





City of Citrus Heights Neighborhoods 8, 9, and 10

Storm Drainage Master Plan Study

Prepared for

City of Citrus Heights

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WEST YOST ASSOCIATES 25 YEARS 1990–2015

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consulting engineers

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EXECUTIVE SUMMARY

ES.1 INTRODUCTION

The City of Citrus Heights (City) incorporated in 1997. However, until 2010 the storm drainage facilities that serve the City were owned by the City and maintained by the County of Sacramento. The City has now taken over full responsibility for the drainage system and is in the process of developing a comprehensive drainage Capital Improvement Program to reduce or eliminate flooding and drainage problems. The City retained West Yost Associates (West Yost) to perform a drainage study for City Neighborhoods 8, 9, and 10. This study represents another step in the City's effort towards the development of the drainage Capital Improvement Program. A drainage study was completed by West Yost for Neighborhoods 6 and 7 in March 2012.

ES.1.1 Study Objectives

The main objectives of the study are as follows:

- Gain an understanding of the facilities that comprise the existing drainage system in the study area.
- Determine the flood control performance of the key elements of the existing drainage system.
- Identify local drainage and flooding problems and develop solutions to eliminate the problems.
- Develop a Capital Improvement Plan (CIP) that includes a list of the proposed drainage and flooding solutions, the associated costs, and an implementation schedule.

ES.1.2 Study Area

Neighborhoods 8, 9, and 10 are located in the central and eastern portions of the City (see Figure ES-1). These neighborhoods are comprised of rolling terrain that drains to one of the three major creeks in the area: Cripple Creek, Arcade Creek, or San Juan Creek (see Figure ES-2). Although the three creeks present a flood threat to portions of the study area, this study was focused on local flooding issues separate from the creek flooding. The creek flooding is considered a regional flooding issue that needs to be resolved in coordination with Sacramento County.

ES.1.3 Study Approach

The general approach to the study was as follows:

- Define the Existing Storm Drainage System – The first step of the study was to gain an understanding of the existing drainage system. To do so, we collected the available information on the drainage system and performed a field inventory of selected portions of the system.

- Identify Problems – The existing drainage and flooding problems were identified by the following activities:
  - Hydraulic analyses of trunk storm drains
  - Review of service call records
  - Input from City staff
  - Input from residents
- Develop Solutions for Problem – The identified problems were evaluated and recommended solutions were developed.
- Develop a CIP – A drainage CIP was developed that includes a prioritized list of recommended improvements. The CIP also includes estimated implementation costs and an implementation schedule.

Each of the tasks listed above is described in more detail below.

ES.2 EXISTING STORM DRAINAGE SYSTEM

To gain an understanding of the existing drainage system in the study area, West Yost gathered the existing available data that had already been prepared by others. We also performed a field inventory for selected portions of the drainage system.

ES.2.1 Data Collection

The data collected for this study generally fits into one of the following categories:

- Previous Studies Prepared by Others – This included the Flood Insurance Study prepared by FEMA.
- As-built Design Drawings – This included a number of construction drawings for the major storm drain pipes in the study area.
- Mapping Data – This included aerial topographic mapping, aerial photographs, and Geographic Information System (GIS) based storm drain system mapping.
- Field Evaluations Performed by West Yost Staff – This included a field review of key portions of the drainage system to verify the existence of and the approximate horizontal location of the facilities included in the City's GIS storm drainage facility mapping, to confirm that the information included on as-built plans is reasonably accurate, to fill in data gaps on important facilities, and to gain a general understanding of the drainage patterns in the study area.
- Service Calls and Public Input – Input was solicited from City residents at a public meeting and a list of past service calls received by the City and Sacramento County was obtained.

ES.3 IDENTIFICATION OF PROBLEMS

Drainage and flooding problems in the study area were identified by the following activities:

- Hydraulic analyses of trunk storm drains
- Review of service call records
- Input from City staff
- Input from residents

ES.3.1 Hydraulic Analyses of Trunk Storm Drains

Existing trunk storm drain pipes with diameters 36-inches or larger were analyzed to determine whether they have adequate capacity to carry runoff from storms (see Figure ES-2). All but one of the trunk pipe systems were found to have adequate capacity to meet the City's drainage criteria. The pipe system that was found to be inadequate is labeled as SD6 on Figure ES-2. This pipeline was identified as Problem Location 10 and improvements to the system were recommended as described later in this report.

ES.3.2 Review of Service Call Records

City staff provided a list of service calls that document problems reported by residents during prior storm events. This list included service calls recorded primarily by Sacramento County and to a lesser extent the City. This list was reviewed and used to prepare a preliminary list of problem areas within the study area.

ES.3.3 Input from City Staff

City staff have significant knowledge of the drainage issues in the study area based on prior discussions with residents and visual observations during storm events. West Yost met with City staff at the outset of the project to obtain input on known problem locations.

ES.3.4 Input from Residents

A public meeting was held in March 2012, to solicit input from residents on flooding and drainage problems in the area. Descriptions of potential problems were provided by the residents. A follow-up public meeting was held to provide interested residents with a status report and a description of preliminary solutions that had been developed for the problems.

Based on the above activities, a total of 12 flooding and drainage problems were identified. Figure ES-2 presents the general locations the problems.

ES.4 SOLUTIONS TO PROBLEMS

Each flooding and drainage problem location was evaluated and a recommended solution identified. In many cases, the proposed solutions affect more than one problem; therefore, multiple problems were grouped together for evaluation. The problem locations and recommended solutions are shown on Figures ES-3 through ES-12. Table ES-1 provides a summary of the problem locations and the recommended solutions.

ES.5 CAPITAL IMPROVEMENT PROGRAM

The CIP provides a prioritized list of the recommended improvements along with estimated implementation costs and an implementation schedule. The recommended improvements have been separated into three categories: high priority; medium priority; and low priority. The criteria used to define the priority of a given set of improvements are as follows:

- High Priority Improvements – The high priority improvements include those that address potential structure flooding, threats to health and safety, serious traffic hazards, and those that have a very high benefit to cost ratio. The benefit-cost ratios were determined qualitatively; formal determinations of damages and benefits were not performed.
- Medium Priority Improvements – Medium priority improvements include those that address potential flooding of lesser structures (e.g., garages, outbuildings), chronic ponding over large areas, and problems that require excessive maintenance.
- Low Priority Improvements – Low priority improvements include those that address minor or occasional ponding and nuisance drainage issues.

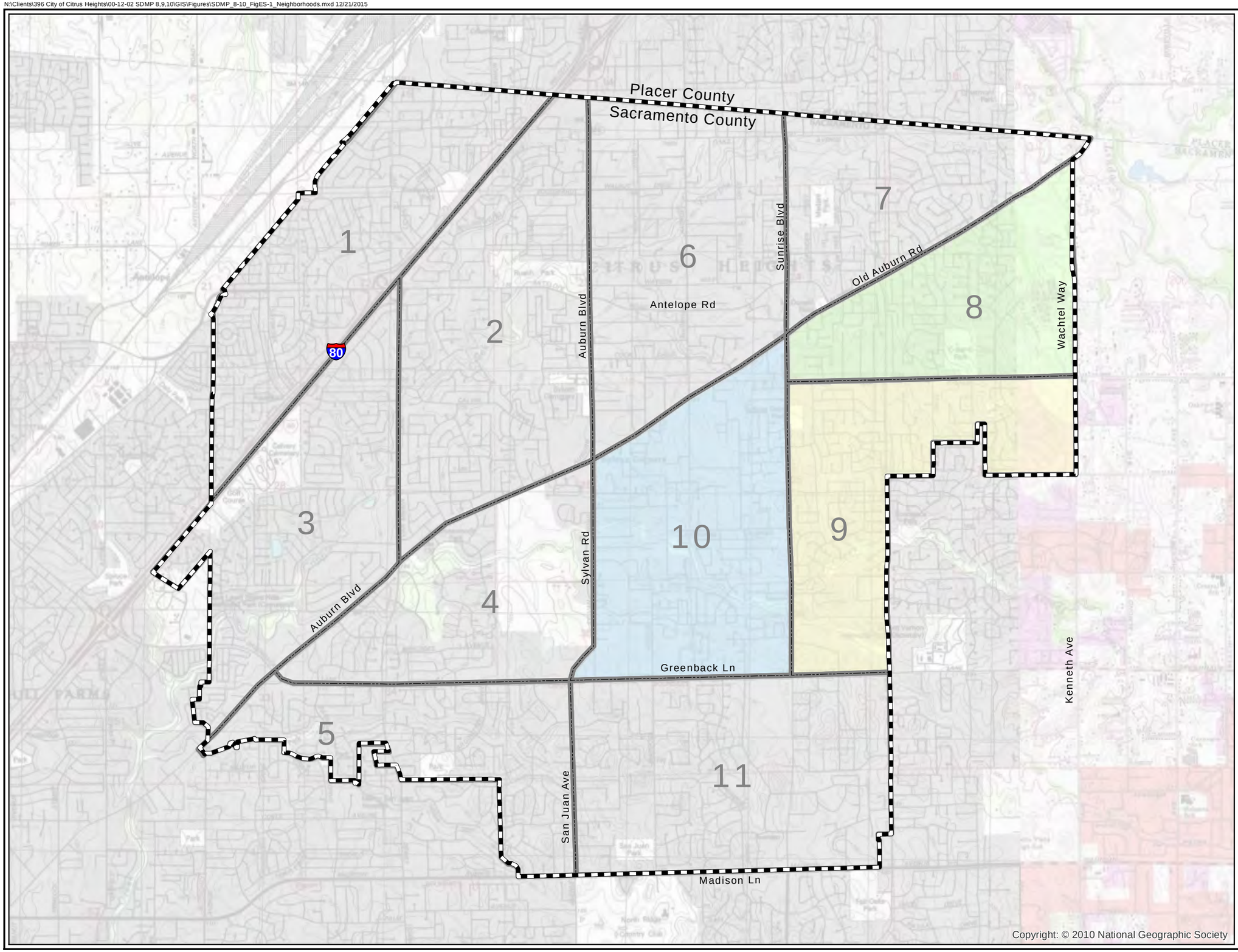
Table ES-1 lists the recommended projects along with the associated priority, estimated schedule for implementation, and estimated implementation cost. The estimated costs include the cost of construction as well as costs for planning, design, construction management, environmental permitting, and program management. The cost estimates are master planning level estimates suitable for decision making and budgeting purposes. More detailed cost estimates should be prepared to a greater level of accuracy as the projects advance to the design stage and more detailed information is developed. Also, the cost estimates were prepared based on the assumption that small projects will be bundled with large projects at the time of implementation to achieve better cost efficiency. The schedules for the project are based on input from City staff.

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FIGURE ES-1

City of Citrus Heights Neighborhoods 8, 9, and 10 Drainage Master Plan Study

STUDY AREA



N

0 1,250 2,500

Scale in Feet

LEGEND

- City Limit
- Neighborhood 8
- Neighborhood 9
- Neighborhood 10
- 4 Other Neighborhoods

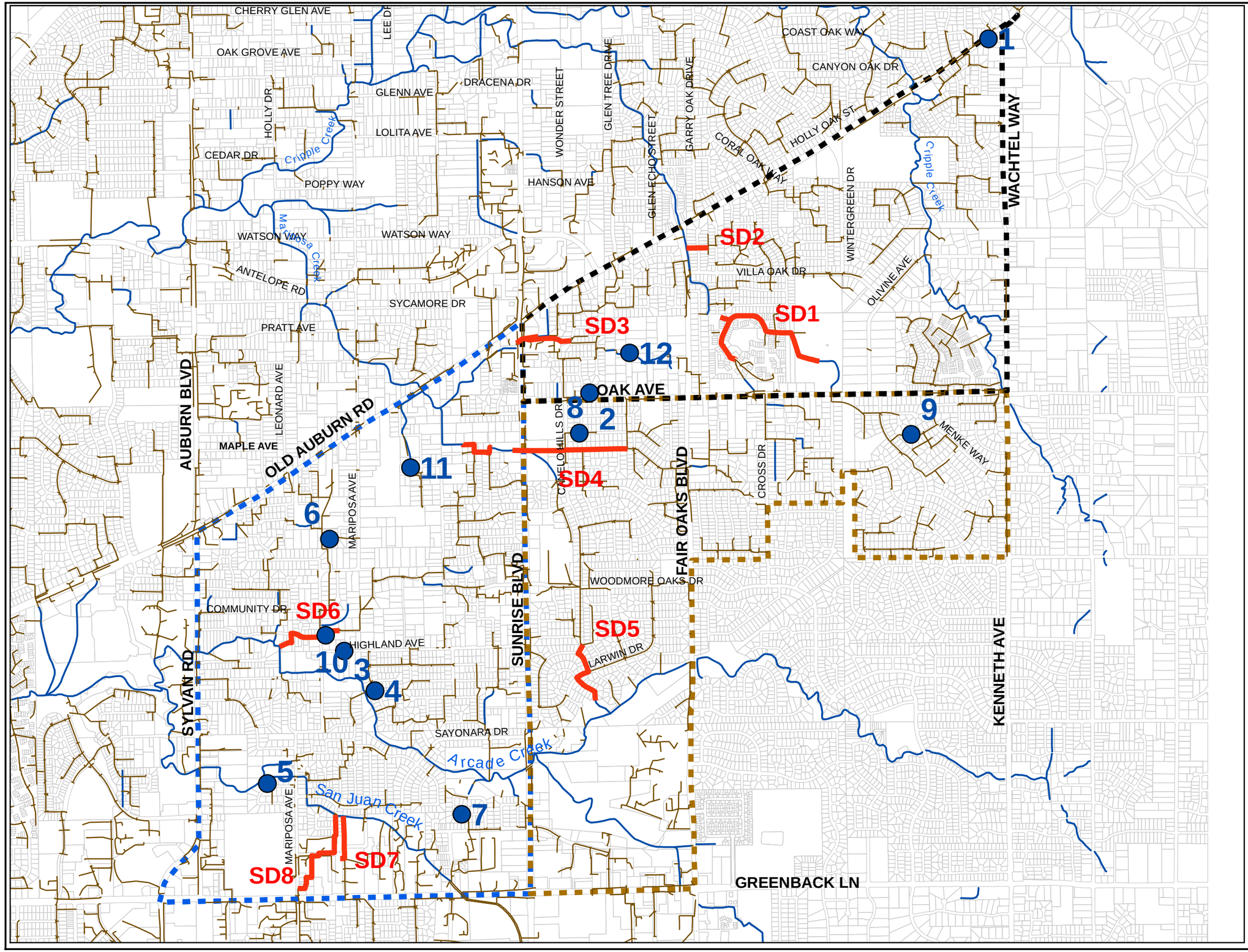
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FIGURE ES-2

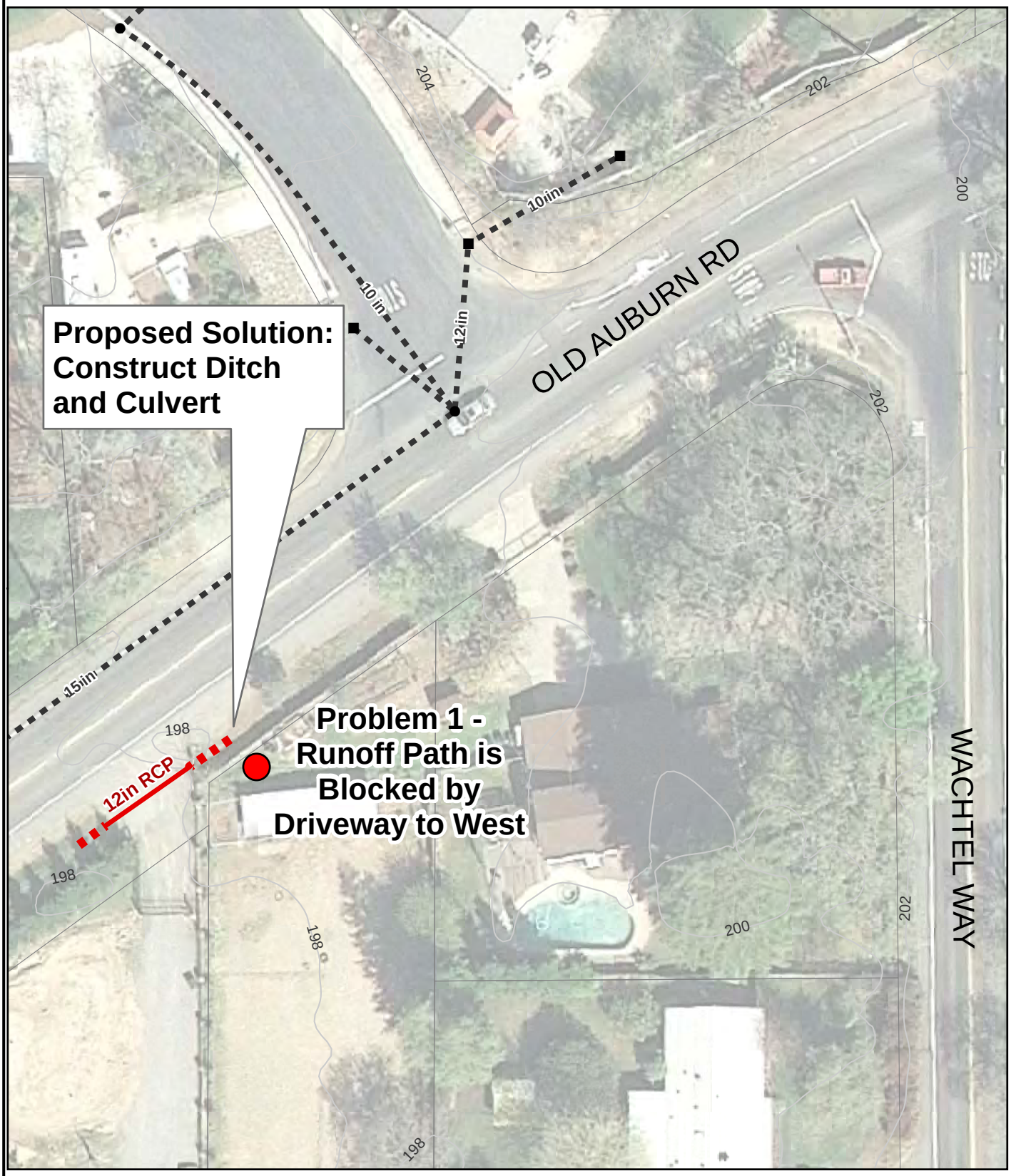
City of Citrus Heights Neighborhoods 8, 9, and 10 Drainage Master Plan Study

TRUNK PIPES AND PROBLEM LOCATIONS



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LEGEND

- Stream or Channel
- Existing Drain Pipe
- Existing Inlet
- Existing Outfall
- Existing Manhole
- Elevation Contour (NAVD88)
- Proposed Pipeline
- Proposed Ditch

N

0 20 40

Scale in Feet

Figure ES-3

City of Citrus Heights Neighborhoods 8, 9, and 10 Drainage Master Plan Study

Problem Location 1 and Proposed Solution

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LEGEND

- Stream or Channel
- Existing Drain Pipe
- Existing Inlet
- Existing Outfall
- Existing Manhole
- Elevation Contour (NAVD88)
- Proposed Pipeline or Drain

N

0 20 40

Scale in Feet

Figure ES-4

City of Citrus Heights Neighborhoods 8, 9, and 10 Drainage Master Plan Study

Problem Location 2 and Proposed Solution

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Figure ES-5

City of Citrus Heights
Neighborhoods 8, 9, and 10
Drainage Master Plan Study

Problem Locations 3 and 4 Proposed Solution

Problem 3 - Inadequate Drainage System Along Highland Ave. and Beam Dr.

Problem 4 - Flooding on Rinconada Dr.

SYLVAN VALLEY WAY
BEAM DR
ROSA VISTA AVE
HIGHLAND AVE
SPRING VALLEY DRIVE
PACHECO WAY
APTOS CIRCLE
MARIPOSA AVE
RINCONADA DR
Arcade Creek

Fill Ditch Const Valley Gutter
AC V-Ditch
Plug Pipe
Plug Pipe
Construct Larger Inlets

N
0 75 150
Scale in Feet

LEGEND

- Problem Location
- Stream or Channel
- Existing Drain Pipe
- Existing Inlet
- Existing Outfall
- Existing Manhole
- Proposed Inlet
- Proposed Outfall
- Proposed Manhole
- Elevation Contour (NAVD88)
- Proposed Pipeline or Drain
- Proposed Pipeline or Drain for Problem Location 10
- Proposed Ditch Replacement
- Proposed Overland Release

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LEGEND

- Stream or Channel
- Existing Drain Pipe
- Existing Inlet
- Existing Outfall
- Existing Manhole
- Elevation Contour (NAVD88)
- Proposed Pipeline or Drain

N

0 50 100

Scale in Feet

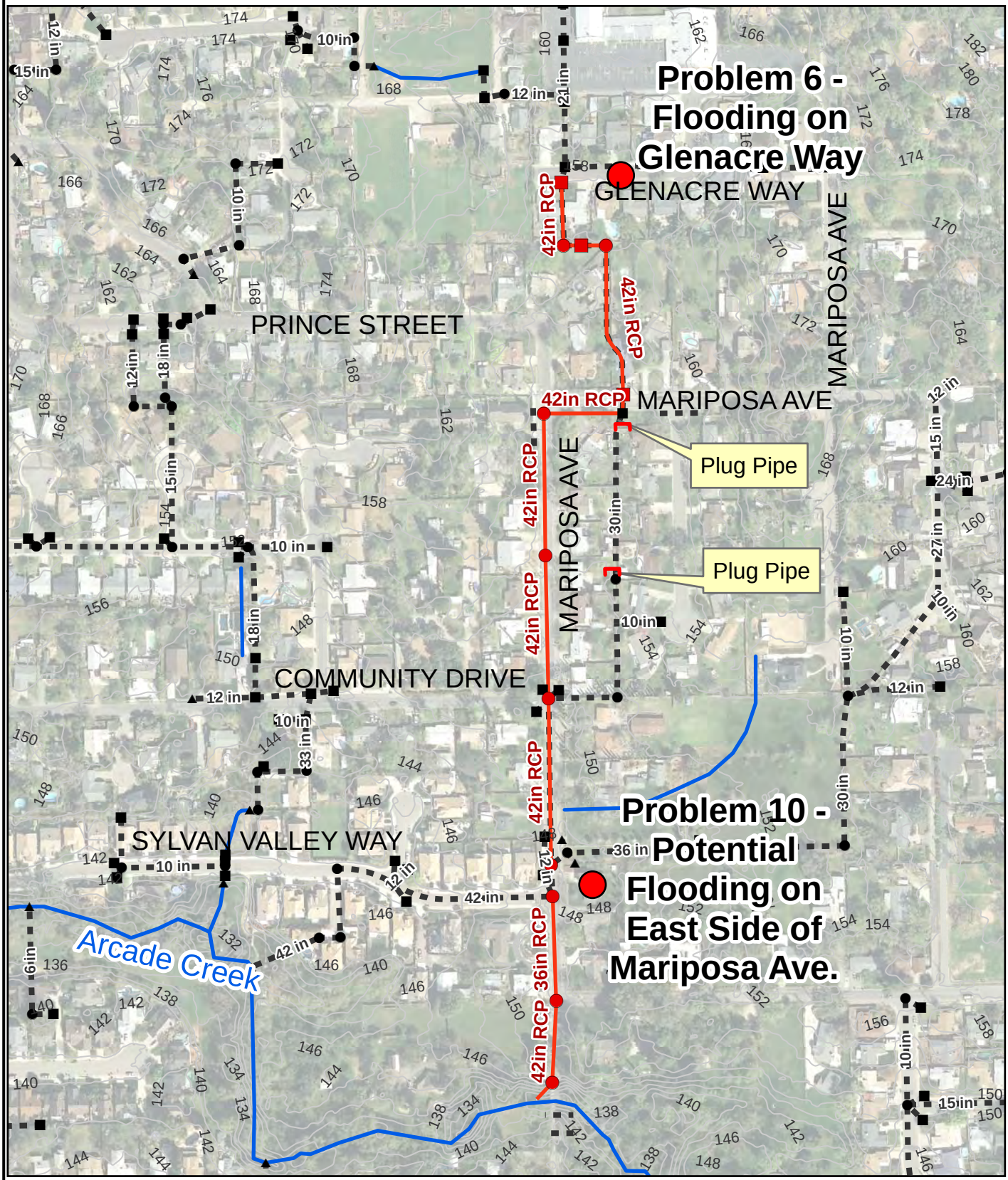
Figure ES-6

City of Citrus Heights
Neighborhoods 8, 9, and 10
Drainage Master Plan Study

Problem Location 5
and Proposed Solution

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LEGEND

- Stream or Channel
- Existing Drain Pipe
- Existing Inlet
- Existing Outfall
- Existing Manhole
- Proposed Pipeline or Drain
- Proposed Inlet
- Proposed Outfall
- Proposed Manhole
- Elevation Contour (NAVD88)

N

0 150 300

Scale in Feet

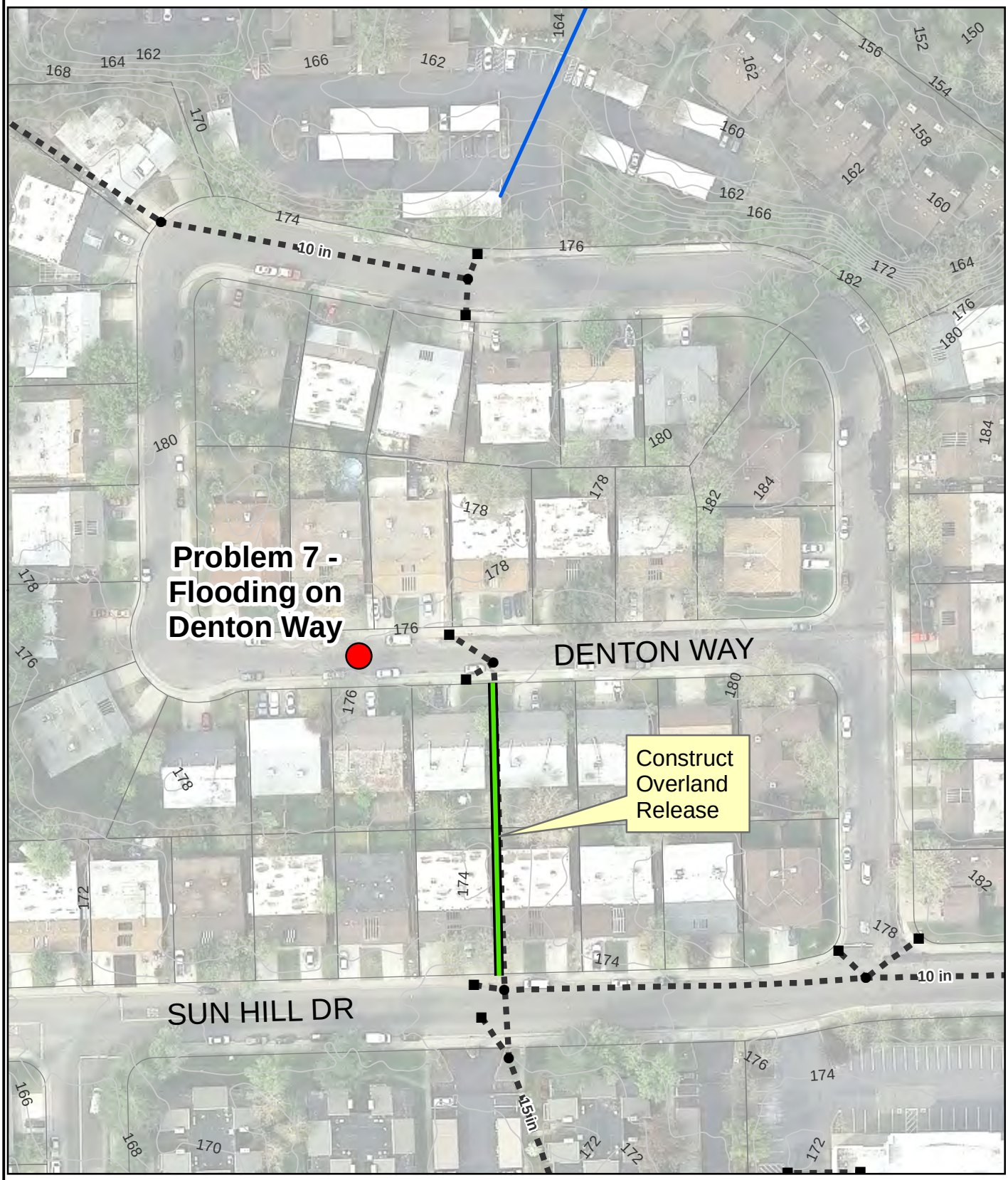
Figure ES-7

City of Citrus Heights Neighborhoods 8, 9, and 10 Drainage Master Plan Study

Problem Locations 6 and 10 Proposed Solution

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LEGEND

- Stream or Channel
- Existing Drain Pipe
- Existing Inlet
- Existing Outfall
- Existing Manhole
- Elevation Contour (NAVD88)
- Proposed Overland Release

N

0 50 100

Scale in Feet

Figure ES-8

City of Citrus Heights Neighborhoods 8, 9, and 10 Drainage Master Plan Study

Problem Location 7 Proposed Solution

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LEGEND

- Stream or Channel
- Existing Drain Pipe
- Existing Inlet
- Existing Outfall
- Existing Manhole
- Elevation Contour (NAVD88)
- Proposed Pipeline or Drain

N

0 50 100

Scale in Feet

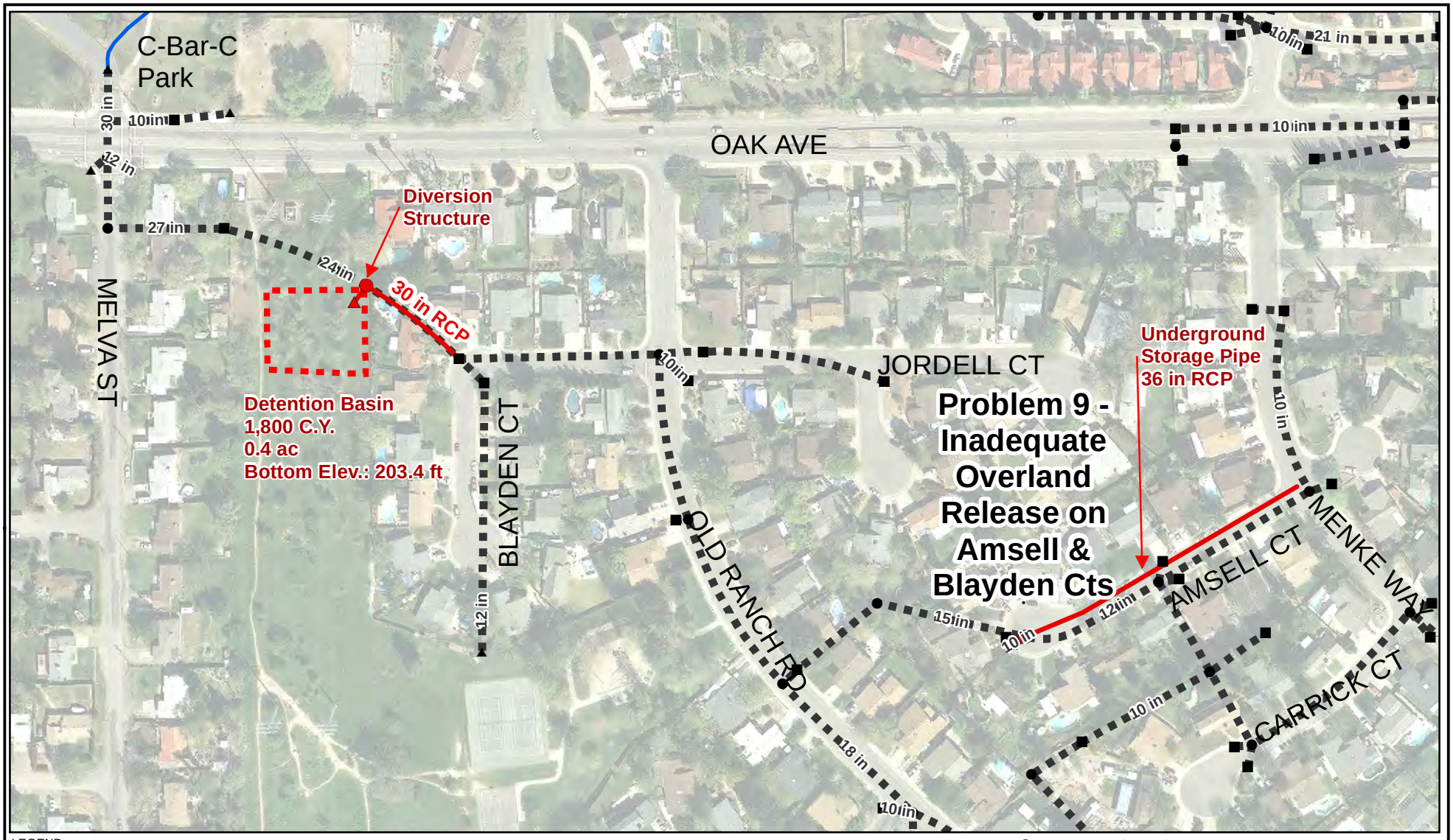
Figure ES-9

City of Citrus Heights
Neighborhoods 8, 9, and 10
Drainage Master Plan Study

Problem Location 8
Proposed Solution

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LEGEND

- Stream or Channel
- Existing Drain Pipe
- Existing Inlet
- Existing Outfall
- Existing Manhole
- Proposed Pipe or Drain
- Proposed Detention Basin
- Elevation Contour (NAV88)

N

0 100 200

Scale in Feet

Figure ES-10

City of Citrus Heights Neighborhoods 8, 9, and 10 Drainage Master Plan Study

Problem Location 9 Proposed Solution

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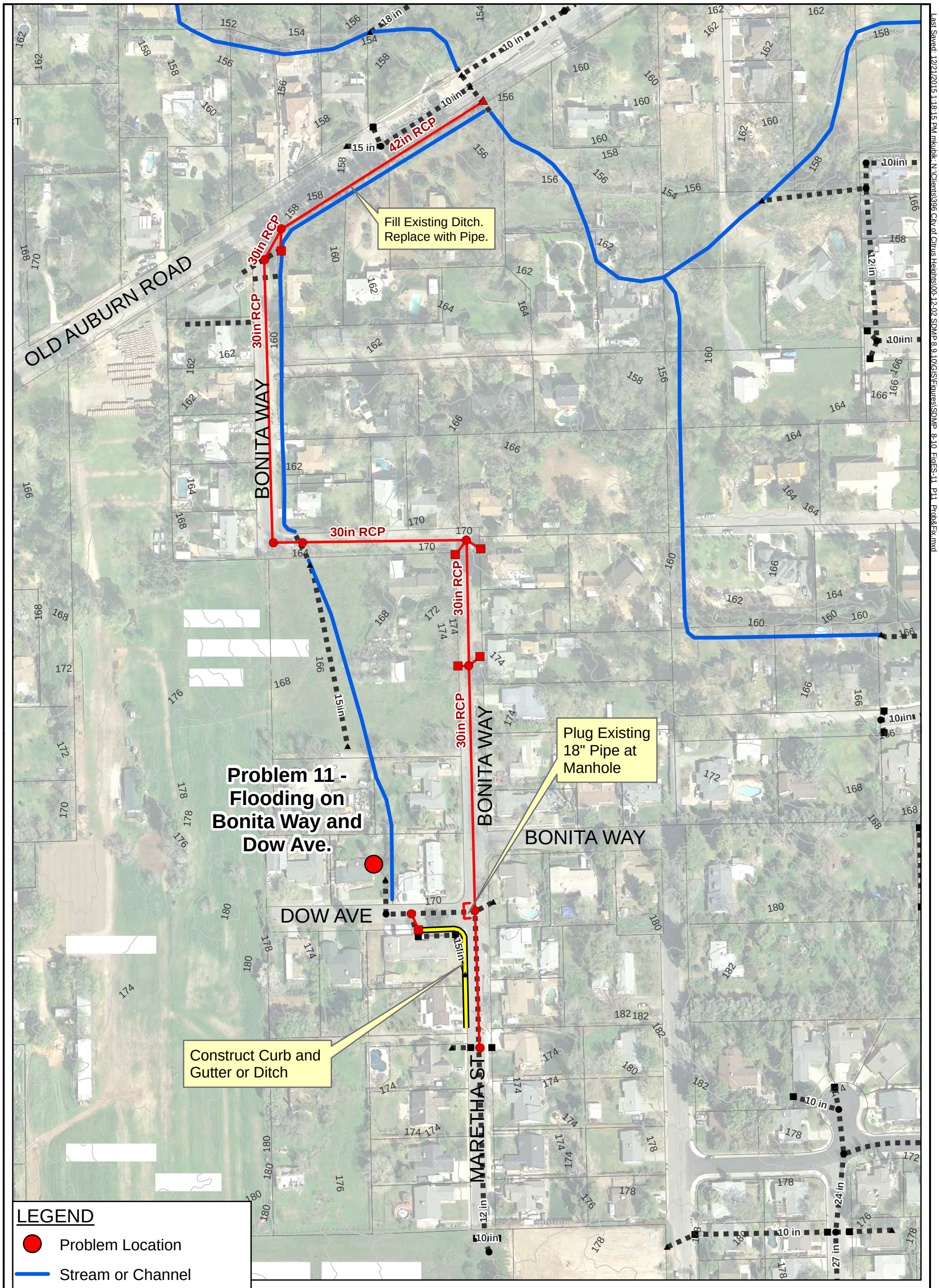


FIGURE ES-11

City of Citrus Heights
Neighborhoods 8, 9, and 10
Drainage Master Plan Study

Problem Location 11
and Proposed Solution

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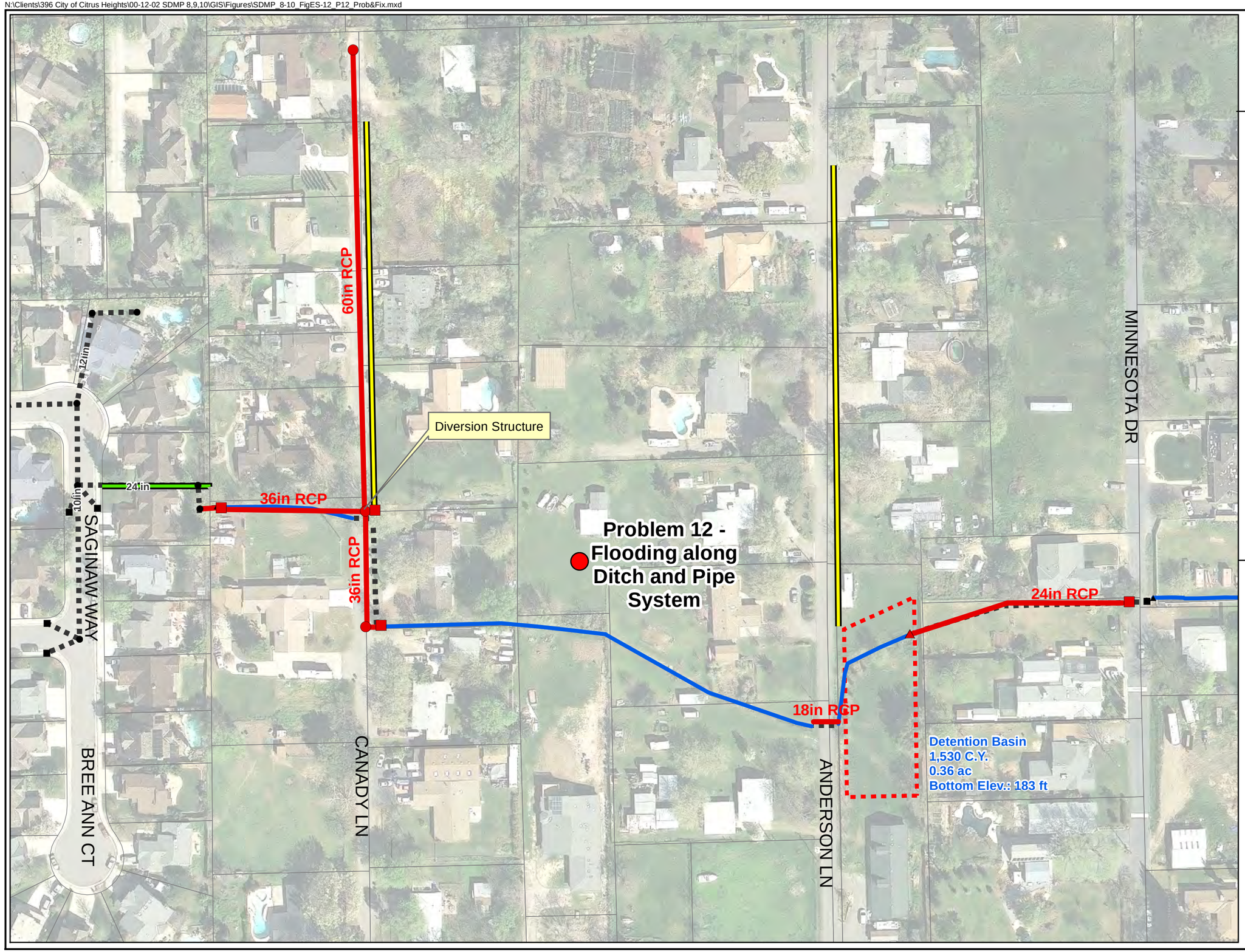
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Figure ES-12

City of Citrus Heights Neighborhoods 8, 9, and 10 Drainage Master Plan Study

Problem Location 12 and Proposed Solution



N

0 50 100

Scale in Feet

LEGEND

- Elevation Contour (NAVD88)
- Stream or Channel
- Existing Drain Pipe
- Proposed Pipe or Drain
- Proposed Detention Basin
- Proposed Overland Release
- Proposed Ditch or Gutter
- Proposed Inlet
- Proposed Outfall
- Proposed Manhole

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