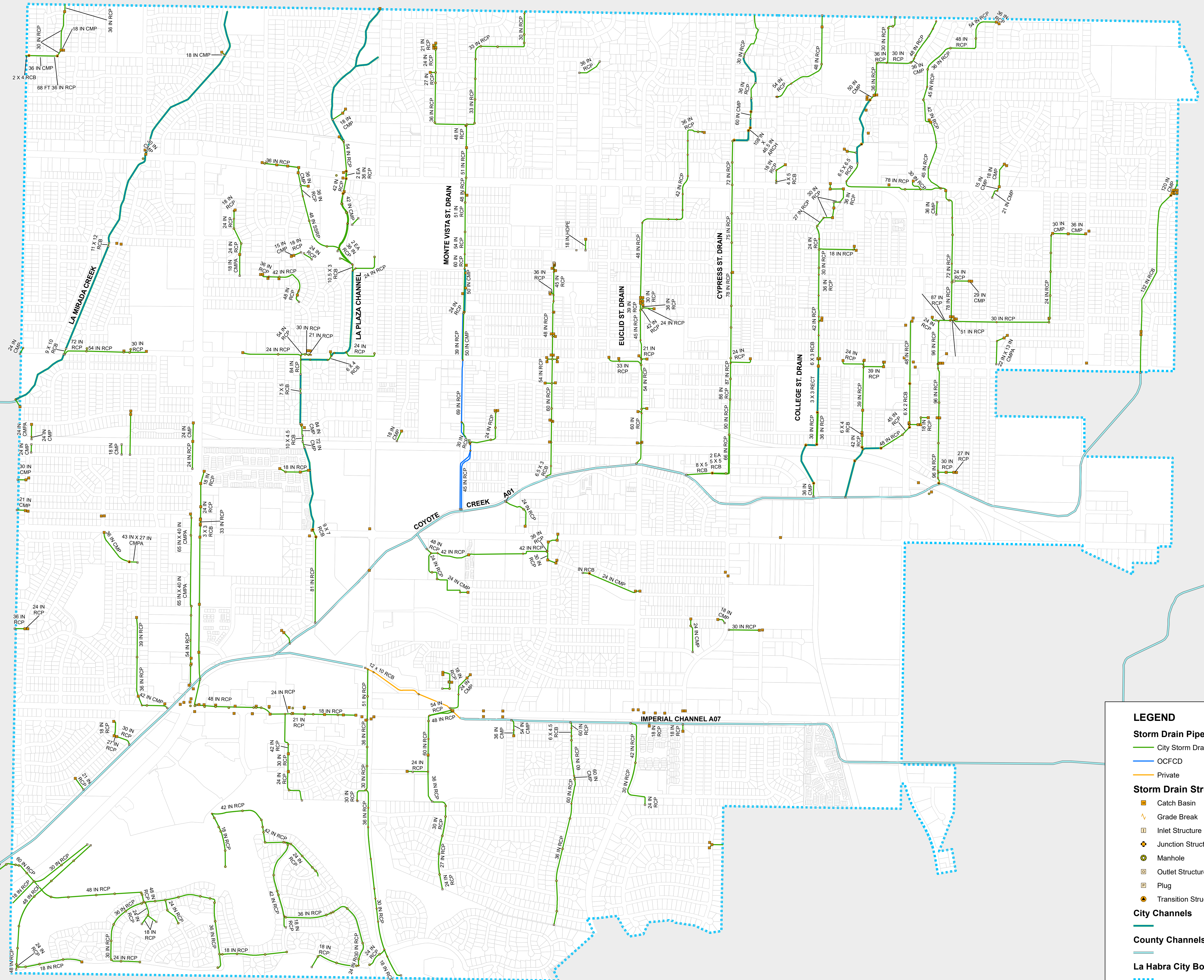
Appendix C
Existing Drainage Facilities



STORM DRAIN MASTER PLAN 2018

APPENDIX C

EXISTING DRAINAGE FACILITIES



LEGEND

Storm Drain Pipes

- City Storm Drain
- OCFCD
- Private

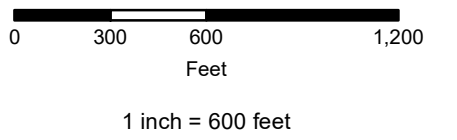
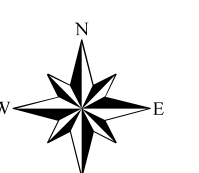
Storm Drain Structures

- Catch Basin
- Grade Break
- Inlet Structure
- Junction Structure
- Manhole
- Outlet Structure
- Plug
- Transition Structure

City Channels

County Channels

La Habra City Boundary



1 inch = 600 feet

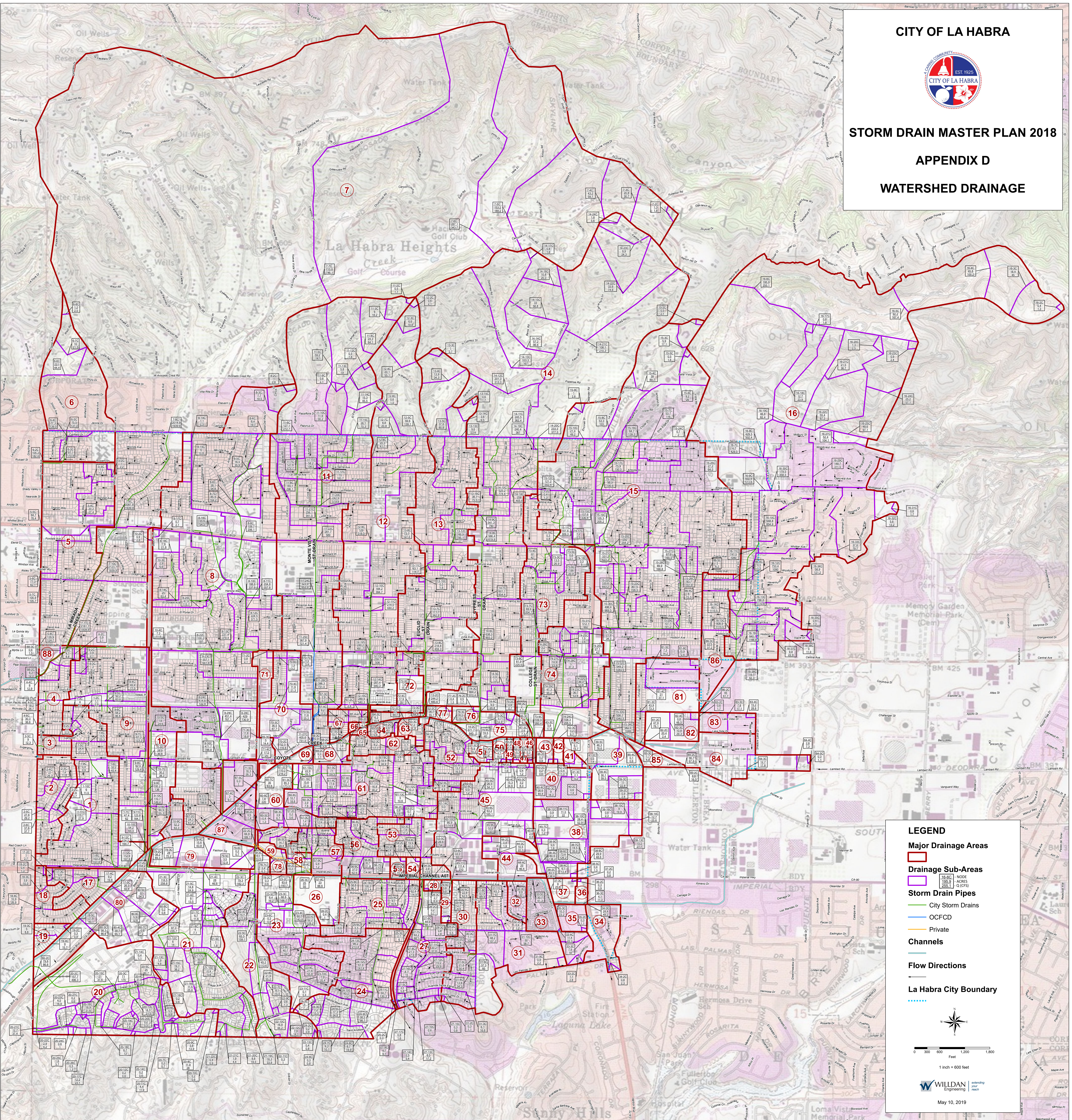
Appendix D
Watershed Drainage



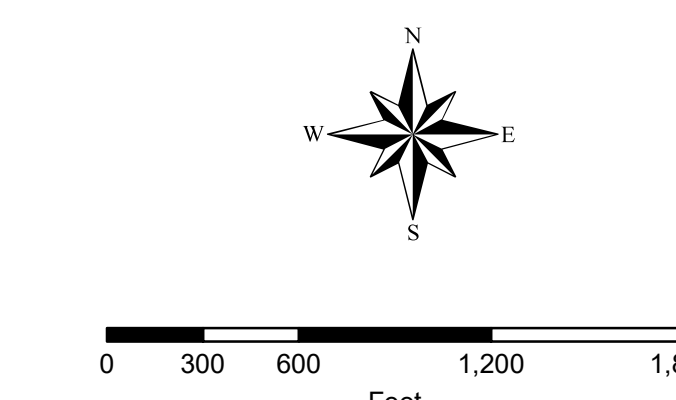
STORM DRAIN MASTER PLAN 2018

APPENDIX D

WATERSHED DRAINAGE



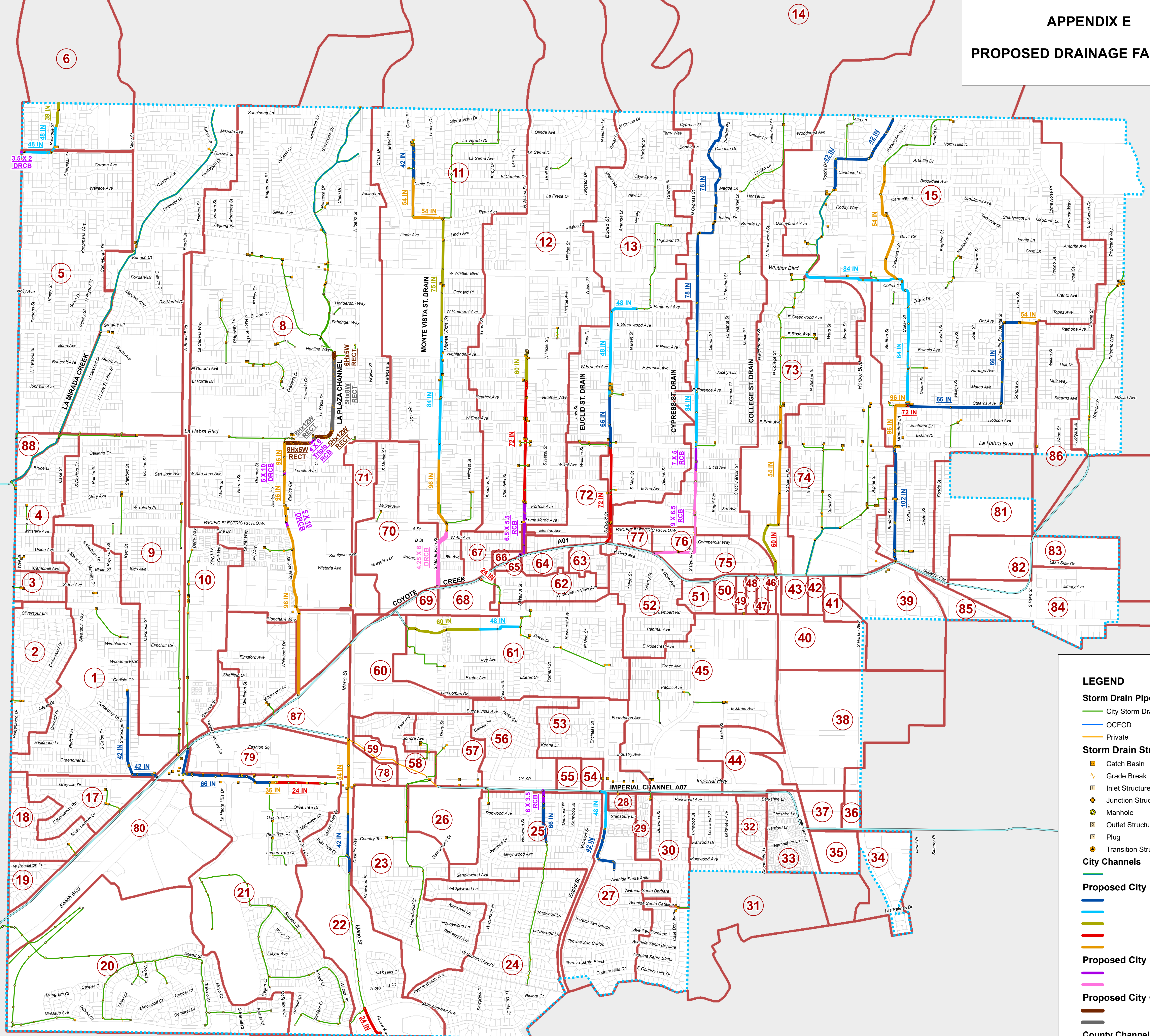
- LEGEND**
- Major Drainage Areas**
 - Drainage Sub-Areas**
 - Storm Drain Pipes**
 - Channels**
 - Flow Directions**
 - La Habra City Boundary**



Appendix E
Proposed Drainage Facilities Map



STORM DRAIN MASTER PLAN 2018
APPENDIX E
PROPOSED DRAINAGE FACILITIES



LEGEND

Storm Drain Pipes

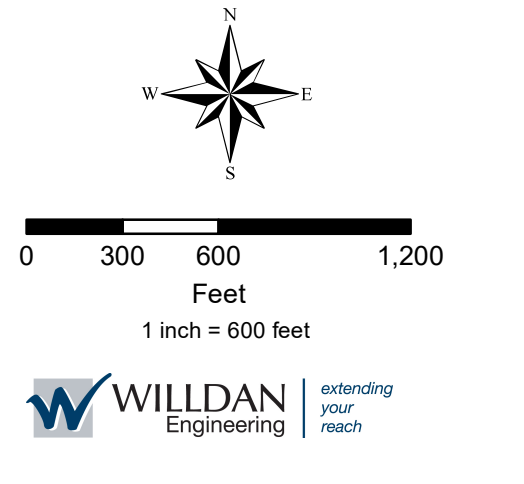
- City Storm Drain
- OCFCD
- Private

Storm Drain Structures

- Catch Basin
- Grade Break
- Inlet Structure
- Junction Structure
- Manhole
- Outlet Structure
- Plug
- Transition Structure

City Channels

- Proposed City Pipes
- Proposed City RCB's
- Proposed City Channels
- County Channels
- La Habra City Boundary



Appendix F
Construction Cost Estimating
Sheets for CIP Projects

APPENDIX F

La Habra SDMP Sturbridge Drive Ar01		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 59,100	\$ 59,100
3	42-INCH RCP	1,720	LF	\$ 300	\$ 516,000
4	MANHOLE/JUNCTION STRUCTURES	6	EA	\$ 12,500	\$ 75,000
SUBTOTAL CONSTRUCTION:					\$ 650,100
(15% of Construction Cost) CONTINGENCY:					\$ 97,515
Site Total:					\$ 747,615
PS&E and Construction Services (17%):					\$ 127,095
Budget Total:					\$ 874,710

APPENDIX F

La Habra SDMP		Date:	5/10/2019		
Roanoke Street Ar06		Prepared by:	KRK		
Does not include cost for improvements within the City of Whittier		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 53,675	\$ 53,675
2	48-INCH RCP	860	LF	\$ 325	\$ 279,500
3	42-INCH RCP	70	LF	\$ 300	\$ 21,000
4	39-INCH RCP	490	LF	\$ 275	\$ 134,750
5	2Hx3.5W Dbl RCB	60	LF	\$ 650	\$ 39,000
6	MANHOLE/JUNCTION STRUCTURES	5	EA	\$ 12,500	\$ 62,500
				SUBTOTAL CONSTRUCTION:	\$ 590,425
				(15% of Construction Cost) CONTINGENCY:	\$ 88,564
				Site Total:	\$ 678,989
				PS&E and Construction Services (17%):	\$ 115,428
				Budget Total:	\$ 794,417

APPENDIX F

La Habra SDMP La Plaza Drive Ar08		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 526,400	\$ 526,400
2	96-INCH RCP	3,790	LF	\$ 700	\$ 2,653,000
3	5Hx10W Dbl RCB	270	LF	\$ 1,100	\$ 297,000
4	8Hx5W RECTANGULAR CHANNEL	350	LF	\$ 1,000	\$ 350,000
5	4Hx6W TRIPLE RCB	150	LF	\$ 1,000	\$ 150,000
6	8Hx12W RECTANGULAR CHANNEL	130	LF	\$ 1,800	\$ 234,000
7	6Hx12W RECTANGULAR CHANNEL	200	LF	\$ 1,500	\$ 300,000
8	5Hx8W RECTANGULAR CHANNEL	1,040	LF	\$ 900	\$ 936,000
9	5Hx6W RECTANGULAR CHANNEL	180	LF	\$ 800	\$ 144,000
10	MANHOLE/JUNCTION STRUCTURES	16	EA	\$ 12,500	\$ 200,000
SUBTOTAL CONSTRUCTION:				\$	5,790,400
(15% of Construction Cost) CONTINGENCY:				\$	868,560
Site Total:				\$	6,658,960
PS&E and Construction Services (17%):				\$	1,132,023
Budget Total:				\$	7,790,983

APPENDIX F

La Habra SDMP Monte Vista SD Ar11		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 477,100	\$ 477,100
2	6Hx4.25W Dbi RCB	960	LF	\$ 1,000	\$ 960,000
3	96-INCH RCP	870	LF	\$ 700	\$ 609,000
4	84-INCH RCP	2,450	LF	\$ 600	\$ 1,470,000
5	75-INCH RCP	1,550	LF	\$ 530	\$ 821,500
6	54-INCH RCP	1,230	LF	\$ 350	\$ 430,500
7	42-INCH RCP	350	LF	\$ 300	\$ 105,000
8	MANHOLE/JUNCTION STRUCTURES	30	EA	\$ 12,500	\$ 375,000
SUBTOTAL CONSTRUCTION:				\$	5,248,100
(15% of Construction Cost) CONTINGENCY:				\$	787,215
Site Total:				\$	6,035,315
PS&E and Construction Services (17%):				\$	1,026,004
Budget Total:				\$	7,061,319

APPENDIX F

La Habra SDMP Walnut Street Ar12		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 178,750	\$ 178,750
2	5.5Hx6.5W RCB	1,050	LF	\$ 550	\$ 577,500
4	72-inch RCP	1,670	LF	\$ 500	\$ 835,000
5	60-inch RCP	500	LF	\$ 400	\$ 200,000
6	MANHOLE/JUNCTION STRUCTURES	14	EA	\$ 12,500	\$ 175,000
				SUBTOTAL CONSTRUCTION:	\$ 1,966,250
				(15% of Construction Cost) CONTINGENCY:	\$ 294,938
				Site Total:	\$ 2,261,188
				PS&E and Construction Services (17%):	\$ 384,402
				Budget Total:	\$ 2,645,589

APPENDIX F

La Habra SDMP Euclid Street Ar13		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 139,150	\$ 139,150
3	72-INCH RCP	1,500	LF	\$ 315	\$ 472,500
4	66-INCH RCP	810	LF	\$ 300	\$ 243,000
5	48-INCH RCP	1,700	LF	\$ 280	\$ 476,000
6	MANHOLE/JUNCTION STRUCTURES	16	EA	\$ 12,500	\$ 200,000
SUBTOTAL CONSTRUCTION:					\$ 1,530,650
(15% of Construction Cost) CONTINGENCY:					\$ 229,598
Site Total:					\$ 1,760,248
PS&E and Construction Services (17%):					\$ 299,242
Budget Total:					\$ 2,059,490

APPENDIX F

La Habra SDMP Cypress Street Ar14		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 431,550	\$ 431,550
2	9x6.5 RCB	2,020	LF	\$ 800	\$ 1,616,000
3	7x5 RCB	310	LF	\$ 650	\$ 201,500
4	84-INCH RCP	1,270	LF	\$ 600	\$ 762,000
5	78-INCH RCP	2,520	LF	\$ 550	\$ 1,386,000
6	MANHOLE/JUNCTION STRUCTURES	28	EA	\$ 12,500	\$ 350,000
				SUBTOTAL CONSTRUCTION:	\$ 4,747,050
				(15% of Construction Cost) CONTINGENCY:	\$ 712,058
				Site Total:	\$ 5,459,108
				PS&E and Construction Services (17%):	\$ 928,048
				Budget Total:	\$ 6,387,156

APPENDIX F

La Habra SDMP Bedford Street Ar15		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 504,250	\$ 504,250
2	102-INCH RCP	1,840	LF	\$ 800	\$ 1,472,000
3	96-INCH RCP	780	LF	\$ 700	\$ 546,000
4	84-INCH RCP	3,580	LF	\$ 600	\$ 2,148,000
5	42-INCH RCP	1,630	LF	\$ 300	\$ 489,000
6	Manholes/Junction Structures	31	EA	\$ 12,500	\$ 387,500
SUBTOTAL CONSTRUCTION:				\$	5,546,750
(15% of Construction Cost) CONTINGENCY:				\$	832,013
Site Total:				\$	6,378,763
PS&E and Construction Services (17%):				\$	1,084,390
Budget Total:				\$	7,463,152

APPENDIX F

La Habra SDMP Lateral 1 Ar15		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 120,300	\$ 120,300
2	54-INCH RCP	2,330	LF	\$ 350	\$ 815,500
3	Manholes/Junction Structures	31	EA	\$ 12,500	\$ 387,500
SUBTOTAL CONSTRUCTION:				\$	1,323,300
(15% of Construction Cost) CONTINGENCY:				\$	198,495
Site Total:				\$	1,521,795
PS&E and Construction Services (17%):				\$	258,705
Budget Total:				\$	1,780,500

APPENDIX F

La Habra SDMP Lateral 2 Ar15		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 186,850	\$ 186,850
2	72-INCH RCP	70	LF	\$ 500	\$ 35,000
3	66-INCH RCP	2,980	LF	\$ 450	\$ 1,341,000
4	54-INCH RCP	300	LF	\$ 350	\$ 105,000
5	Manholes/Junction Structures	31	EA	\$ 12,500	\$ 387,500
SUBTOTAL CONSTRUCTION:				\$	2,055,350
(15% of Construction Cost) CONTINGENCY:				\$	308,303
Site Total:				\$	2,363,653
PS&E and Construction Services (17%):				\$	401,821
Budget Total:				\$	2,765,473

APPENDIX F

La Habra SDMP Imperial Ar21		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 92,300	\$ 92,300
2	66-INCH RCP	1,540	LF	\$ 450	\$ 693,000
3	36-INCH RCP	100	LF	\$ 250	\$ 25,000
4	24-INCH RCP	700	LF	\$ 150	\$ 105,000
6	MANHOLE/JUNCTION STRUCTURES	8	EA	\$ 12,500	\$ 100,000
SUBTOTAL CONSTRUCTION:					\$ 1,015,300
(15% of Construction Cost) CONTINGENCY:					\$ 152,295
Site Total:					\$ 1,167,595
PS&E and Construction Services (17%):					\$ 198,491
Budget Total:					\$ 1,366,086

APPENDIX F

La Habra SDMP Idaho Street Ar22		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 97,350	\$ 97,350
2	54-INCH RCP	1,150	LF	\$ 350	\$ 402,500
3	42-INCH RCP	1,180	LF	\$ 300	\$ 354,000
4	24-INCH RCP	530	LF	\$ 150	\$ 79,500
5	MANHOLE/JUNCTION STRUCTURES	11	EA	\$ 12,500	\$ 137,500
SUBTOTAL CONSTRUCTION:					\$ 1,070,850
(15% of Construction Cost) CONTINGENCY:					\$ 160,628
Site Total:					\$ 1,231,478
PS&E and Construction Services (17%):					\$ 209,351
Budget Total:					\$ 1,440,829

APPENDIX F

La Habra SDMP Dorwood Street Ar24		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 51,900	\$ 51,900
2	3.5Hx6W RCB	110	LF	\$ 400	\$ 44,000
3	66-INCH RCP	1,000	LF	\$ 450	\$ 450,000
4	MANHOLE/JUNCTION STRUCTURES	2	EA	\$ 12,500	\$ 25,000
SUBTOTAL CONSTRUCTION:					\$ 570,900
(15% of Construction Cost) CONTINGENCY:					\$ 85,635
Site Total:					\$ 656,535
PS&E and Construction Services (17%):					\$ 111,611
Budget Total:					\$ 768,146

APPENDIX F

La Habra SDMP Euclid Street Ar27		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 31,750	\$ 31,750
2	48-INCH RCP	640	LF	\$ 325	\$ 208,000
3	42-INCH RCP	850	LF	\$ 300	\$ 255,000
4	MANHOLE/JUNCTION STRUCTURES	5	EA	\$ 12,500	\$ 62,500
SUBTOTAL CONSTRUCTION:					\$ 557,250
(15% of Construction Cost) CONTINGENCY:					\$ 83,588
Site Total:					\$ 640,838
PS&E and Construction Services (17%):					\$ 108,942
Budget Total:					\$ 749,780

APPENDIX F

La Habra SDMP Lambert Ar61		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 73,850	\$ 73,850
2	60-INCH RCP	750	LF	\$ 400	\$ 300,000
3	48-INCH RCP	1,080	LF	\$ 325	\$ 351,000
4	MANHOLE/JUNCTION STRUCTURES	7	EA	\$ 12,500	\$ 87,500
SUBTOTAL CONSTRUCTION:					\$ 812,350
(15% of Construction Cost) CONTINGENCY:					\$ 121,853
Site Total:					\$ 934,203
PS&E and Construction Services (17%):					\$ 158,814
Budget Total:					\$ 1,093,017

APPENDIX F

La Habra SDMP Mountain View Ave Ar62		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 2,000	\$ 2,000
2	24-INCH RCP	50	LF	\$ 150	\$ 7,500
3	MANHOLE/JUNCTION STRUCTURES	1	EA	\$ 12,500	\$ 12,500
SUBTOTAL CONSTRUCTION:					\$ 22,000
(15% of Construction Cost) CONTINGENCY:					\$ 3,300
Site Total:					\$ 25,300
PS&E and Construction Services (17%):					\$ 4,301
Budget Total:					\$ 29,601

APPENDIX F

La Habra SDMP College Street Ar73		Date:	5/10/2019		
		Prepared by:	KRK		
		Checked by:	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
1	MOBILIZATION (10%)	1	LS	\$ 119,050	\$ 119,050
2	60-INCH RCP	1,000	LF	\$ 400	\$ 400,000
3	54-INCH RCP	1,830	LF	\$ 350	\$ 640,500
4	MANHOLE/JUNCTION STRUCTURES	12	EA	\$ 12,500	\$ 150,000
SUBTOTAL CONSTRUCTION:					\$ 1,309,550
(15% of Construction Cost) CONTINGENCY:					\$ 196,433
Site Total:					\$ 1,505,983
PS&E and Construction Services (17%):					\$ 256,017
Budget Total:					\$ 1,762,000