APPENDIX I

Sanitary Sewer Study

7991.00

SANITARY SEWER STUDY

LEVEL TWO

FOR

SUNCREEK SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

MARCH, 2009

PREPARED FOR:
SACRAMENTO COUNTY
WATER QUALITY DIVISION SASD
10545 ARMSTRONG AVENUE, SUITE 101
MATHER, CA 95655

PROJECT DEVELOPER:
THE SUNCREEK OWNERS GROUP
7700 COLLEGE TOWN DR. SUITE 220
SACRAMENTO, CA 95826-2304

PREPARED BY:
MACKAY & SOMPS CIVIL ENGINEERS, INC.
1771 TRIBUTE ROAD, SUITE E
SACRAMENTO, CA 95815-4487

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ABBREVIATIONS

ADWF	Average dry weather flow
cfs	Cubic feet per second
SASD	Sacramento Area Sewer District
d/D	Depth of flow/diameter of pipe
ESD	Equivalent single family dwelling units
fps	Feet per second
gpd	Gallons per day
I/I	Inflow and Infiltration
mgd	Million gallons per day
MSL	Mean sea level
LC	Laguna Creek
LCI	Laguna Creek Interceptor
PF	Peaking factor
PUE	Public Utility Easement
PDWF	Peak dry weather flow
PWWF	Peak wet weather flow
PUD	Planned Unit Development
SFEMP	Sewerage Facilities Expansion Master Plan
SRCSD	Sacramento Regional County Sanitation District
SRWTP	Sacramento Regional Wastewater Treatment Plant

EXECUTIVE SUMMARY

This SASD Level Two sewer study is prepared for the SunCreek Specific Plan hereafter referred to as the "SunCreek Project". The SunCreek Project proposes to develop 1,266+/- acres into mostly single family residential land uses within the Sunrise Douglas Community Plan. The project includes low to high-density single-family residential units, multi-family residential units, schools, parks, open space areas and commercial land uses.

Location

The SunCreek project is located within the limits of the City of Rancho Cordova. Refer to **Exhibit A: SunCreek Specific Plan - Vicinity Map** to see the location of the SunCreek Project. The SunCreek Project is bounded by Sunrise Blvd., the Anatolia III development and Rancho Cordova Parkway on the west. The eastern boundary is adjacent to Grant Line Road and undeveloped County of Sacramento property. Two SunRidge Specific Plan projects, Arista del Sol and the Preserve are adjacent to the northern project boundary while the southern boundary is adjacent to the Arboretum Project (Waegell/Lewis Homes) and undeveloped County of Sacramento property. Refer to **Exhibit B: SunCreek Specific Plan - Land Use Plan** to see the SunCreek Project land uses and adjacent projects.

Purpose of Study

This sewer study intends to satisfy SASD Level Two Minimum Sewer Study Requirements dated February 13, 2008. The purpose of this study is to:

- Ensure technical compliance with the latest SASD Master Plan
- Support EIR documentation and establish a finance plan for the Project
- Confirm the capacity of existing and future sewer improvements that will serve the project
- Establish sewer sheds within project area and identify off-site tributary shed areas
- Size the backbone sewer interceptor and trunk system, locate and size a pump station, establish depth of pipes and verify pipe cover

The focus of this study is on topography, major infrastructure phasing & timing, Laguna Creek Interceptor and its capacity, trunk sewers and their capacity, and shed shifts. This sewer study will be used to support the preparation of the project specific Environmental Impact Report (EIR) and will be used to establish a finance plan for the SunCreek Project.

Sanitary Sewer Sheds and Facilities to Serve the Project

The SunCreek Project is tributary to the proposed Laguna Creek Interceptor and lies within basin LC51. Refer to **Exhibit C: SunCreek Specific Plan – Sanitary Sewer Study Area** to see the SunCreek Project and adjacent sewer sheds included in this study. Exhibit C represents the SunCreek Sewer Study Area discussed throughout this Level Two sanitary sewer study.

Development in the SunCreek Sewer Study Area is expected to exceed the time lines anticipated in the Master Plan Studies of both SASD and Sacramento Regional County Sanitation District (SRCSD). Initial sanitary sewer service for the SunCreek Sewer Study Area may be needed as early as 2011. Due to the potential need for sanitary sewer service prior to the SASD Master Plan year 2020 timetable, SASD and SRCSD may accelerate the Mather Interceptor Project to provide interim sanitary sewer service.

The SunCreek Project proposes to construct a portion of the Laguna Creek Interceptor (LCI). The SunCreek Project will construct a portion of LCI segment no. 5 that lies within the SunCreek Project boundary. The SunCreek portion of LCI-5 will be used on an interim basis by SASD as a sanitary sewer collector and as flows increase as an oversized trunk. Once upstream development occurs and sanitary sewer flows exceed 10 mgd the pipeline will become an interceptor. Located at the downstream end of the SunCreek portion of LCI-5 will be an interim sewer pump station (SunCreek Sewer Pump Station). Sewer flows from the SunCreek Pump Station will be conveyed to the Sacramento Regional Wastewater Treatment Plant (SRWTP). Refer to **Exhibit D: SASD & SRCSD Interceptors and Trunk Sewer** to see the trunk sewers and interceptors near the SunCreek Project.

Within the SunCreek Sewer Study Area, The Arboretum Project, located adjacent to the SunCreek Project's southern boundary is also going through a similar development entitlement process as the SunCreek Project. Therefore, this Level Two Sanitary Sewer Study includes two development scenarios for sewer service to the SunCreek Sewer Study Area. Scenario One describes the sanitary sewer infrastructure should the SunCreek Project develop before the Arboretum Project. Scenario Two describes the sanitary sewer infrastructure should the Arboretum Project develop before the SunCreek Project.

Calculated Wastewater Flows

Using SASD design criteria for base ESD flow rates, peaking factors, and inflow and infiltration (I/I), the SunCreek Project peak wet weather flows PWWF (mgd) is calculated to be 6.31 mgd and 27.74 mgd for upstream off-site sheds. The combined total calculated wastewater flows for the entire study area through the SunCreek Project is calculated to be 33.32 mgd. Refer to **Table 7-Calculated Wastewater Flows** in section III.2 of this study to see peaking factors, ESD's and areas used to calculate these flows.

Conclusion

This Level Two Sanitary Sewer Study concludes there is sufficient interim capacity within the existing offsite interceptor system to accommodate the SunCreek Specific Plan Project and development with the SunCreek Sanitary Sewer Study Area until the ultimate facilities are completed. An onsite gravity sewer collector system, trunk sewer and interceptor system can be constructed to convey sewer flows to a proposed pump station located within the SunCreek Sanitary Sewer Study Area. Offsite facilities will be constructed and/or utilized to convey sewer flows from the pump station to a SRCSD Interceptor.

SUNCREEK SPECIFIC PLAN SEWER STUDY
LEVEL TWO

I. Introduction and Background

I.1 Purpose of Study

This SASD Level Two sewer study is prepared for the SunCreek Specific Plan Area hereafter referred to as the "SunCreek Project", a 1,266-acre mixed-density, mixed land use community within the City of Rancho Cordova. This study establishes the backbone trunk system and sheds, the alignment and design of LCI-5, the location of the SunCreek Sewer Pump Station and defines sewer capacity reservations. Reference the following two exhibits for a SunCreek Project overview:

- Exhibit A: Vicinity Map
- Exhibit B: SunCreek Specific Plan Land Use Plan

The purpose of this study is to satisfy SASD Level Two Minimum Sewer Study Requirements, dated February 13, 2008, which are summarized as follows:

- Ensure technical compliance with the latest SASD Master Plan
- Support EIR documentation and establish a finance plan for the Project
- Define sewer capacity reservations and sewer sheds
- Confirm the capacity of existing and future trunk sewers that will serve the project
- Establish sewer sheds within project area and identify off-site tributary shed areas
- Size the backbone sewer interceptor and trunk system, locate and size the pump station, establish depth of pipes and verify cover

I.2 Level of Study

This study identifies points of connections, locates the SunCreek Pump Station and calculates interceptor and trunk sewer system flows to serve the Project based on:

- SASD Design Standards, Version 1.00, dated February 13, 2008
- 2006 Draft SASD Sewerage Facilities Master Plan Update
- Previously prepared Sewer Master Plans documents for the Preserve at SunRidge and Anatolia III
- Draft Mather Interceptor EIR dated July 31, 2007
- The proposed SunCreek land use plan with acreages and densities

This study provides the necessary information to establish the SunCreek Project sewer backbone infrastructure consisting of a sewer interceptor, sewer trunk sizes and alignments and a sewer pump station location. Sewer sheds, total ESD's at nodes, flow rates, pipeline sizes, pipeline slopes, invert elevations, manhole rim elevations have been calculated to provide a Level Two sewer study detail.

I.3 Project Location

On-Site

The SunCreek project is located within the limits of the City of Rancho Cordova. The SunCreek Project is bounded by Sunrise Blvd., the Anatolia III development and Rancho Cordova Parkway on the west. The eastern boundary is adjacent to Grant Line Road and undeveloped County of Sacramento property. Two SunRidge Specific Plan projects, Arista del Sol and The Preserve are adjacent to the northern project boundary while the southern boundary is adjacent to The Arboretum Project (Waegell/Lewis Homes) and undeveloped County of Sacramento property.

The SunCreek Project applicant is currently processing an entitlement application for a General Plan Amendment and a Specific Plan Rezone with the City of Rancho Cordova.

The project is tributary to the Laguna Creek Interceptor and is located within interceptor basin LC51. Refer to the **Appendix B: SRCSD Master Plan 2000 – Laguna Creek Interceptor Basins, Figure 14** for the Laguna Creek Interceptor Basins.

Off-Site

The project also is tributary to upstream off-site Laguna Creek Interceptor basins LC52, LC61 and LC62 and through an approved permanent shed shift a portion of Aerojet Interceptor Basin AJ11. These upstream off-site interceptor basins will ultimately receive sewer service through the SunCreek Project.

I.4 Topography

On-Site Topography

The overall project site can be characterized as rolling terrain with elevations ranging from 130 to 230 feet above mean sea level. The greatest surface relief occurs in the major drainage way that traverses the SunCreek Project generally from east to west. The ground slopes generally to the west and south, and several intermittent natural and manmade channels drain the property. This main drainage feature is referred to as Kite Creek, which is a tributary of Laguna Creek.

Annual grasslands are interspersed with occasional groups of non-native trees and seasonal wetlands and drainages typical of eastern Sacramento County.

Off-Site Topography

The main drainage feature that traverses the SunCreek Project continues northeast of the SunCreek Project area. This area is upstream of the SunCreek Project and is approximately 600 acres in size with elevations ranging from 230 to 280 feet above mean sea level. This upstream off-site area defines the headwaters for Kite Creek. Kite Creek leaves the SunCreek Project at the southwestern boundary. The terrain in this part of the SunCreek Project area can be characterized as slightly rolling with a gradual slope towards Jackson Road (State Route 16). The elevation at the SunCreek Project southwestern boundary is 120 feet above mean sea level and 110 feet above mean sea level near State Route 16.

I.5 Site Specific Design Consideration

The SunCreek Project proposes to construct the segment of the Laguna Creek Interceptor that falls within the SunCreek Project boundary. This section of the Laguna Creek interceptor within the SunCreek Project boundary represents approximately 80% of segment 5. The Interceptor would begin in Grant Line Road at the northeast project boundary. The interceptor will follow Grant Line road to the north where Grant Line Road will intersect Chrysanthy Blvd. The Interceptor will follow Chrysanthy Blvd. to the west to the Chrysanthy Blvd. Americanos Blvd. intersection. The interceptor will then follow Americanos to the south to the Americanos Blvd. and Central Park Drive Intersection. The Interceptor then follows Central Park Drive to the west until it meets Kite Creek. The Interceptor then follows Kite Creek to the southwest to a point where Kite Creek crosses Rancho Cordova Parkway near the intersection of Rancho Cordova Parkway and Kiefer Blvd. The interceptor then follows Kiefer Blvd. to the west to the Kiefer Blvd. and Sunrise Blvd. intersection. The interceptor then follows Sunrise Blvd to the south to the SunCreek Project southwestern corner where the SunCreek Pump Station is located. The portion of the interceptor alignment that follows Kite Creek will be located within a 70-foot wide wetland buffer area. The interceptor will be designed to SRCSD standards and utilized on an interim basis as an oversized trunk. SASD would maintain the interceptor until flows from upstream shed areas reach interceptor volumes.

The Chrysanthy Blvd. Trunk Sewer has been planned by SASD to be placed adjacent to a portion of the SunCreek Project's northern boundary in Chrysanthy Blvd. The SunCreek Project is planning to place the Laguna Creek Interceptor in this same segment of Chrysanthy Blvd. Therefore, to eliminate redundant sanitary sewer facilities and cost of the Chrysanthy Blvd. trunk sewer, the SunCreek Project processed a permanent shed shift to shift trunk sewer sheds SDA047, SDA048, SDA049 and SDA 051 from this segment of the Chrysanthy Blvd. trunk sewer into the Laguna Creek Interceptor. This approved shed shift moves 641.6 acres and 3,850 ESD's from the Chrysanthy Blvd. Trunk Shed (Aerojet Sunrise Douglas Interceptor Basin AJ11) to the Laguna Creek Interceptor. Refer to **Appendix F: Permanent Shed Shift – AJ Sunrise Douglas Trunk Shed & LC Upper Laguna Creek Trunk Shed** to review the approved shed shift forms and exhibits.

The Anatolia III project is an existing residential development located upstream and adjacent to the SunCreek Project and is within the LC Upper Laguna Creek Trunk Shed. The Anatolia III Project is receiving sewer service through an existing sewer pump station and force main. The Anatolia III pump station is located near the intersection of Kiefer Blvd. and Country Garden Drive. The Anatolia III Pump Station is connected to the Chrysanthy Blvd. Pump Station by an 8-inch force main. The Anatolia III force main follows Kiefer Blvd. from the Kiefer Blvd.-Country Garden intersection east to Rancho Cordova Parkway then turns to the north and follows Rancho Cordova Parkway to Chrysanthy Blvd. The 8-inch force main connects to a gravity sewer pipeline at the intersection of Rancho Cordova Parkway and Chrysanthy Blvd. that connects to the Chrysanthy Blvd. Sewer Pump Station. The Chrysanthy Blvd. Sewer Pump Station currently pumps sewer flows in an 18-inch force main south in Sunrise Blvd. to Kiefer Blvd. then west in Kiefer Blvd. and eventually connects to the Northeast Interceptor.

The Chrysanthy Blvd. Sewer Pump Station and force main will be taken out of service by the construction of the Mather Interceptor. The Mather Interceptor gravity connects the Chrysanthy Blvd. Sewer Pump Station to the Bradshaw Interceptor. The Mather Interceptor or another, yet to be determined, interim sewer facility will be constructed by SRCSD when the current SASD facilities within the SunCreek Sewer Study Area are nearing capacity.

The Anatolia III Project is located upstream of the SunCreek Project and is within the same trunk shed. Therefore, the Anatolia III sewer shed has been incorporated into the design of the SunCreek Project sewer system. Refer to **Exhibit D: SASD & SRCSD Interceptors and Trunk Sewer** for the location of the Anatolia III Sewer Pump Station, the Chrysanthy Blvd. Sewer Pump Station and the regional backbone sewer infrastructure.

The Preserve at SunRidge is a mixed-use residential development project that is adjacent to the SunCreek Project. A portion of the Preserve at SunRidge Project is located with the LC Upper Laguna Creek Trunk Shed. The SunCreek Project has incorporated into its sewer design the portion of the Preserve at SunRidge Project that will sewer through the SunCreek Project.

The Arboretum Project is a mixed-use residential development project located adjacent to the SunCreek Project's southern boundary. The SunCreek Sewer Study has included sewer flows from the Arboretum Project in the sizing of a sewer trunk located along the southern SunCreek Boundary and the SunCreek Pump Station.

The Cordova Hills Development Project is a 3,500 acre mixed-density, mixed-land use development project located upstream of the SunCreek Project and is within the Laguna Creek Interceptor Basin. The Cordova Hills Project will connect Laguna Creek Interceptor Basins LC52, LC61 and LC62 to LCI-5. A formal development application for the Cordova Hills Project has been submitted to the County of Sacramento. Therefore, the SunCreek Project has included the Cordova Hills sewer flows within the Laguna Creek Interceptor and the SunCreek Sewer Pump Station.

Refer to the **Appendix D: CSD-1 Sewerage Facilities Expansion Master Plan 2006 Update – DC Upper Deer Creek Trunk Shed** which shows offsite sewer shed areas and flows from east of Grant Line Road and the location of SRCSD regional pump station.

I.6 Land Use and Zoning

On-Site

- The SunCreek Project area is currently undeveloped land with relatively poor agricultural soils. The area was used for dry land farming and grazing on spring grasses. The existing 1,266+/- acre project area is currently zoned AG-20 and AG-80.
- The SunCreek Specific Plan is a mixed-use, mixed-density residential development that includes a network of interconnected, large open spaces linked by a pedestrian and bike trail system. Proposed land uses include single family residential,

condominium, multi-family residential, commercial, office, live-work units, schools, parks, open space, habitat preserve, and collector, arterial and local roads.

Off-Site

- The SunCreek Specific Plan is located within the Sunrise Douglas Community Plan, which is approved and is currently being developed. The Sunrise Douglas Community Plan encompasses separate plan areas including the Preserve at SunRidge and the SunRidge Specific Plan.
- Lands to the south of SunCreek and east of Grant Line Road are undeveloped. These lands are used for grazing and limited farming purposes. Existing zoning consists of AG-20 and AG-80. These areas are within the Sacramento County Urban Services Boundary and are being considered for development. The Sacramento County General Plan indicates future land uses of medium to high density residential uses in these areas.

II. Design

II.1 Assumptions

- Downstream Capacity: This study assumes that there is or will be adequate interim capacity within the Mather, Bradshaw and Northeast Interceptors to provide interim sewer service to the SRWTP until the Laguna Creek Interceptor is extended to the SunCreek Project.

- Upstream Shed Areas: This Study assumes that the upstream developments of Anatolia III, Cordova Hills, Arista Del Sol, Arboretum Project and portions of the Preserve and Grant Line 220 will utilize the Laguna Creek Interceptor and the SunCreek Sewer Pump Station and force mains. It is further assumed that as other upstream shed areas develop and connect to the SunCreek Project sewer infrastructure, they will be responsible for capacity increases to sewer facilities (pump stations, force mains) serving their projects.

- Off-site Land Use ESD density for flow calculations: Land use densities of 6 ESD's per acre was assumed for future development in the off-site areas for which sewer flow information was not available. This assumed density is consistent with current SASD design standards.

II.2 Approach and Design Criteria

Design Task One: Compile Record Data

The design approach for the SunCreek Project sewer study began with the compilation of known data and resources within the project vicinity. The following summarizes the resources used to prepare this report:

- SunCreek Specific Plan Land Use Plan
- SASD Design Standards, Version 1.00, dated February 13, 2008

- 2006 Draft SASD Sewerage Facilities Master Plan Update (SFEMP)
- SRCSD Interceptor System Master Plan 2000- Executive Summary Reconciliation Report, July 2003
- Sewer Master Plan for SunRidge Park, March 2004, prepared by Wood-Rodgers
- The Preserve at SunRidge-Sewer Exhibit E, June 2006, prepared by Wood-Rodgers
- The Arboretum (Weagell/Lewis Property) Level 1 Trunk Sewer Design Report dated November 2008

Design Task Two: Identify Points of Connection and Capacity

- Reviewed the 2006 SASD SFEMP, the Mather Interceptor EIR and the Wood-Rodgers sewer study for Anatolia III and The Preserve at SunRidge to identify the SunCreek Project sewer points of connection and verify the available capacity in the existing 8-inch and 18-inch force mains.

Design Task Three: Obtain Criteria to Calculate ESD's and Design Flows

The project area ESD's and sewer flows are based on design standards obtained from:

- SASD Design Standards, Version 1.00, dated February 13, 2008
- 2006 Draft SASD Sewerage Facilities Expansion Master Plan (SFEMP)

The following tables are a summary of on-site ESD densities based on land use, formulas used to calculate average dry weather and peak wet weather flows, and design/capacity criteria to size pipelines.

Table 1: Land Uses and ESD Densities

Land Use	Abbreviation	ESDs / acre or Lot Count
Low Density Residential (2-6 du/ac)	LDR	6
Medium Density Residential (6-12 du/ac)	MDR	Actual lot count
Compact Density Residential (12-18 du/ac)	CMDR	Actual lot count
High Density Residential (18-40 du/ac)	HDR	Actual lot count
Commercial Mixed Use	CMU	6
Village Center	VC	6
Public/Quasi-public	P/QP	6
Park	P	6
Wetland Buffer/ Bike Path Corridor	WB	6
Detention Basin	DB	6
Storm Drain Channel	Channel	6
Wetland Preserve	WP	6
High School	School	6
Middle School	School	0.060 mgd or 193
Elementary School	School	0.025 mgd or 81
Major Roads	Road	6

Sources:

- *SunCreek Specific Plan Land Use Plan*
- *SASD Design Standards, Version 1.00, dated February 13, 2008*
- *2006 Draft SASD SFEMP*

Notes:

1) Lot counts were used to calculate ESDs where lot counts were greater than or equal to Area x 6 ESD's/acre.
2) The High School ESD's were calculated using 6 ESD's per acre because it generated a higher ESD number than 0.080 mgd per High School Site.
3) ESD's for High Density Residential (HDR) land use are based on 232 gallons per residential unit/day (0.75 ESD).

Table 2: Design Flow Factors

Item	Value
ESD Flow Factor ~ PDWF	310 GPD per ESD
Inflow & Infiltration (I/I) rate	1400 GPD / acre

Source: SASD Design Standards, Version 1.00, dated February 13, 2008

Table 3: Design Flow Formulas

Collector and Trunk Sewers	Formula or Value
ESDs	Equivalent single family dwelling units
ADWF =	(ESDs X 310) ÷ 1,000,000
I/I =	1400 x sewer shed area
PF =	3.5 - (1.8 x ADWF $^{0.05}$), Minimum is 1.2
PDWF (mgd) =	ADWF x PF
PWWF (mgd) =	PDWF + $Q_{I/I}$

Source: SASD Design Standards, Version 1.00, dated February 13, 2008

Table 4: Hydraulic Design Criteria

Sanitary Sewer ~ Design flow	Value
Manning "n"	0.013
Minimum Velocity at PWWF	2.0 fps
Maximum Velocity	8.0 fps
Maximum d/D ~ diameter < or = 12" with service connections	0.7
Maximum d/D ~diameter = or > 12" without service connections	1.0

Source: SASD Design Standards, Version 1.00, dated February 13, 2008

Table 5: Minimum Pipe Slopes & Capacities

Sanitary Sewer ~ Design flow			
Pipe Diameter	Minimum Design Slope	Minimum Schematic Slope	Design Capacity (MGD)
8"	0.0035	0.0060	0.38
10"	0.0025	0.0035	0.58
12"	0.0020	0.0024	1.03
15"	0.0015	0.0018	1.60
18"	0.0012	0.0014	2.35
21"	0.0011	0.0012	3.40
24"	0.0010	0.0011	4.50
27"	0.0010	0.0010	6.20
30"	0.0010	0.0010	8.20
33"	0.0010	0.0010	10.50
36"	0.0010	0.0010	13.63

Source: SASD Design Standards, Version 1.00, dated February 13, 2008

Table 6: Manhole Elevation Criteria

Pipe Condition	Minimum Flow line criteria
Same pipe diameter in / out	0.05 foot invert drop
Direction change of 20 degree or greater	0.10 foot invert drop
Pipes in /out are not the same size	Match crown
Collector to Trunk connection	Collector invert to match Trunk crown
Trunk to Interceptor connection	Trunk invert to match Interceptor crown

Sources:

- SASD Design Standards, Version 1.00, dated February 13, 2008

Design Task Four: Calculate ESD's, Peak Flows and Determine Pipe Sizes

- A preliminary grading plan was prepared for the SunCreek Project. The grading plan generally follows the "lay of the land" sloping to the central drainage feature within the Project (Kite Creek which drains from northeast to southwest).
- Utilizing the preliminary grading plan and land use plan determine alignments for LCI-5, trunk sewers and collector pipelines. Extended sewer pipelines to upstream off-site shed areas to provide sewer service through the SunCreek Project. Schematic pipelines were extended to upstream ends of on-site and off-site shed areas to verify serviceability.
- Cover on sewer pipelines were verified using a minimum depth of 8.0 feet.
- Established on-site shed areas based on preliminary grading plan, street network and pipeline network.
- Use the Land Use Map, sewer pipeline network and ESD criteria to calculate the SunCreek Project ESD's plus the ESD's from upstream shed areas.
- Use the ESD counts to calculate PWWF's and size the sewer pipelines and compare the design flow to the available capacity at the point of connection.
- Use the ESD counts to calculate the Laguna Creek Interceptor PDWF's and verify pipe flow characteristics are within acceptable SRCSD parameters.

III. Summary of Results

III.1 Recap of SASD Study Requirements

At the beginning of this study, a description of SASD Minimum Sewer Study Requirements for a Level Two report included:

- Ensure technical compliance with the latest SASD Master Plan
- Confirm the capacity of existing and future sewer improvements that will serve the project
- Establish sewer sheds within project area and identify off-site tributary shed areas
- Size the backbone sewer interceptor and trunk system, locate and size pump station, establish depth of pipes and verify cover
- The focus of the study is on topography, major phasing & timing, Interceptor and its capacity, trunk sewers and their capacity, and shed shifts

This study achieves the SASD requirements and has:

- Used the most current SASD Master Facilities Plan
- Verified capacity of existing Interceptors and force-mains that will connect the project to the SRWTP
- Identified the sanitary sewer points of connection and has established location and capacity of the SunCreek Sanitary Sewer Pump Station.
- Established project and upstream sewer shed areas and sized the project sewer system to accept future development flows from the study area
- Verified cover on sewer using the preliminary grading plan
- Identified options to build the project in phases

III.2 Summary of Sewer Flows and Alignments

The Peak Wet Weather Flows (PWWF) generated from the SunCreek study area are calculated as follows:

Table 7: Calculated Wastewater Flows

Area	Acres	ESDs	PF	PWWF (mgd)
SunCreek Specific Plan	1,286.8*	9,070.4	1.60	6.31
Total Off-site Area	6,702.6	40,641.0	1.46	27.74
Total	**7,989.4**	**49,711.4**	**1.44**	**33.32**

* The 1,286.8 acres includes an additional 20.8 acres of major road right-of-way that is not within the 1,266 acre SunCreek Specific Plan boundary.

- The Anatolia III development will be connected to LCI-5
- A 10-inch collector will be extended to The Preserve at SunRidge which will connect to a sewer trunk within SunCreek and then LCI-5
- Schematic 8-inch sewer lines are provided to show serviceability of undeveloped upstream off-site sheds
- The upstream offsite LC Upper Laguna Creek Trunk Shed LCK-183 (LC52) and the DC Upper Deer Creek Trunk Shed (LC61 & LC62) will connect to the upstream end of LCI 5
- The upstream offsite AJ Sunrise Douglas Trunk Sheds SDA047, SDA048, SDA049 & SDA051 (a portion of AJ11) will connect to LCI-5

Refer to the following Tables and Exhibits for detailed design of the sewer infrastructure for the SunCreek Specific Plan:

- **Exhibit E: SunCreek Specific Plan - Sanitary Sewer Master Plan**
- **Table 8: SunCreek Specific Plan - Sanitary Sewer Calculation**
- **Table 9**: **SunCreek Sewer Study Area - Sanitary Sewer Calculation**
- **Table 10: SunCreek Specific Plan –Phase 1 Sewer Pump Station Calculation**
- **Table 11: Sunrise / Douglas Developments – Sewer Pump Station Capacity Calculations**
- **Table 12: SunCreek Specific Plan – Sewer Study Area Detailed Sanitary Sewer Calculations**
- **Table 13: SunCreek Specific Plan – Laguna Creek Interceptor Section 5, Sanitary Sewer Peak Dry Weather Flow Calculations**

III.3 Laguna Creek Interceptor Section 5

The SunCreek Project proposes to construct the portion of the Laguna Creek Interceptor that has been planned by SRCSD to traverse through the Project. This sewer study has analyzed several alignments for the interceptor to follow while traversing the SunCreek Project. The alignment indicated for LCI-5 in this study is believed to be the best location for this vital component of the Backbone Sewer Infrastructure for the SunCreek Sewer Study Area. The alignment provided in this study considered depth, conflicts with trunk sewers and trunk drainage, terrain, flow velocity, maintenance, access, environmental impacts and the ability to securing off-site easements.

Due to the large elevation difference between the second node located in Grant Line Road and the ninth node located adjacent to Anatolia III, flow velocity was the most difficult flow characteristic to maintain within the typical limits. The terrain at the upper most quadrant of the Specific Plan is the steepest within the Project Area. This segment of the interceptor pipeline will follow Chrysanthy Blvd. to the east from the Americanos Blvd. Intersection to the Grant Line Road Intersection. This segment of LCI-5 will require special pipeline coating materials and manhole coatings to prevent corrosion.

Since the Laguna Creek Interceptor will only see PWWF during large storms the flow characteristics of Peak Dry Weather Flow (PDWF) where also analyzed. Refer to **Table 13: SunCreek Specific Plan - Laguna Creek Interceptor Section 5, Sanitary Sewer Peak Dry Weather Flow Calculations**.

III.4 Permanent Sewer Shed Shift

The SFEMP LC Upper Laguna Creek Trunk Shed was used to determine the upstream off-site shed areas that need to be included in the SunCreek sewer study area. When LC Upper Laguna Creek Trunk Shed was prepared for inclusion in the SFEMP, it was assumed that LCI-5 would not be constructed with the initial phases of the SunCreek development. The SunCreek Project proposes to construct the segment of LCI-5 that is within the SunCreek development and use it on an interim basis as an oversized sewer collector and then as a sewer trunk as development occurs and flow volumes increase. The construction of LCI-5 in the initial phases of the SunCreek Project significantly changes the trunk sheds and trunk system within the SFEMP LC Upper Laguna Creek Trunk Shed.

The SunCreek Project proposes to place LCI-5 within Chrysanthy Blvd. from the Americanos Blvd. intersection to its intersection with Grant Line Road. This alignment for LCI-5 matches the alignment for the Chrysanthy Blvd. Trunk included in SFEMP AJ Sunrise Douglas Trunk Shed. Therefore, the Chrysanthy Blvd. Trunk segment adjacent to the SunCreek northern boundary (Chrysanthy Blvd.) has been eliminated and the sewer sheds have been shifted to LCI-5. This shed shift moves 641.6 acres and 3,850 ESD's from the AJ Sunrise Douglas Trunk to the LC Upper Laguna Creek Trunk.

Due to the inclusion of LCI–5 into the SunCreek Project area, trunk shed areas per the SFEMP LC Upper Laguna Creek Trunk Shed and AJ Sunrise Douglas Trunk Sheds have been reconfigured to conform to the proposed SunCreek sewer pipeline network. Refer to **Appendix F: Permanent Shed Shift – AJ Sunrise Douglas Trunk Shed & LC Upper Laguna Creek Trunk Shed** to review the new trunk sheds.

III.5 SunCreek Project Sewer Service

This SunCreek Sewer Study includes two development scenarios that describe the necessary sanitary sewer facilities to provide sanitary sewer service to the SunCreek Sewer Study Area. Within the SunCreek Sewer Study Area there are two development Projects that are at the downstream end of the study area. These two Projects will be receiving interim sewer service through common sanitary sewer infrastructure. Since it is not known which Project will develop first, this section of the Sewer Study will describe two development scenarios. Each development scenario will describe the assumed existing sanitary sewer infrastructure built during the previous phase of development and required sanitary sewer infrastructure to provide sewer service for each Project should it develop first and the other follows.

Scenario One: The SunCreek Project develops first followed by the Arboretum Project

Phase 1 Sanitary Sewer Service: The SunCreek Project constructs portions of LCI-5, sewer collectors, sewer trunks and a 2.26 mgd sewer pump station to serve the first phase of development. This first phase of construction connects the Anatolia III development's gravity sewer system to the SunCreek Project's sewer system and the Anatolia III Sewer Pump Station is decommissioned. The SunCreek Project utilizes the Anatolia III force main to convey sewer flows to the Chrysanthy Boulevard Sewer Pump

Station. Should the Arboretum Project begin developing there first phase after the SunCreek Project, the Arboretum Project would build a sewer pump station and convey the sewer flows to the SunCreek Project Phase 1 Sewer Pump Station. To extended time frame that this Phase could be operational, the lower reaches of the LCI-5 built with the SunCreek Project could be used to temporally store peak sewer flows. Refer to **Exhibit F-1: SunCreek Project Sewer Service** to review a schematic layout of the sewer infrastructure associated this scenario and phase.

Phase 2 Sanitary Sewer Service: The Chrysanthy Pump Station is decommissioned due to the construction of the Mather Interceptor. The SunCreek Sewer Pump Station capacity is increased up to 9.91 mgd and utilizes the Sunrise Boulevard segment of the Chrysanthy Blvd. Pump Station force main to convey sewer flows to the Mather Interceptor. The Arboretum Project increases the capacity of their sewer pump station to 4.3 mgd and continues to pump to the SunCreek Sewer Pump Station. As with Phase 1, the time duration that this Phase can provide sewer service could be extended by utilizing the lower reaches of LCI-5 to temporally store peak sewer flows. Refer to **Exhibit F-2: SunCreek Project Sewer Service** to review a schematic layout of the sewer infrastructure associated this scenario and phase. As development continues to occur and sewer flows increase, SRCSD could decide to increase the capacity of the SunCreek Sewer Pump Station up to 19.0 mgd and utilize the Kiefer Boulevard segment of the Chrysanthy Blvd. Sewer Pump Station force main to convey sewer flows to the Bradshaw Interceptor. Refer to **Exhibit F-3: SunCreek Project Sewer Service** to review a schematic layout of the sewer infrastructure associated this scenario and phase.

Phase 3 Sanitary Sewer Service: This phase of development is how the SunCreek Sewer Study Area ultimately receives sanitary sewer service to the Sacramento regional Wastewater Treatment Plant (SRWTP). The lowers reaches of LCI are constructed from the SRWTP and connected to LCI-5. The SunCreek and Arboretum Project's gravity sewer systems are connected to LCI. The SunCreek and Arboretum Sewer Lift Station's and associated force mains are decommissioned. Refer to **Exhibit F-4: SunCreek Project Sewer Service** to review a schematic layout of the sewer infrastructure associated this scenario and phase.

Scenario Two: The Arboretum Project develops first followed by the SunCreek Project

Phase 1 Sanitary Sewer Service: The Arboretum Project has constructed gravity sewer collectors, sewer trunks and a sewer pump station to serve their first phase of development. A sewer force main connects the 1.5 mgd Arboretum Sewer Pump Station to the Anatolia III Sewer Pump Station. The Anatolia III Pump Station capacity has been increased to 2.26 mgd. SASD would have several options on how to provide sanitary sewer service to the SunCreek Project should they start developing during this Phase. One option would be for the SunCreek Project to develop as follows: The Anatolia III Pump Station would be decommissioned and the Anatolia III development would be gravity connected to the SunCreek Sewer Pump Station. The Arboretum Pump Station force main would be connected to the SunCreek Sanitary Sewer Pump Station. The SunCreek Pump Station force main would utilize the Arboretum Pump

Station force main and connect it to the Anatolia III Pump Station force main. The Anatolia III Pump Station would be decommissioned. The SunCreek Sewer Pump Station would pump to the Chrysanthy Sewer Pump Station. Refer to **Exhibit F-5: SunCreek Project Sewer Service** to review a schematic layout of the sewer infrastructure associated this scenario and phase. Another option would be for the SunCreek Project to extend either LCI-5 from the SunCreek Project or a smaller gravity sewer pipeline to the Arboretum Sewer Pump Station. Thus the SunCreek Project would gravity sewer to the Arboretum Sewer Pump Station which would pump to the Anatolia III Sewer Pump Station which would pump to the Chrysanthy Sewer Pump Station. Refer to **Exhibit F-6: SunCreek Project Sewer Service** to review a schematic layout of the sewer infrastructure associated this scenario and phase.

Phase 2 Sanitary Sewer Service: The Chrysanthy Blvd. Pump Station has been decommissioned due to the construction of the Mather Interceptor. The Arboretum Sewer Pump Station capacity has been increased to 9.91 mgd and utilizes the Sunrise Boulevard segment of the Chrysanthy Blvd. Pump Station force main to convey sewer flows to the Mather Interceptor. The Arboretum force main to the Anatolia III Sewer Pump Station is decommissioned. The 2.26 mgd Anatolia III Sewer Pump Station remains operational to pump the Anatolia III sewer flows to the Chrysanthy Blvd. gravity sewer system and to the Mather Interceptor. SASD would have several options on how to provide sanitary sewer service to the SunCreek Project should they start developing during this Phase. One option would be for SunCreek to develop as follows: The SunCreek Project would construct a Sewer Pump Station with approximately 1.5 mgd capacity. The SunCreek Pump Station would connect to the decommissioned Arboretum Project force main that is connect to the Anatolia III Sewer Pump Station. The Arboretum Pump Station would pump to the Chrysanthy Blvd. gravity sewer system and to the Mather Interceptor. Refer to **Exhibit F-7: SunCreek Project Sewer Service** to review a schematic layout of the sewer infrastructure associated this scenario and phase. As development continued to occur within and upstream of the SunCreek Project and the 2.26 mgd capacity of the Anatolia III force main is reached, the SunCreek Project would need to either extend LCI-5 or a smaller gravity pipeline to the Arboretum Sewer Pump Station in order for the SunCreek Project to continue receiving sanitary sewer service. During this phase of development the Anatolia III development gravity sewer system would be connected to the SunCreek Project sewer system and the Sewer Pump Station and associated force main would be decommissioned. Refer to **Exhibit F-8: SunCreek Project Sewer Service** to review a schematic layout of the sewer infrastructure associated this scenario and phase. As development within the SunCreek Sewer Study Area continues to occur and sewer flows increase, SRCSD could decide to increase the capacity of the Arboretum Sewer Pump Station up to 19.0 mgd. A second force main would be extended from the Arboretum Sewer Pump Station to Kiefer Blvd. and connected to the Kiefer Blvd. segment of the Chrysanthy Blvd. Sewer Pump Station force main and sewer flows would be conveyed to the Northeast Interceptor. Refer to **Exhibit F-9: SunCreek Project Sewer Service** to review a schematic layout of the sewer infrastructure associated this scenario and phase.

Phase 3 Sanitary Sewer Service: This phase of development is how the SunCreek Sewer Study Area ultimately receives sanitary sewer service to the SRWTP. The

lowers reaches of LCI are constructed from the SRWTP and connected to LCI-5. The SunCreek and Arboretum Project's gravity sewer systems are connected to LCI. The SunCreek and Arboretum Sewer Lift Station's and associated force mains are decommissioned. Refer to **Exhibit F-10: SunCreek Project Sewer Service** to review a schematic layout of the sewer infrastructure associated this scenario and phase.

III.6 SunCreek Project Sewer Pump Station

This Level Two Sewer Study has been prepared for the SunCreek Owners Group, for the purposes of this discussion regarding the SunCreek Project Sewer Pump Station it will be assumed that the SunCreek Project will precede the Arboretum Project.

The SunCreek Pump Station will be constructed in phases and will ultimately serve 13,800 ESD's on 2,300+/-acres with a PWWF of 9.91 mgd. The sewer pump station will be designed to pump at a maximum flow rate of 6,880 gpm. The SunCreek Sewer Pump Station will serve development within the SunCreek Sewer Study Area and on interim basis adjacent developments. SRCSD could decide to further increase the capacity of the SunCreek Sewer Pump Station to serve additional development within the SunCreek Sewer Study Area.

III.7 Exception to SASD Policy

This sewer study does not request any exceptions to SASD policy.

IV. Project Phasing

The SunCreek Specific Plan will be developed in phases. The development phasing is not known at this time, but Phase 1 would likely begin at the southwest corner of the SunCreek Specific Plan Area and progress towards the east. The Phase 1 sewer infrastructure will include the 2.26 mgd SunCreek Sewer Pump Station and 8-inch force main, Laguna Creek Interceptor section LCI-5 from the SunCreek Pump Station to Americanos Boulevard.

The Phase 2 sewer infrastructure will increase the capacity of the SunCreek Sewer Pump Station to 9.91 mgd and connect two 18-inch force mains to the Chrysanthy Blvd. force main

The Phase 3 sewer infrastructure will extend LCI-5 to Grant Line Road.

The SunCreek Sanitary Sewer Study Area will build out at a pace set by the home construction market. As the 9.91 mgd SunCreek Sewer Pump Station nears, its capacity limit SRCSD may upgrade the SunCreek Sewer Pump Station to a 19.0 mgd Regional Pump Station.

V. SunCreek Project Construction Cost

A Preliminary Probable Opinion of Construction Cost for the SunCreek Specific Plan Backbone Sanitary Sewer Infrastructure has been prepared. The construction cost opinion is based on the backbone sanitary sewer infrastructure depicted in Exhibit E and includes trunk sewer pipes, the portion of LCI-5 through the SunCreek Project, Phase 1 and Phase 2 Sanitary Sewer Pump Stations and force mains. The total cost of $44,719,000 is for the necessary backbone sanitary sewer infrastructure to provide sanitary sewer service for the SunCreek Sanitary Sewer Study Area. The cost of the collection system to provide sanitary sewer service to each lot will be in addition to the backbone sanitary sewer infrastructure cost.

VI. Conclusion

- The total sewer flow from the SunCreek Project and the upstream off-site shed areas were determined to be 6.31 mgd PWWF and 27.74 mgd PWWF respectively. The total sewer flow for the entire study area is calculated to be 33.32 mgd PWWF.
- The SunCreek Specific Plan area of 1,286+/- acres and total off-site area of 6,703+/- acres contributing 9,070 ESD's and 40,641 ESD's respectively were analyzed in this study.
- A 9.91 mgd (6,880 gpm) SunCreek Pump Station is proposed for the SunCreek project.
- Trunk shed shifts have been approved within the LC Upper Laguna Creek Trunk Shed and AJ Sunrise Douglas Trunk due to the proposed construction of LCI-5 within the SunCreek Project.
- Laguna Creek Interceptor Section 5 will be constructed through the SunCreek Project and will serve upstream off-site development and the SunCreek Project, initially as an oversized trunk, and ultimately as an interceptor as flows increase above 10 mgd.
- Interim Interceptor capacity is available to serve the SunCreek Specific Plan until the downstream Laguna Creek Interceptor segments are constructed.
- A SASD Level Three study will be prepared prior to submission of improvement plans for the SunCreek project.

In conclusion, there is sufficient interim capacity within the existing offsite interceptor system to accommodate the SunCreek Specific Plan until the ultimate facilities are completed. An onsite gravity collector, trunk and interceptor sewer system will be constructed to convey sewer flows to a proposed pump station located on the southwest project boundary. The SunCreek Pump Station will convey sewer flows the Northeast Interceptor and when available to the Mather Interceptor.

TABLES

Table 8
SunCreek Specific Plan
Sanitary Sewer Calculation

Land Use Designation	Total Acres	ESD's/Acre	ESD's
Low Density Residential (2.1 to 6 du/ac)	194.8	6.00	1,168.8
Medium Density Residential (6.1 to 12 du/ac)[1]	379.0	7.97	3,020.0
Compact Density Residential (12.1 to 18 du/ac)[1]	27.0	17.37	469.0
High Density Residential (18.1 to 40 du/ac)[2]	29.0	15.0	435.0
Commercial Mixed Use	29.0	6.0	174.0
Village Center	3.0	6.0	18.0
Public/Quasi Public	7.3	6.0	43.8
Neighborhood Park	60.5	6.0	363.0
Community Park	35.1	6.0	210.6
Parkway, Paseos and Trails	28.3	6.0	169.8
Wetland Buffer/Bike Path Corridor	29.8	6.0	178.8
Detention Basin	31.0	6.0	186.0
Storm Drain Channel	9.1	6.0	54.6
Wetland Preserve	218.3	6.0	1,309.8
High School[3]	48.0	6.0	288.0
Middle School[4]	35.9	N/A	194.0
Elementary School[4]	31.0	N/A	243.0
Major Roads	90.7	6.0	544.2
Subtotal	1,286.8		9,070.4
Average Dry Weather Flow (mgd)			2.81
Peaking Factor			1.60
Peak Dry Weather Flow (mgd)			4.51
Peak Wet Weather Flow (mgd)			**6.31**

[1] Denotes that the ESD's are based on actual unit counts.

[2] Denotes that the ESD's are based on 232 gallons per unit/day or 0.75 ESD's /unit. Total High Density Residential Units equals 580.

[3] Denotes that average dry weather flow was calculation is based on 6 ESD's per Acre.

[4] Denotes that SASD minimum average dry weather flow of 0.025 mgd per Elementary School, 0.060 mgd per Middle School were used to determine ESD's.

Table 9
SunCreek Sewer Study Area
Sanitary Sewer Calculation

Land Use Designation	Total Area (Acres)	Total ESD's
SunCreek Specific Plan	1,286.8	9,070.4
Anatolia III - Shed 6-1	197.7	1,186.0
The Arboretum - Sheds 7-4 & 7-6	396.7	2,380.2
Offsite - Shed 4-1	85.5	513.0
Offsite - Sheds 3-1, 3-2, 3-3	171.8	1,031.8
The Preserve at SunRidge - Shed 3-10	68.5	835.0
Offsite -Shed LCK 183	241.4	1,448.0
Offsite - Permanent shed shift from AJ Sunrise Douglas Trunk Shed	641.6	3,850.0
DC Upper Deer Creek Trunk Shed	4,899.4	29,397.0
Subtotal	7,989.4	49,711.4
Average Design Flow (mgd)		15.41
Peaking Factor		1.44
Peak Dry Weather Flow (mgd)		22.13
Peak Wet Weather Flow (mgd)		**33.32**

Table 10
SunCreek Specific Plan
Phase 1 Sanitary Sewer
Pump Station Calculation

Land Use Designation	Total Acres	ESD's
SunCreek Sewer Study Area and the Arboretum	295	1,770
Anatolia III	198	1,186
Subtotal	493	2,956
Average Design Flow (mgd)		0.92
Peaking Factor		1.71
Peak Dry Weather Flow (mgd)		1.56
Peak Wet Weather Flow (mgd)		**2.26**

Force-main Capacity Calculations:

Assumptions:

1) Existing 8-inch force-main pipe material is Ductile Iron, Pressure Class 350
2) Force-main length is 14,700 feet. (SunCreek Pump Station to Discharge Manhole)
3) 8-inch force-main discharge elevation of 165.0
4) SunCreek Pump-Off Elevation 95.0 (Assumed)

Calculations:

8-inch diameter pipe flowing at 10 fps carries a flow of 1,569 gpm or 2.26 mgd.

Velocity Friction Loss : 14,700-ft x 41.963-ft / 1,000-ft = 616.9-ft / 2.3072 psi/ft = 267.4 psi.
Static Head Loss: (165 - 95)/2.3071psi/ft = 30 psi.

Max. Pressure is in force main is approx. 297 psi which is less than the pipe rating of 350 psi.

Table 11
Sunrise / Douglas Developments
Sewer Pump Station Capacity Calculations

Pump Station	Total Acres	ESD's
SunCreek Sewer Pump Station - Phase 1	493	2,956
Subtotal	493	2,956
Average Design Flow (mgd)		0.92
Peaking Factor		1.71
Peak Dry Weather Flow (mgd)		1.56
Peak Wet Weather Flow (mgd)		**2.26**
SunCreek Sewer Pump Station - Phase 2	2,300	13,800
Subtotal	2,300	13,800
Average Design Flow (mgd)		4.28
Peaking Factor		1.56
Peak Dry Weather Flow (mgd)		6.69
Peak Wet Weather Flow (mgd)		**9.91**
SunCreek Regional Sewer Pump Station - Phase 3	4,540	27,240
Subtotal	4,540	27,240
Average Design Flow (mgd)		8.44
Peaking Factor		1.50
Peak Dry Weather Flow (mgd)		12.64
Peak Wet Weather Flow (mgd)		**19.00**
Chrysanthy Blvd. Pump Station	1,530	9,180
Subtotal	1,530	9,180
Average Design Flow (mgd)		2.85
Peaking Factor		1.60
Peak Dry Weather Flow (mgd)		4.56
Peak Wet Weather Flow (mgd)		**6.70**

Table 12
SunCreek Specific Plan - Sewer Study Area
Detailed Sanitary Sewer Calculations

Node In	Node Out	ESD	Sum ESD	ADWF (mgd)	Peaking Factor	PDWF (mgd)	Area (acres)	Sum Area (acres)	$Q_{I/I}$ (mgd)	PWWF (mgd)	PWWF (gpm)	PWWF (cfs)	Dia. (in.)	Length (ft)	US Rim Elev. (ft)	US Invert (ft)	Depth @ US Invert (ft)	DS Rim Elev. (ft)	DS Invert (ft)	Depth @ DS Invert (ft)	Slope (ft/ft)	Velocity (fps)
1-1	**1-2**	**30845**	**30845**	**9.56**	**1.48**	**14.20**	**5141**	**5141**	**7.20**	**21.40**	**14858**	**33.10**	**36**	**1300**	**235.0**	**212.9**	**22.1**	**231.0**	**209.6**	**21.4**	**0.0025**	**5.33**
SDA049	SDA048	1434	1434	0.44	1.77	0.79	238.9	238.9	0.33	1.12	779	1.74	15	2850	245.5	225.3	20.2	239.5	220.2	19.3	0.0018	2.36
SDA048	**1-2**	680	2114	0.66	1.74	1.14	113.3	352.2	0.49	1.63	1133	2.52	18	1730	239.5	219.4	20.1	231.0	217.0	14.0	0.0014	2.35
1-2	**1-3**	**329.0**	**33288**	**10.32**	**1.48**	**15.24**	**54.8**	**5548**	**7.77**	**23.01**	**15979**	**35.60**	**36**	**2700**	**231.0**	**209.5**	**21.5**	**225.3**	**201.4**	**23.9**	**0.0030**	**5.84**
1-3	**1-4**	**0.0**	**33288**	**10.32**	**1.48**	**15.24**	**0.0**	**5548**	**7.77**	**23.01**	**15979**	**35.60**	**36**	**1000**	**211.4**	**201.3**	**10.1**	**197.9**	**181.3**	**16.6**	**0.0200**	**12.14**
1-4	**1-5**	**0.0**	**33288**	**10.32**	**1.48**	**15.24**	**0.0**	**5548**	**7.77**	**23.01**	**15979**	**35.60**	**36**	**100**	**197.9**	**174.0**	**23.9**	**196.4**	**173.7**	**22.7**	**0.0030**	**5.84**
SDA051	**1-5**	1407	1407	0.44	1.77	0.77	234.6	234.6	0.33	1.10	765	1.70	15	1060	202.0	183.4	18.6	196.4	181.5	14.9	0.0018	2.36
1-5	**1-6**	**1407.0**	**34695**	**10.76**	**1.47**	**15.84**	**234.6**	**5782.4**	**8.10**	**23.94**	**16624**	**37.04**	**36**	**2660**	**196.4**	**173.6**	**22.8**	**183.0**	**157.6**	**25.4**	**0.0060**	**7.93**
2-1	2-3	216.2	216.2	0.07	1.93	0.13	32.4	32.4	0.05	0.17	121	0.27	8	1880	229.3	220.0	9.3	223.5	208.7	14.8	0.0060	2.23
2-2	2-3	157.2	157.2	0.05	1.95	0.10	24.9	24.9	0.03	0.13	90	0.20	8	1160	226.2	215.7	10.5	223.5	208.7	14.8	0.0060	2.11
2-3	2-5	0.0	373.4	0.12	1.88	0.22	0.0	57.3	0.08	0.30	207	0.46	8	530	223.5	208.6	14.9	222.4	205.4	17.0	0.0060	2.55
2-4	2-5	116.4	116.4	0.04	1.98	0.07	19.4	19.4	0.03	0.10	68	0.15	8	1400	227.0	213.8	13.2	222.4	205.4	17.0	0.0060	1.93
2-5	2-7	156.4	646.2	0.20	1.84	0.37	25.0	101.7	0.14	0.51	355	0.79	8	2450	222.4	205.3	17.1	193.6	176.3	17.3	0.0118	3.97
2-6	2-7	216.0	216.0	0.07	1.93	0.13	29.3	29.3	0.04	0.17	118	0.26	8	1460	228.0	213.1	14.9	193.6	176.3	17.3	0.0252	2.91
2-7	2-9	13.2	875.4	0.27	1.81	0.49	2.2	133.2	0.19	0.68	471	1.05	10	330	193.6	176.1	17.5	185.3	174.9	10.4	0.0035	2.64
2-8	2-9	249.8	249.8	0.08	1.92	0.15	36.0	36.0	0.05	0.20	138	0.31	8	2570	222.0	208.4	13.6	185.3	175.0	10.3	0.0130	3.10
2-9	2-11	0.0	1125.2	0.35	1.79	0.63	0.0	169.2	0.24	0.86	599	1.33	10	170	185.3	174.8	10.5	183.7	173.8	9.9	0.0060	3.41
2-10	2-11	294.2	294.2	0.09	1.90	0.17	47.9	47.9	0.07	0.24	167	0.37	8	710	186.2	178.1	8.1	183.7	173.8	9.9	0.0060	2.44
2-11	2-13	0.0	1419.4	0.44	1.77	0.78	0.0	217.1	0.30	1.08	753	1.68	12	540	183.7	172.8	10.9	182.3	169.0	13.3	0.0070	3.91
2-12	2-13	88.8	88.8	0.03	2.00	0.05	14.8	14.8	0.02	0.08	53	0.12	8	1480	196.0	178.8	17.2	182.3	169.9	12.4	0.0060	1.42
2-13	2-16	0.0	1508.2	0.47	1.77	0.83	0.0	231.9	0.32	1.15	799	1.78	12	330	182.3	168.9	13.4	183.3	166.9	16.4	0.0060	3.71
2-15	2-16	91.6	91.6	0.03	1.99	0.06	15.2	15.2	0.02	0.08	54	0.12	8	1740	188.9	178.4	10.5	183.4	167.9	15.5	0.0060	1.42
2-16	**1-6**	39.6	1639.4	0.51	1.76	0.89	6.6	253.7	0.36	1.25	868	1.93	12	200	183.3	166.8	16.5	183.3	160.5	22.8	0.0315	7.04
1-6	**1-7**	**1639.4**	**36334.4**	**11.26**	**1.47**	**16.54**	**253.7**	**6036.1**	**8.45**	**24.99**	**17353**	**38.66**	**36**	**2840**	**183.0**	**157.5**	**25.5**	**172.9**	**140.5**	**32.4**	**0.0060**	**7.93**

Table 12
SunCreek Specific Plan - Sewer Study Area
Detailed Sanitary Sewer Calculations

Node In	Node Out	ESD	Sum ESD	ADWF (mgd)	Peaking Factor	PDWF (mgd)	Area (acres)	Sum Area (acres)	$Q_{I/I}$ (mgd)	PWWF (mgd)	PWWF (gpm)	PWWF (cfs)	Dia. (in.)	Length (ft)	US Rim Elev. (ft)	US Invert (ft)	Depth @ US Invert (ft)	DS Rim Elev. (ft)	DS Invert (ft)	Depth @ DS Invert (ft)	Slope (ft/ft)	Velocity (fps)
3-1	3-4	405.6	405.6	0.13	1.88	0.24	67.6	67.6	0.09	0.33	230	0.51	8	3400	225.0	215.0	10.0	178.0	159.4	18.6	0.0164	3.87
3-2	3-4	335.4	335.4	0.10	1.89	0.20	55.9	55.9	0.08	0.28	191	0.43	8	2600	220.0	210.0	10.0	178.0	159.4	18.6	0.0195	4.02
3-3	3-4	289.8	289.8	0.09	1.90	0.17	48.3	48.3	0.07	0.24	166	0.37	8	2300	181.5	173.2	8.3	178.0	159.4	18.6	0.0060	2.44
3-4	3-6	0.0	1030.8	0.32	1.80	0.58	0.0	171.8	0.24	0.82	566	1.26	10	1510	178.0	159.2	18.8	170.5	151.6	18.9	0.0050	3.15
3-5	3-6	283.8	283.8	0.09	1.91	0.17	47.3	47.3	0.07	0.23	162	0.36	8	2630	189.0	177.9	11.1	170.5	151.6	18.9	0.0100	2.88
3-6	3-9	0.0	1314.6	0.41	1.78	0.72	0.0	219.1	0.31	1.03	716	1.60	12	1000	170.5	150.6	19.9	171.3	147.8	23.5	0.0028	2.66
3-7	3-8	403.2	403.2	0.12	1.88	0.23	43.2	43.2	0.06	0.30	205	0.46	8	2270	178.0	167.1	10.9	175.0	153.5	21.5	0.0060	2.55
3-8	3-9	367.6	770.8	0.24	1.82	0.44	44.2	87.4	0.12	0.56	388	0.86	10	1250	175.0	153.2	21.8	171.3	148.8	22.5	0.0035	2.54
3-9	3-16	0.0	2085.4	0.65	1.74	1.12	0.0	306.5	0.43	1.55	1079	2.40	15	200	171.3	147.5	23.8	172.9	147.1	25.8	0.0018	2.50
3-10	3-13	835.0	835.0	0.26	1.82	0.47	68.5	68.5	0.10	0.57	393	0.88	10	1700	176.0	158.6	17.4	169.1	152.6	16.5	0.0035	2.54
3-11	3-13	239.2	239.2	0.07	1.92	0.14	32.4	32.4	0.05	0.19	130	0.29	8	1900	174.6	164.1	10.5	169.1	152.7	16.4	0.0060	2.35
3-12	3-13	288.0	288.0	0.09	1.90	0.17	48.0	48.0	0.07	0.24	165	0.37	8	1830	172.5	163.7	8.8	169.1	152.7	16.4	0.0060	2.44
3-13	3-15	0.0	1362.2	0.42	1.78	0.75	0.0	148.9	0.21	0.96	666	1.48	12	420	169.1	152.4	16.7	168.9	151.3	17.6	0.0026	2.57
3-14	3-15	300.6	300.6	0.09	1.90	0.18	50.1	50.1	0.07	0.25	172	0.38	8	2800	190.0	168.4	21.6	168.9	151.6	17.3	0.0060	2.55
3-15	3-16	21.6	1684.4	0.52	1.76	0.92	3.6	202.6	0.28	1.20	834	1.86	12	860	168.9	150.3	18.6	172.9	147.3	25.6	0.0035	3.00
3-16	**1-7**	0.0	3769.8	1.17	1.69	1.97	0.0	509.1	0.71	2.68	1863	4.15	15	30	172.9	147.0	25.9	172.9	143.5	29.4	0.1170	12.93
1-7	**1-8**	**3769.8**	**40104.2**	**12.43**	**1.46**	**18.13**	**509.1**	**6545.2**	**9.16**	**27.29**	**18953**	**42.23**	**42**	**860**	**172.9**	**140.0**	**32.9**	**167.4**	**137.4**	**30.0**	**0.0030**	**6.27**
4-1	4-2	513.0	513.0	0.16	1.86	0.30	85.5	85.5	0.12	0.42	288	0.64	8	2690	188.0	180.0	8.0	172.0	163.9	8.1	0.0060	2.87
4-2	4-4	214.8	727.8	0.23	1.83	0.41	35.8	121.3	0.17	0.58	405	0.90	8	1760	172.0	163.8	8.2	167.1	149.7	17.4	0.0080	3.44
4-3	4-4	193.0	193.0	0.06	1.94	0.12	35.9	35.9	0.05	0.17	115	0.26	8	1400	172.5	158.1	14.4	167.1	149.7	17.4	0.0060	2.23
4-4	4-6	0.0	920.8	0.29	1.81	0.52	0.0	157.2	0.22	0.74	511	1.14	10	830	167.1	149.5	17.6	162.9	146.2	16.7	0.0040	2.82
4-5	4-6	523.0	523.0	0.16	1.86	0.30	51.3	51.3	0.07	0.37	259	0.58	8	1300	163.2	154.0	9.2	162.9	146.2	16.7	0.0060	2.83
4-6	4-9	0.0	1443.8	0.45	1.77	0.79	0.0	208.5	0.29	1.08	753	1.68	12	720	162.9	145.2	17.7	161.9	143.5	18.4	0.0024	2.51
4-7	4-9	368.8	368.8	0.11	1.88	0.22	30.3	30.3	0.04	0.26	179	0.40	8	1390	163.0	152.8	10.2	161.9	144.5	17.4	0.0060	2.55
4-8	4-9	306.0	306.0	0.09	1.90	0.18	51.0	51.0	0.07	0.25	175	0.39	8	2050	166.0	156.8	9.2	161.9	144.5	17.4	0.0060	2.55
4-9	**1-8**	27.6	2146.2	0.67	1.74	1.16	4.6	294.4	0.41	1.57	1088	2.43	15	1320	161.9	143.2	18.7	167.4	140.8	26.6	0.0018	2.50
1-8	**1-9**	**2146.2**	**42250.4**	**13.10**	**1.45**	**19.03**	**294.4**	**6839.6**	**9.58**	**28.61**	**19865**	**44.26**	**42**	**2750**	**167.4**	**137.3**	**30.1**	**147.0**	**128.2**	**18.8**	**0.0033**	**6.58**
5-1	5-2	355.2	355.2	0.11	1.89	0.21	56.2	56.2	0.08	0.29	199	0.44	8	1120	167.0	152.7	14.3	162.0	146.0	16.0	0.0060	2.55
5-2	5-3	125.2	480.4	0.15	1.86	0.28	17.6	73.8	0.10	0.38	264	0.59	8	650	162.0	145.9	16.1	150.0	136.6	13.4	0.0140	3.89
5-3	5-8	200.0	680.4	0.21	1.83	0.39	29.6	103.4	0.14	0.53	369	0.82	10	1010	150.0	136.5	13.5	147.1	133.0	14.1	0.0035	2.51
5-4	5-8	118.0	118.0	0.04	1.97	0.07	15.6	15.6	0.02	0.09	65	0.15	8	1520	153.0	142.2	10.8	147.1	133.0	14.1	0.0060	1.93
5-5	5-7	134.4	134.4	0.04	1.96	0.08	22.4	22.4	0.03	0.11	79	0.18	8	1500	152.8	144.8	8.0	147.1	135.6	11.5	0.0060	1.93
5-6	5-8	197.4	197.4	0.06	1.93	0.12	32.9	32.9	0.05	0.16	114	0.25	8	2000	153.4	145.0	8.4	147.1	133.0	14.1	0.0060	2.23
5-7	5-8	500.0	634.4	0.20	1.84	0.36	55.3	77.7	0.11	0.47	327	0.73	10	680	147.1	135.4	11.7	147.1	133.0	14.1	0.0035	2.45
5-8	**1-9**	0.0	1630.2	0.51	1.76	0.89	0.0	229.6	0.32	1.21	841	1.87	12	130	147.1	132.0	15.1	147.0	131.6	15.4	0.0030	2.81

Table 12
SunCreek Specific Plan - Sewer Study Area
Detailed Sanitary Sewer Calculations

Node In	Node Out	ESD	Sum ESD	ADWF (mgd)	Peaking Factor	PDWF (mgd)	Area (acres)	Sum Area (acres)	$Q_{I/I}$ (mgd)	PWWF (mgd)	PWWF (gpm)	PWWF (cfs)	Dia. (in.)	Length (ft)	US Rim Elev. (ft)	US Invert (ft)	Depth @ US Invert (ft)	DS Rim Elev. (ft)	DS Invert (ft)	Depth @ DS Invert (ft)	Slope (ft/ft)	Velocity (fps)
1-9	**1-10**	**1630.2**	**43880.6**	**13.60**	**1.45**	**19.71**	**229.6**	**7069.2**	**9.90**	**29.61**	**20561**	**45.81**	**42**	**3800**	**147.0**	**128.1**	**18.9**	**137.6**	**113.2**	**24.4**	**0.0039**	**7.09**
6-1	7-11	1186.0	1186.0	0.37	1.79	0.66	197.7	197.7	0.28	0.93	649	1.45	12	1770	137.5	120.3	17.2	137.0	116.0	21.0	0.0024	2.47
1-10	**1-11**	**0.0**	**43880.6**	**13.60**	**1.45**	**19.71**	**0.0**	**7069.2**	**9.90**	**29.61**	**20561**	**45.81**	**48**	**5880**	**137.6**	**112.7**	**24.9**	**140.0**	**105.7**	**34.3**	**0.0012**	**4.45**
7-1	7-2	470.4	470.4	0.15	1.87	0.27	63.2	63.2	0.09	0.36	250	0.56	8	2070	149.0	140.7	8.3	141.0	128.3	12.7	0.0060	2.76
7-2	7-8	81.0	551.4	0.17	1.85	0.32	10.2	73.4	0.10	0.42	291	0.65	8	1240	141.0	128.2	12.8	140.0	120.8	19.2	0.0060	2.87
7-3	7-5	303.6	303.6	0.09	1.90	0.18	50.6	50.6	0.07	0.25	173	0.39	8	730	152.0	141.6	10.4	153.0	134.3	18.7	0.0100	3.03
7-4	7-5	1880.4	1880.4	0.58	1.75	1.02	313.4	313.4	0.44	1.46	1012	2.26	15	210	156.0	133.4	22.6	153.0	133.0	20.0	0.0018	2.48
7-5	7-7	0.0	2184.0	0.68	1.73	1.17	0.0	364.0	0.51	1.68	1170	2.61	15	1280	153.0	132.9	20.1	140.0	120.1	19.9	0.0100	5.00
7-6	7-7	499.8	499.8	0.15	1.86	0.29	83.3	83.3	0.12	0.40	281	0.63	10	410	138.0	122.7	15.3	140.0	121.3	18.7	0.0035	2.26
7-7	7-8	0.0	2683.8	0.83	1.72	1.43	0.0	447.3	0.63	2.05	1427	3.18	18	340	140.0	119.8	20.2	140.0	119.3	20.7	0.0014	2.47
7-8	7-13	0.0	3235.2	1.00	1.70	1.70	0.0	520.7	0.73	2.43	1690	3.77	18	1900	140.0	119.2	20.8	136.0	113.0	23.0	0.0032	3.55
7-9	7-13	462.0	462.0	0.14	1.87	0.27	77.0	77.0	0.11	0.38	261	0.58	8	2100	136.0	127.2	8.8	136.0	114.6	21.4	0.0060	2.83
7-10	7-11	82.2	82.2	0.03	2.00	0.05	13.7	13.7	0.02	0.07	49	0.11	8	1100	155.0	143.3	11.7	137.0	124.0	13.0	0.0175	2.43
7-11	7-13	119.4	1387.6	0.43	1.77	0.76	19.9	231.3	0.32	1.09	755	1.68	15	1300	137.0	115.7	21.3	136.0	113.3	22.7	0.0018	2.36
7-12	7-13	526.4	526.4	0.16	1.86	0.30	54.6	54.6	0.08	0.38	263	0.59	8	1200	140.0	127.6	12.4	136.0	118.0	18.0	0.0080	3.13
7-13	7-15	0.0	5611.2	1.74	1.65	2.87	0.0	883.6	1.24	4.11	2852	6.35	24	1940	136.0	112.5	23.5	138.0	110.3	27.7	0.0011	2.65
7-14	7-15	219.6	219.6	0.07	1.93	0.13	36.6	36.6	0.05	0.18	127	0.28	8	920	149.0	138.0	11.0	138.0	126.0	12.0	0.0130	3.10
7-15	**1-11**	0.0	5830.8	1.81	1.65	2.98	0.0	920.2	1.29	4.26	2961	6.60	24	540	138.0	110.2	27.8	140.0	109.7	30.3	0.0011	2.67
1-11	**PS**	**5830.8**	**49711.4**	**15.41**	**1.44**	**22.13**	**722.5**	**7791.7**	**10.91**	**33.04**	**22945**	**51.12**	**54**	**100.0**	**140.0**	**105.2**	**34.8**	**142.0**	**105.1**	**36.9**	**0.0010**	**4.34**

Table 13
SunCreek Specific Plan
Laguna Creek Interceptor Section 5
Peak Dry Weather Flow Sanitary Sewer Calculations

Node In	Node Out	ESD	Sum ESD	ADWF (mgd)	Peaking Factor	Area (acres)	Sum Area (acres)	$Q_{I/I}$ (mgd)	PDWF (mgd)	PDWF (gpm)	PDWF (cfs)	Dia. (in.)	Length (ft)	US Rim Elev. (ft)	US Invert (ft)	Depth @ US Invert (ft)	DS Rim Elev. (ft)	DS Invert (ft)	Depth @ DS Invert (ft)	Slope (ft/ft)	Velocity (fps)	d/D ratio
1-1	1-2	30845	30845	9.56	1.48	5141	5141	0.00	14.20	9860	21.97	36	1300	235.0	212.9	22.1	231.0	209.6	21.4	0.0025	4.77	0.50
1-2	1-3	2443.0	33288	10.32	1.48	407.0	5548	0.00	15.24	10586	23.58	36	2700	231.0	209.5	21.5	225.3	201.4	23.9	0.0030	5.22	0.50
1-3	1-4	0.0	33288	10.32	1.48	0.0	5548	0.00	15.24	10586	23.58	36	1000	211.4	201.3	10.1	197.9	181.3	16.6	0.0200	10.48	0.30
1-4	1-5	0.0	33288	10.32	1.48	0.0	5548	0.00	15.24	10586	23.58	36	100	197.9	174.0	23.9	196.4	173.7	22.7	0.0030	5.22	0.50
1-5	1-6	1407.0	34695	10.76	1.47	234.6	5782.4	0.00	15.84	11002	24.51	36	2660	196.4	173.6	22.8	183.0	157.6	25.4	0.0060	6.94	0.44
1-6	1-7	1639.4	36334.4	11.26	1.47	253.7	6036.1	0.00	16.54	11485	25.59	36	2840	183.0	157.5	25.5	172.9	140.5	32.4	0.0060	6.94	0.44
1-7	1-8	3769.8	40104.2	12.43	1.46	509.1	6545.2	0.00	18.13	12590	28.05	42	860	172.9	140.0	32.9	167.4	137.4	30.0	0.0030	5.78	0.50
1-8	1-9	2146.2	42250.4	13.10	1.45	294.4	6839.6	0.00	19.03	13215	29.44	42	2750	167.4	137.3	30.1	147.0	128.2	18.8	0.0033	6.07	0.50
1-9	1-10	1630.2	43880.6	13.60	1.45	229.6	7069.2	0.00	19.71	13688	30.50	42	3800	147.0	128.1	18.9	137.6	113.2	24.4	0.0039	6.20	0.44
1-10	1-11	0.0	43880.6	13.60	1.45	0.0	7069.2	0.00	19.71	13688	30.50	48	5880	137.6	112.7	24.9	140.0	105.7	34.3	0.0012	4.00	0.50
1-11	PS	5830.8	49711.4	15.41	1.44	722.5	7791.7	0.00	22.13	15370	34.24	54	100.0	140.0	105.2	34.8	142.0	105.1	36.9	0.0010	3.95	0.50

EXHIBITS

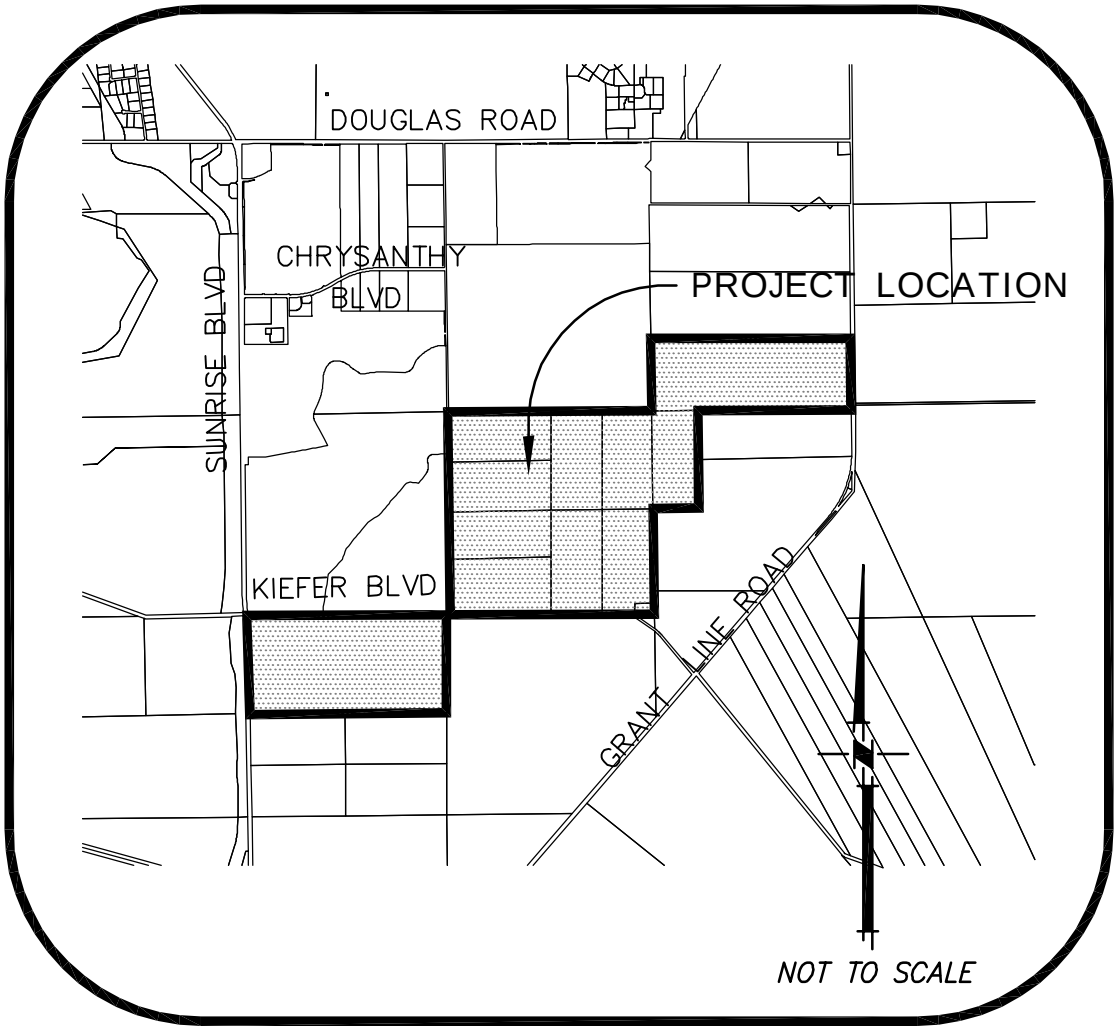


EXHIBIT A
SUNCREEK SPECIFIC PLAN
VICINTY MAP

THE PRESERVE AT SUN RIDGE

ARISTA DEL SOL

RANCHO CORDOVA PARKWAY

GRANT LINE ROAD

SUNRISE BLVD

ANATOLIA III

KIEFER BLVD

THE ARBORETUM (WAEGELL/LEWIS PROPERTY)

LANDS OWNED BY SACRAMENTO COUNTY

Legend

- HIGH DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- LOW DENSITY RESIDENTIAL
- COMPACT DENSITY RESIDENTIAL
- COMMERCIAL MIXED USE
- STORMWATER CANAL
- DETENTION BASIN
- PUBLIC/QUASI PUBLIC
- PARK
- SCHOOL
- VILLAGE CENTER
- WETLAND
- WETLAND BUFFER/BIKE PATH CORRIDOR
- OPEN SPACE

0' 500' 1000'

EXHIBIT B

LAND USE PLAN

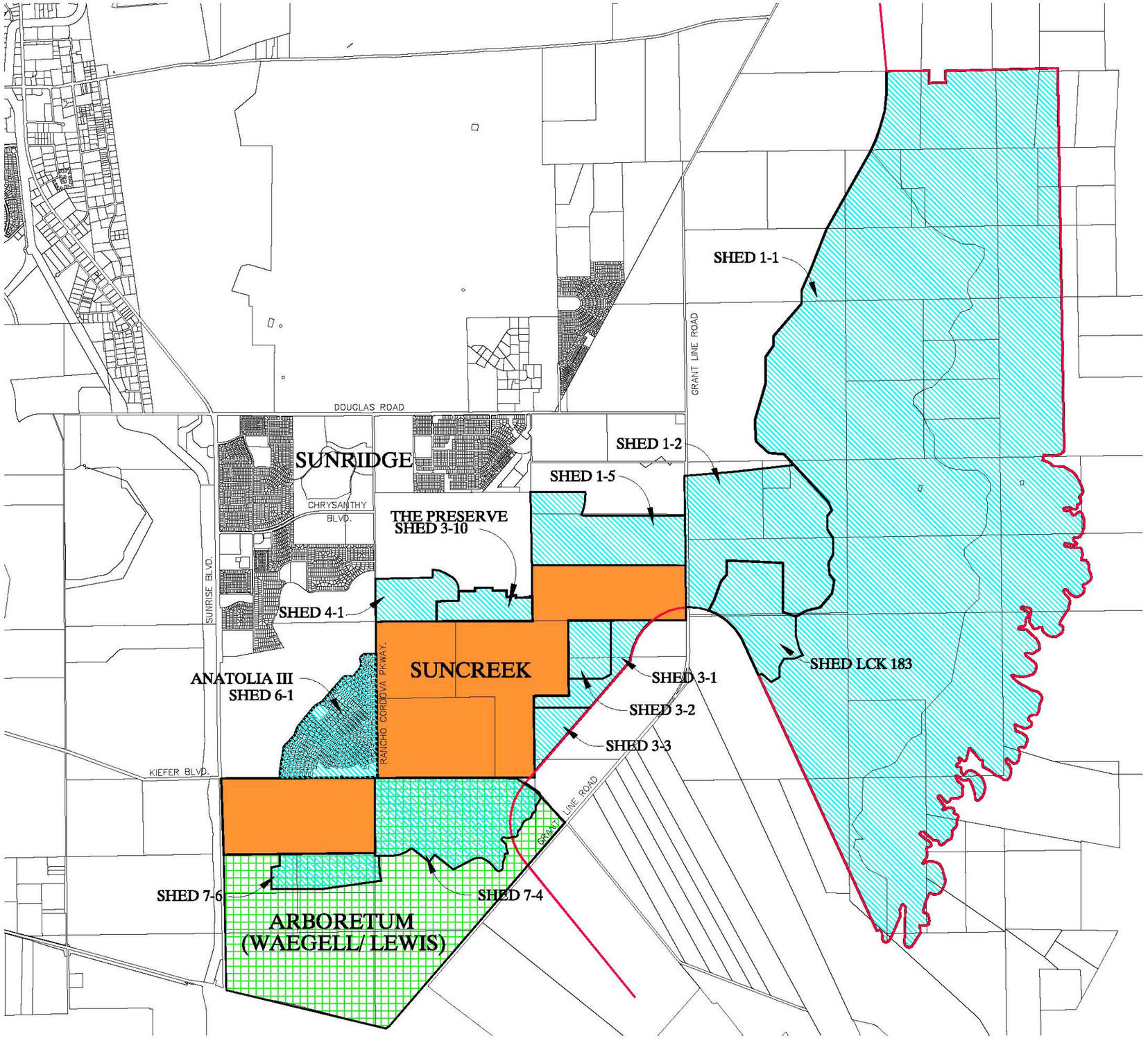
SunCreek Specific Plan

County of Sacramento, California

November 09, 2007

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

7991-00



NTS

Legend

- SUNCREEK SPECIFIC PLAN
- OFFSITE AREA
- ARBORETUM (POSSIBLE INTERM SERVICE)
- URBAN SERVICES BOUNDARY

EXHIBIT C

SANITARY SEWER STUDY AREA

SUNCREEK SPECIFIC PLAN

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

MARCH 2009

7991-00

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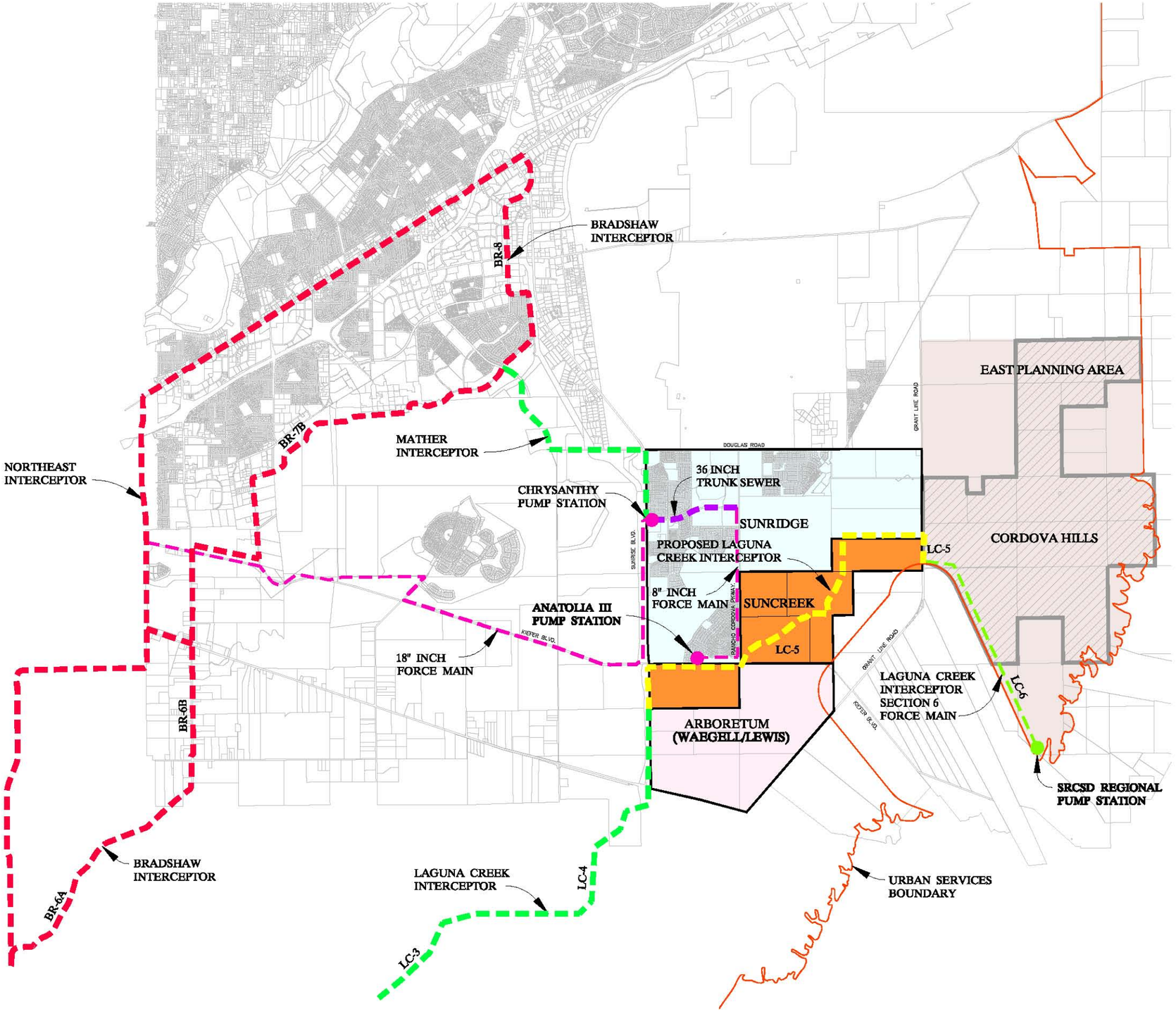

NTS

Legend

- URBAN SERVICES BOUNDARY
- SUNCREEK SPECIFIC PLAN
- SUNRIDGE SPECIFIC PLAN
- EAST PLANNING AREA
- ARBORETUM (WAEGELL/LEWIS)
- CORDOVA HILLS SPECIFIC PLAN
- EXISTING INTERCEPTOR
- FUTURE INTERCEPTOR
- PROPOSED LAGUNA CREEK INTERCEPTOR
- EXISTING 36 INCH TRUNK SEWER
- EXISTING FORCE MAIN
- FUTURE FORCE MAIN
- EXISTING PUMP STATION
- FUTURE PUMP STATION

EXHIBIT D

SASD & SRCSD
INTERCEPTORS & TRUNK SEWER

SUNCREEK SPECIFIC PLAN

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

MARCH 2009

7991-00

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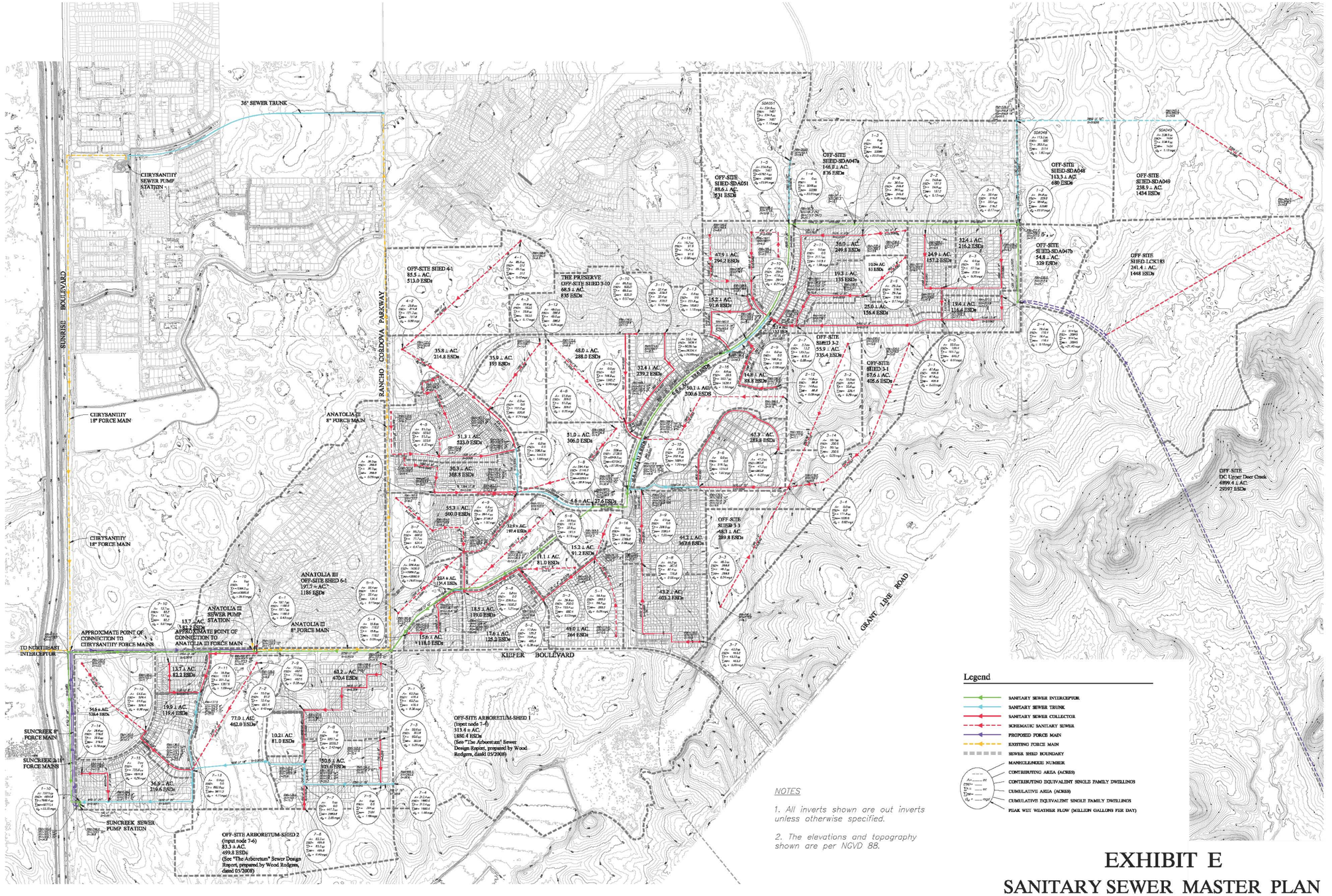


NOTES

1. All inverts shown are out inverts unless otherwise specified.

2. The elevations and topography shown are per NGVD 88.

Legend

- SANITARY SEWER INTERCEPTOR
- SANITARY SEWER TRUNK
- SANITARY SEWER COLLECTOR
- SCHEMATIC SANITARY SEWER
- PROPOSED FORCE MAIN
- EXISTING FORCE MAIN
- SEWER SHED BOUNDARY
- MANHOLE/NODE NUMBER
- CONTRIBUTING AREA (ACRES)
- CONTRIBUTING EQUIVALENT SINGLE FAMILY DWELLINGS
- CUMULATIVE AREA (ACRES)
- CUMULATIVE EQUIVALENT SINGLE FAMILY DWELLINGS
- PEAK WET WEATHER FLOW (MILLION GALLONS PER DAY)

EXHIBIT E

SANITARY SEWER MASTER PLAN

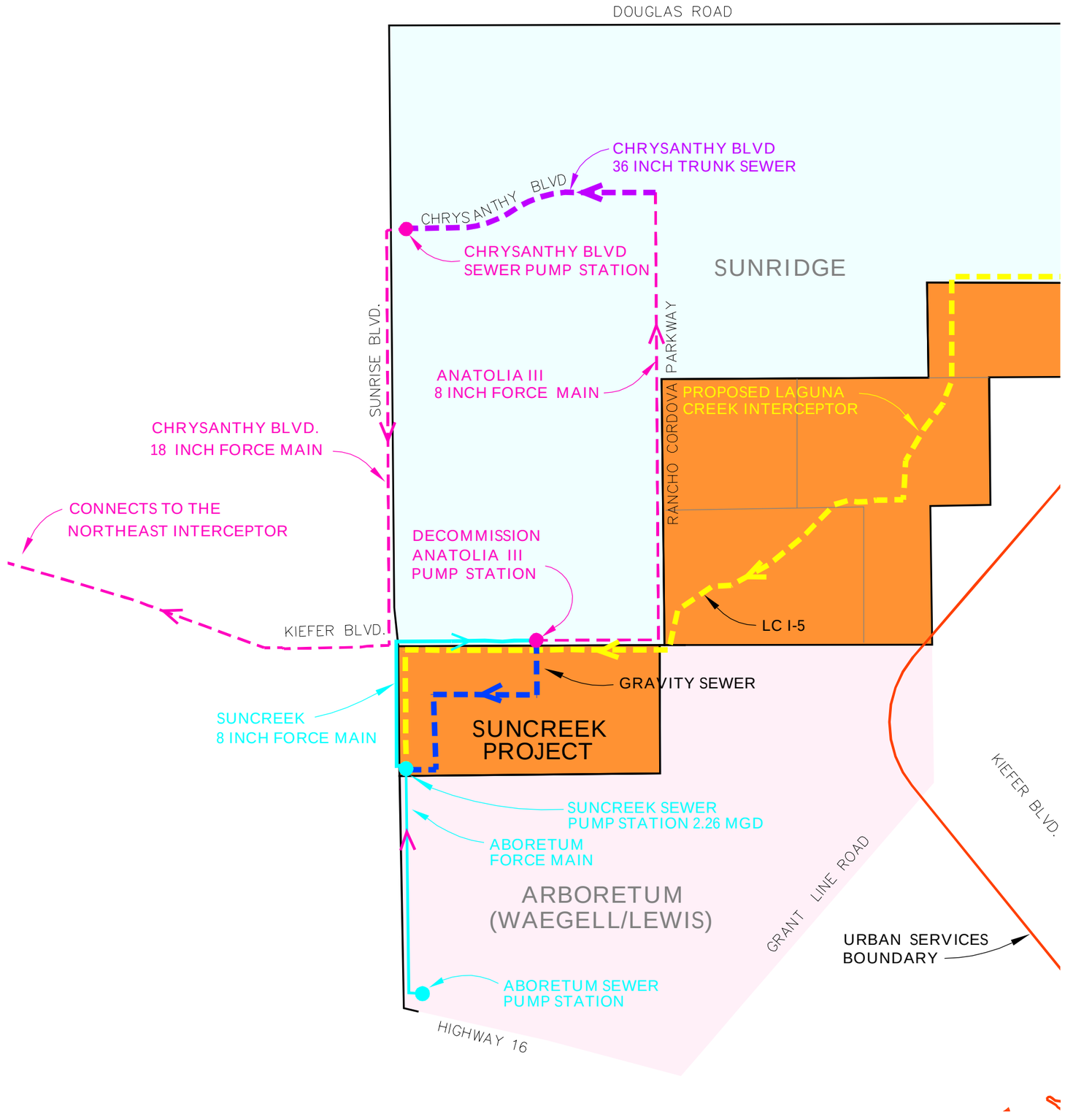
SunCreek Specific Plan

County of Sacramento, California

March, 2009

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

7991-00



NTS

Legend

- URBAN SERVICES BOUNDARY
- SUNCREEK SPECIFIC PLAN
- SUNRIDGE SPECIFIC PLAN
- ARBORETUM (WAEGELL/LEWIS)
- EXISTING INTERCEPTOR
- FUTURE INTERCEPTOR
- PROPOSED LAGUNA CREEK INTERCEPTOR
- PROPOSED GRAVITY SEWER
- EXISTING 36 INCH TRUNK SEWER
- EXISTING FORCE MAIN
- PROPOSED INTERIM SERVICE
- PROPOSED LONG TERM SERVICE
- EXISTING PUMP STATION
- PROPOSED PUMP STATION

EXHIBIT F-1

Service Connection to
SASD & SRCSD Facilities
Scenario One - Phase 1

SUNCREEK SPECIFIC PLAN

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

MARCH 2009

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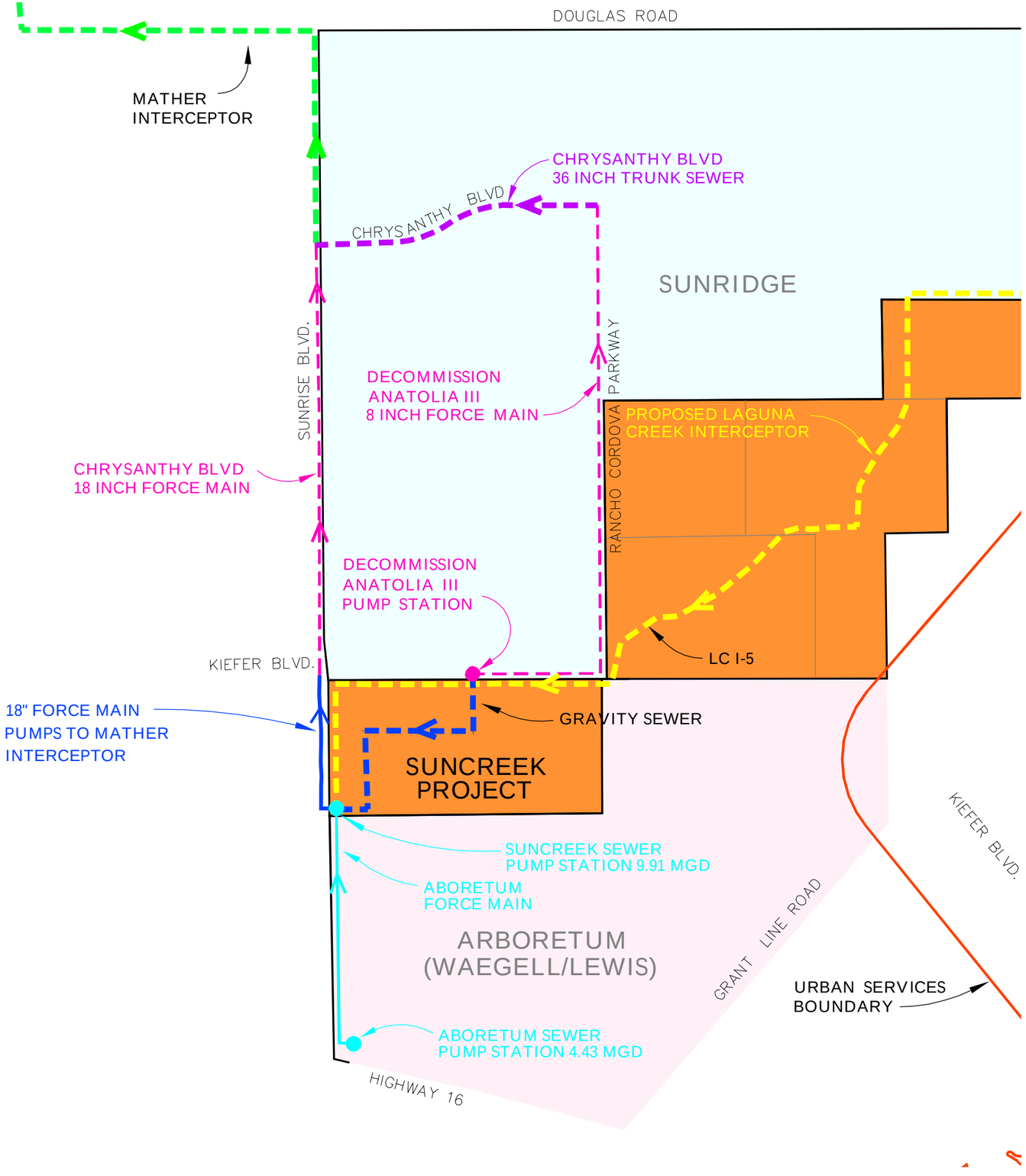

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Legend

- URBAN SERVICES BOUNDARY
- SUNCREEK SPECIFIC PLAN
- SUNRIDGE SPECIFIC PLAN
- ARBORETUM (WAEGELL/LEWIS)
- EXISTING INTERCEPTOR
- FUTURE INTERCEPTOR
- PROPOSED LAGUNA CREEK INTERCEPTOR
- PROPOSED GRAVITY SEWER
- EXISTING 36 INCH TRUNK SEWER
- EXISTING FORCE MAIN
- PROPOSED INTERIM SERVICE
- PROPOSED LONG TERM SERVICE
- EXISTING PUMP STATION
- PROPOSED PUMP STATION

EXHIBIT F-2

Service Connection to
SASD & SRCSD Facilities
Scenario One - Phase 2

SUNCREEK SPECIFIC PLAN

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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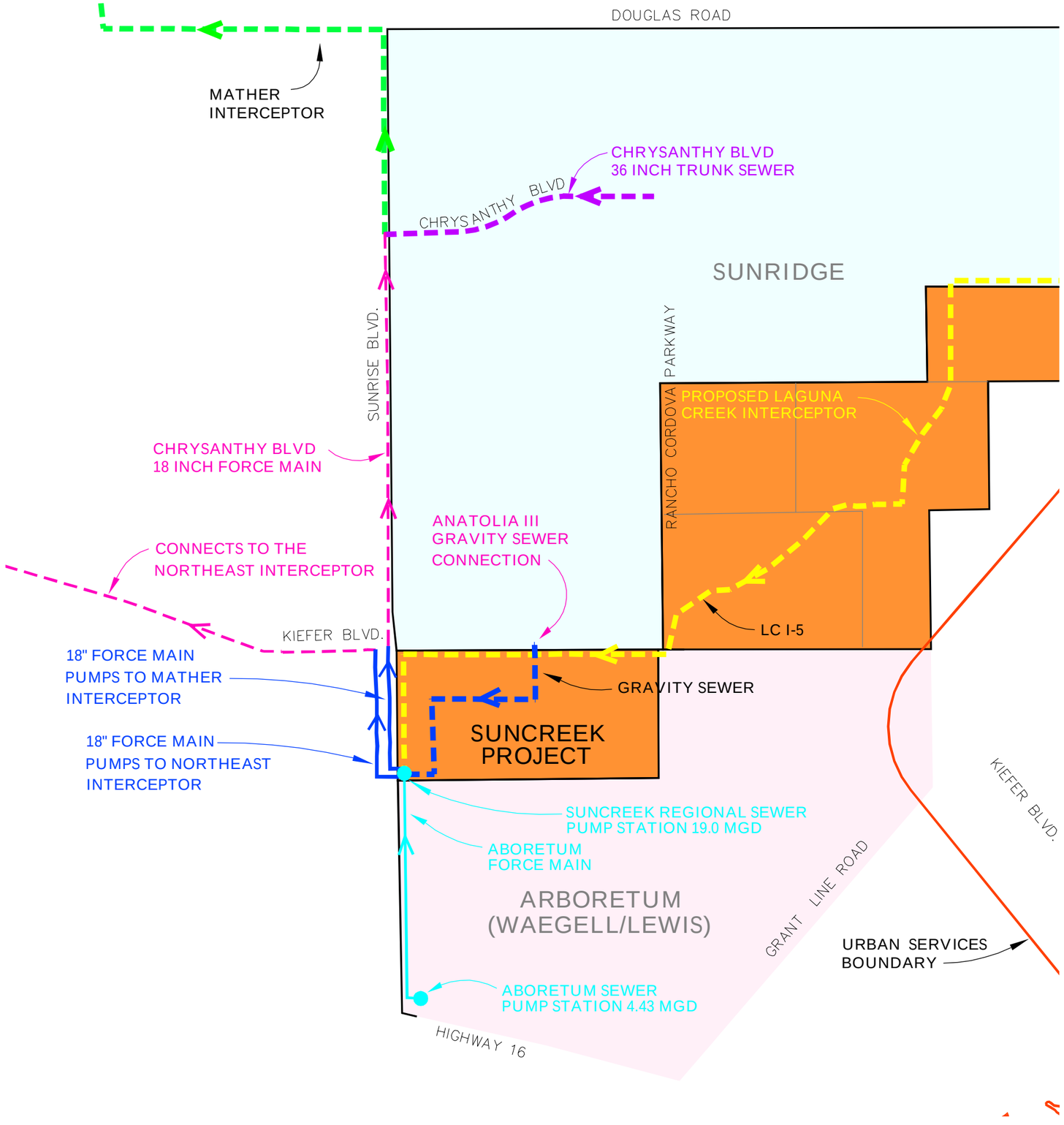

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Legend

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- SUNCREEK SPECIFIC PLAN
- SUNRIDGE SPECIFIC PLAN
- ARBORETUM (WAEGELL/LEWIS)
- EXISTING INTERCEPTOR
- FUTURE INTERCEPTOR
- PROPOSED LAGUNA CREEK INTERCEPTOR
- PROPOSED GRAVITY SEWER
- EXISTING 36 INCH TRUNK SEWER
- EXISTING FORCE MAIN
- PROPOSED INTERIM SERVICE
- PROPOSED LONG TERM SERVICE
- EXISTING PUMP STATION
- PROPOSED PUMP STATION

EXHIBIT F-3

Service Connection to
SASD & SRCSD Facilities
Scenario One - Phase 2
(SRCSD Regional Pump Station)

SUNCREEK SPECIFIC PLAN

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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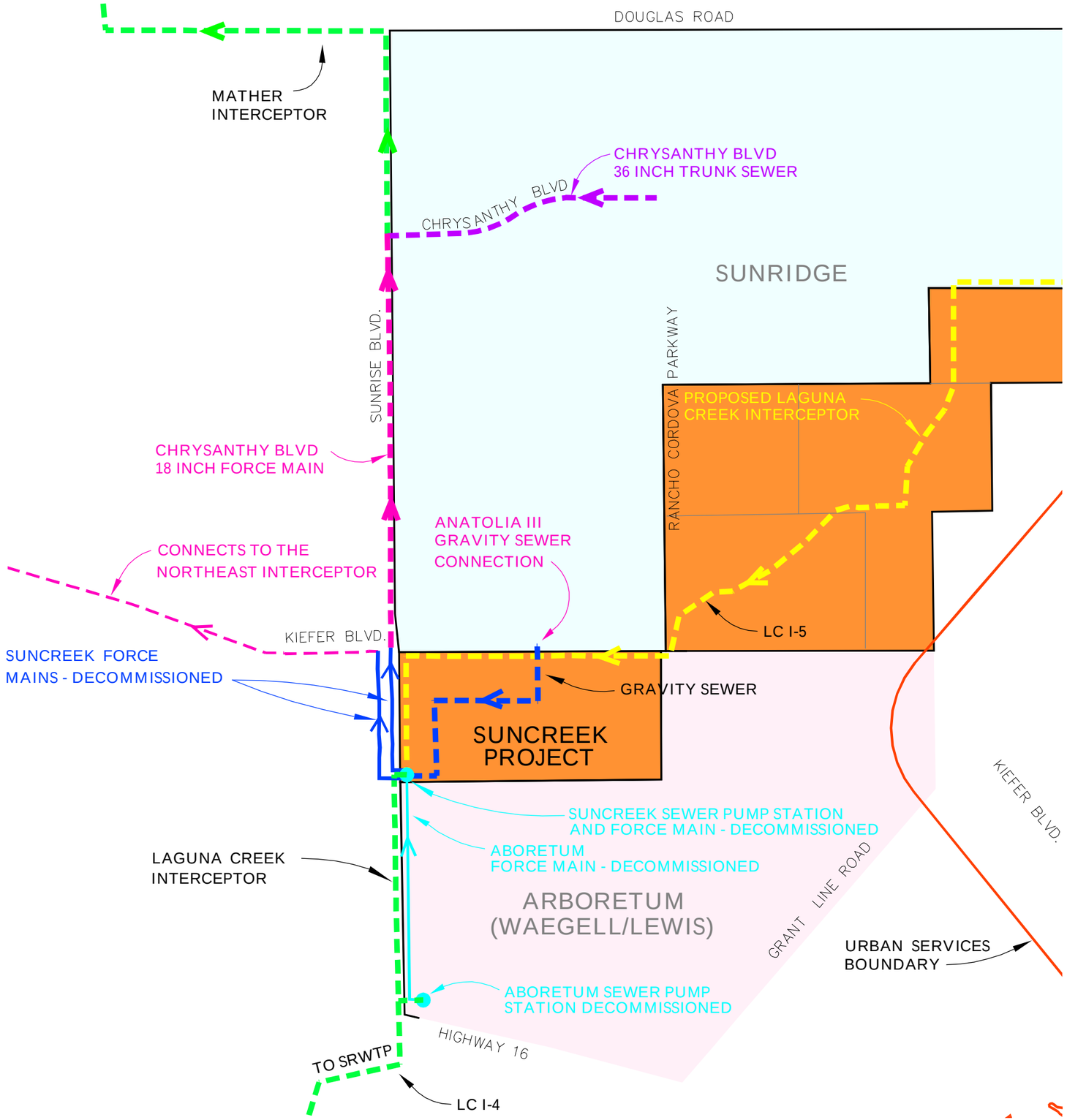

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Legend

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- EXISTING INTERCEPTOR
- FUTURE INTERCEPTOR
- PROPOSED LAGUNA CREEK INTERCEPTOR
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- EXISTING 36 INCH TRUNK SEWER
- EXISTING FORCE MAIN
- PROPOSED INTERIM SERVICE
- PROPOSED LONG TERM SERVICE
- EXISTING PUMP STATION
- PROPOSED PUMP STATION

EXHIBIT F-4

Service Connection to
SASD & SRCSD Facilities
Scenario One - Phase 3

SUNCREEK SPECIFIC PLAN

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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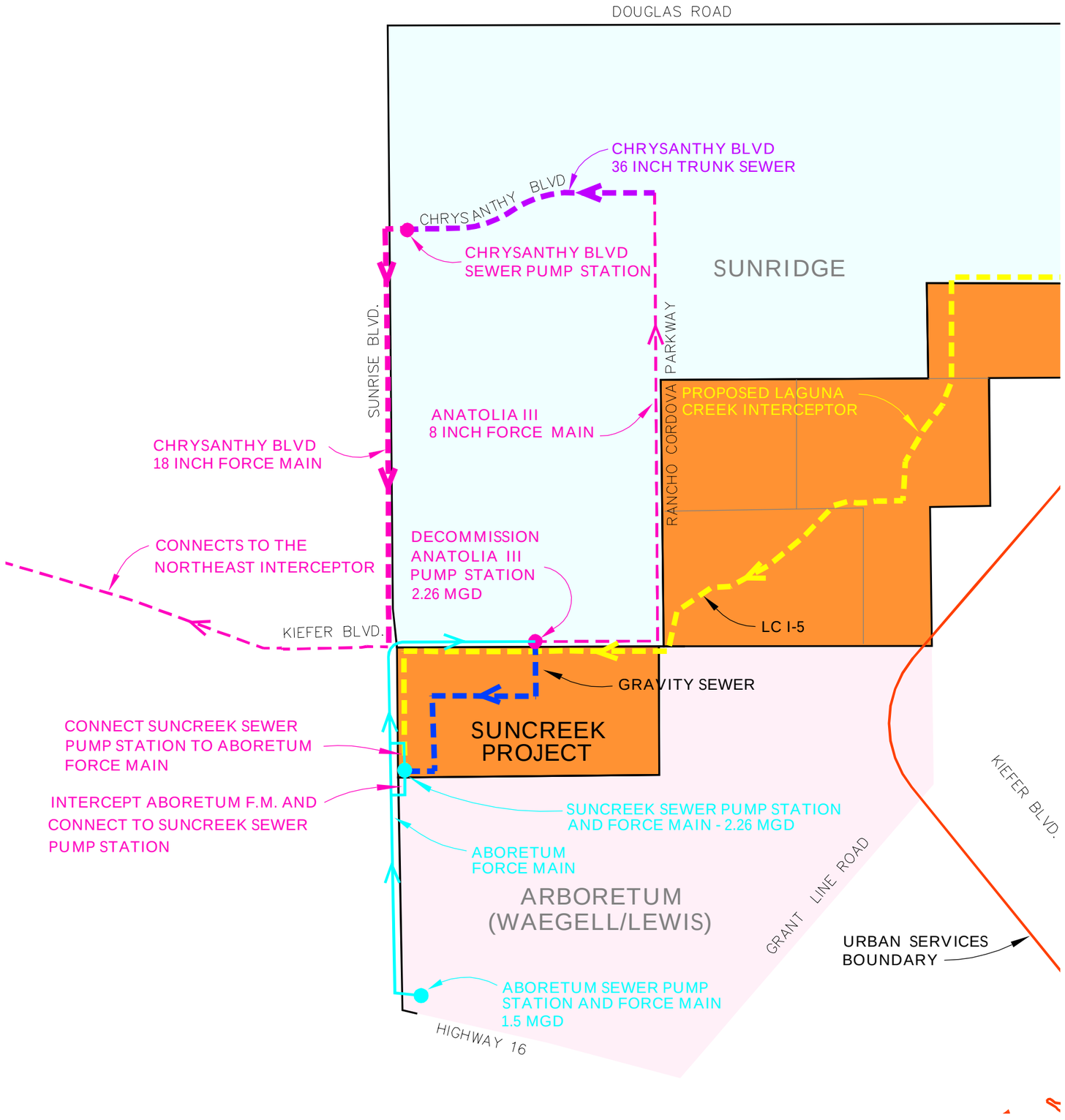

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- PROPOSED LAGUNA CREEK INTERCEPTOR
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- EXISTING FORCE MAIN
- PROPOSED INTERIM SERVICE
- PROPOSED LONG TERM SERVICE
- EXISTING PUMP STATION
- PROPOSED PUMP STATION

EXHIBIT F-5

Service Connection to
SASD & SRCSD Facilities
Scenario Two - Phase 1, Option 1

SUNCREEK SPECIFIC PLAN

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

MARCH 2009

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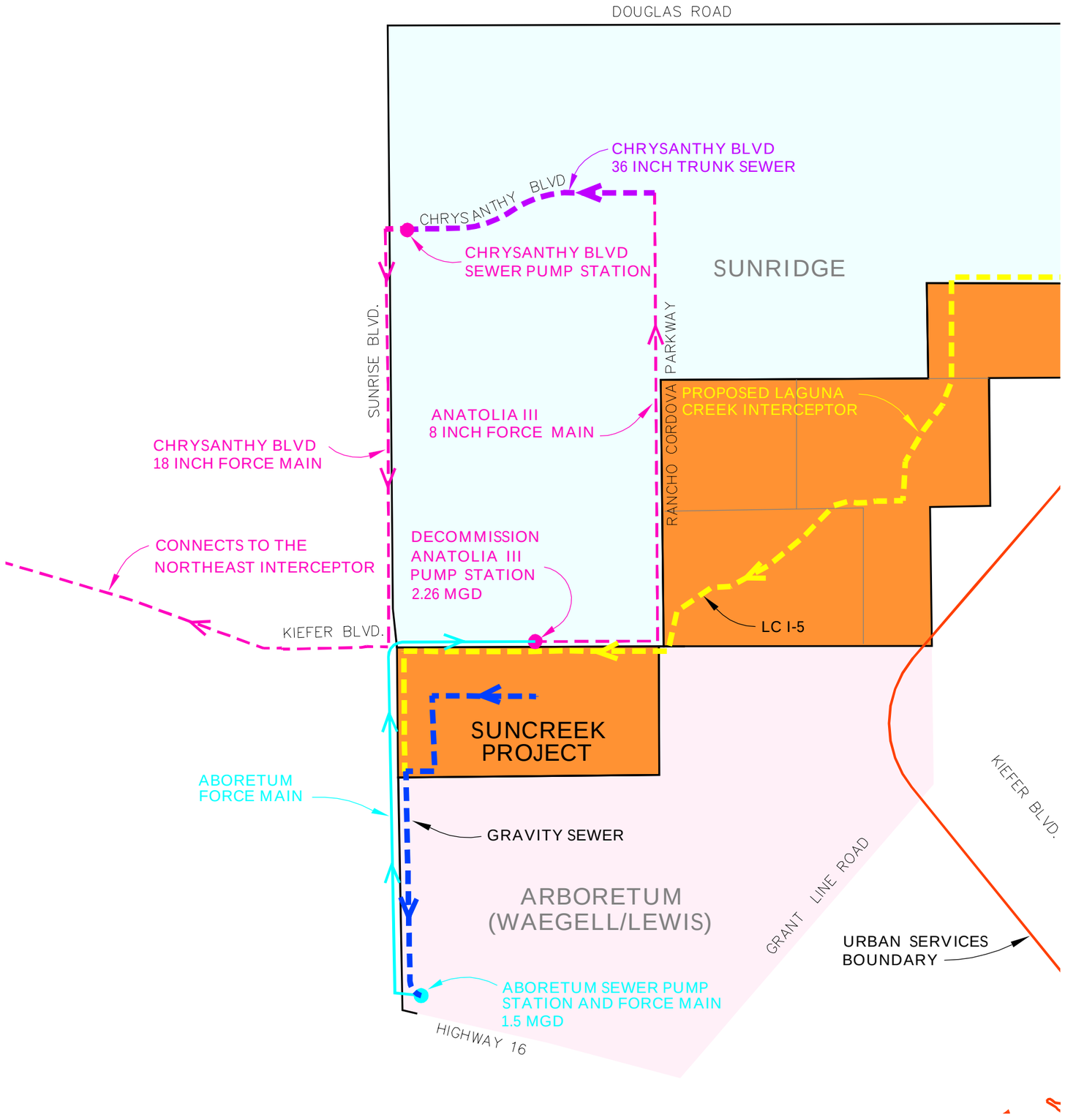

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Legend

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- EXISTING INTERCEPTOR
- FUTURE INTERCEPTOR
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- EXISTING 36 INCH TRUNK SEWER
- EXISTING FORCE MAIN
- PROPOSED INTERIM SERVICE
- PROPOSED LONG TERM SERVICE
- EXISTING PUMP STATION
- PROPOSED PUMP STATION

EXHIBIT F-6

Service Connection to
SASD & SRCSD Facilities
Scenario Two - Phase 1, Option 2

SUNCREEK SPECIFIC PLAN

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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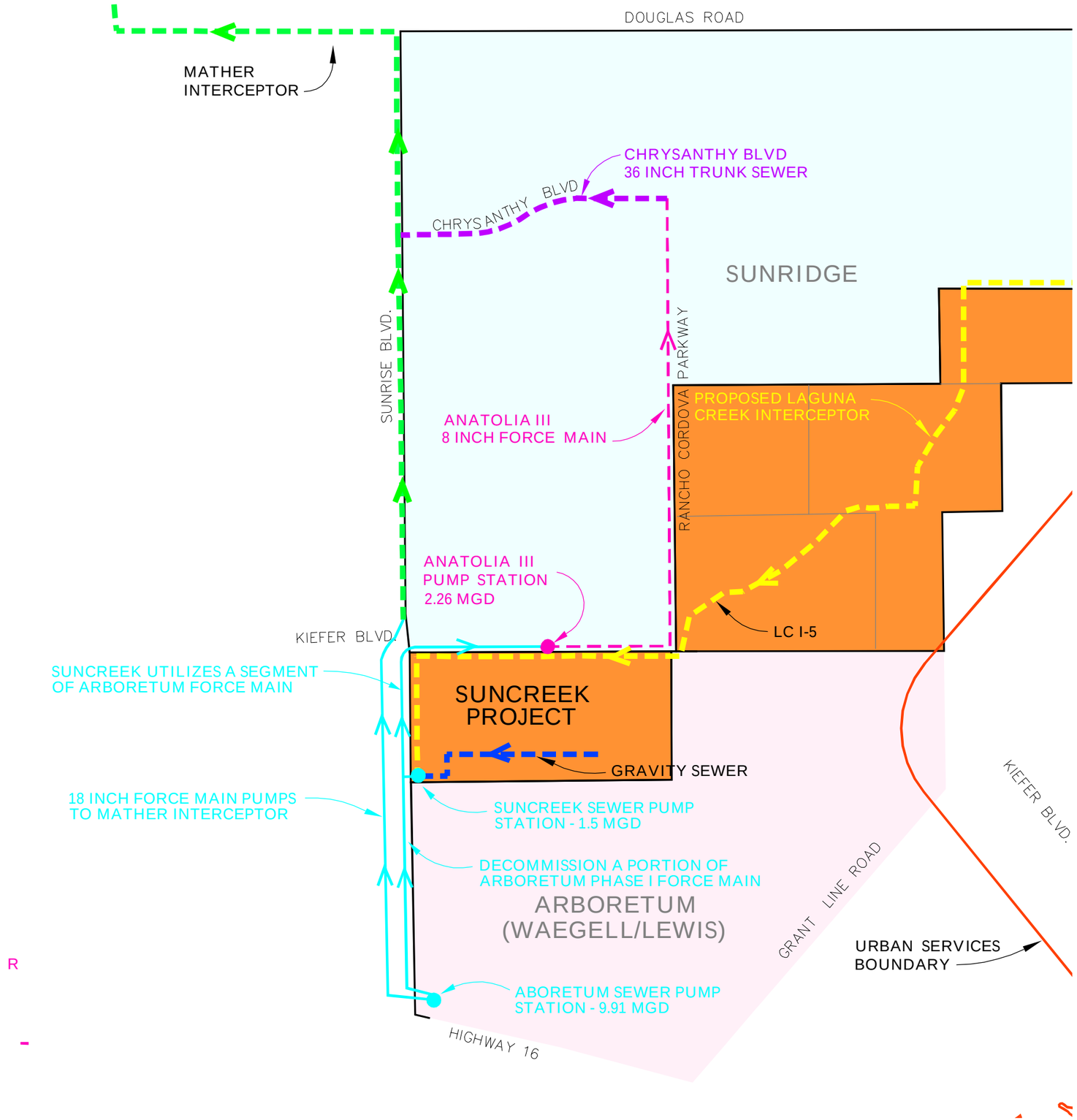

EXHIBIT F-7

Service Connection to
SASD & SRCSD Facilities
Scenario Two - Phase 2, Option 1

SUNCREEK SPECIFIC PLAN

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CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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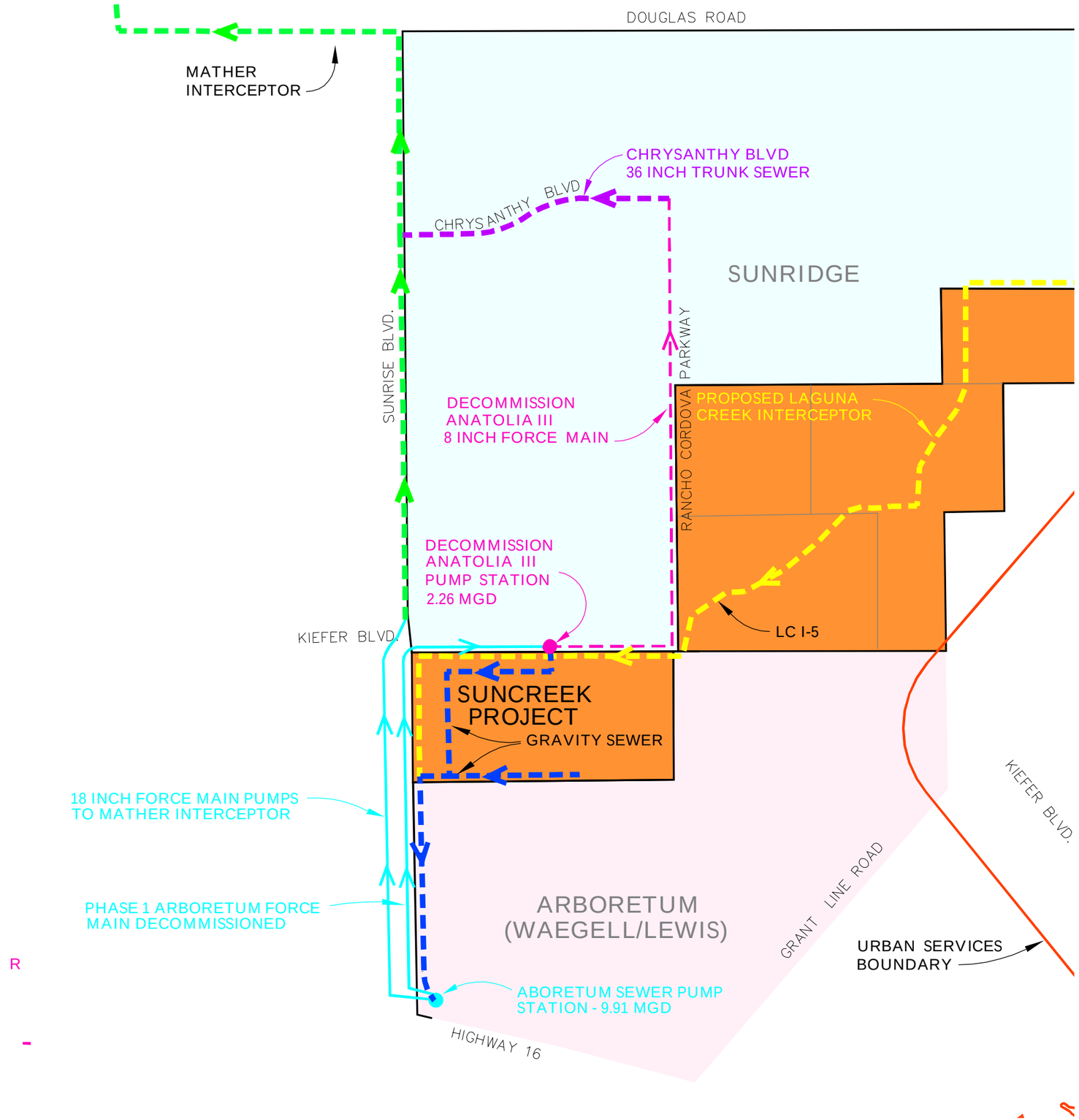

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Legend

- URBAN SERVICES BOUNDARY
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- SUNRIDGE SPECIFIC PLAN
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- EXISTING FORCE MAIN
- PROPOSED INTERIM SERVICE
- PROPOSED LONG TERM SERVICE
- EXISTING PUMP STATION
- PROPOSED PUMP STATION

EXHIBIT F-8

Service Connection to
SASD & SRCSD Facilities
Scenario Two - Phase 2, Option 2

SUNCREEK SPECIFIC PLAN

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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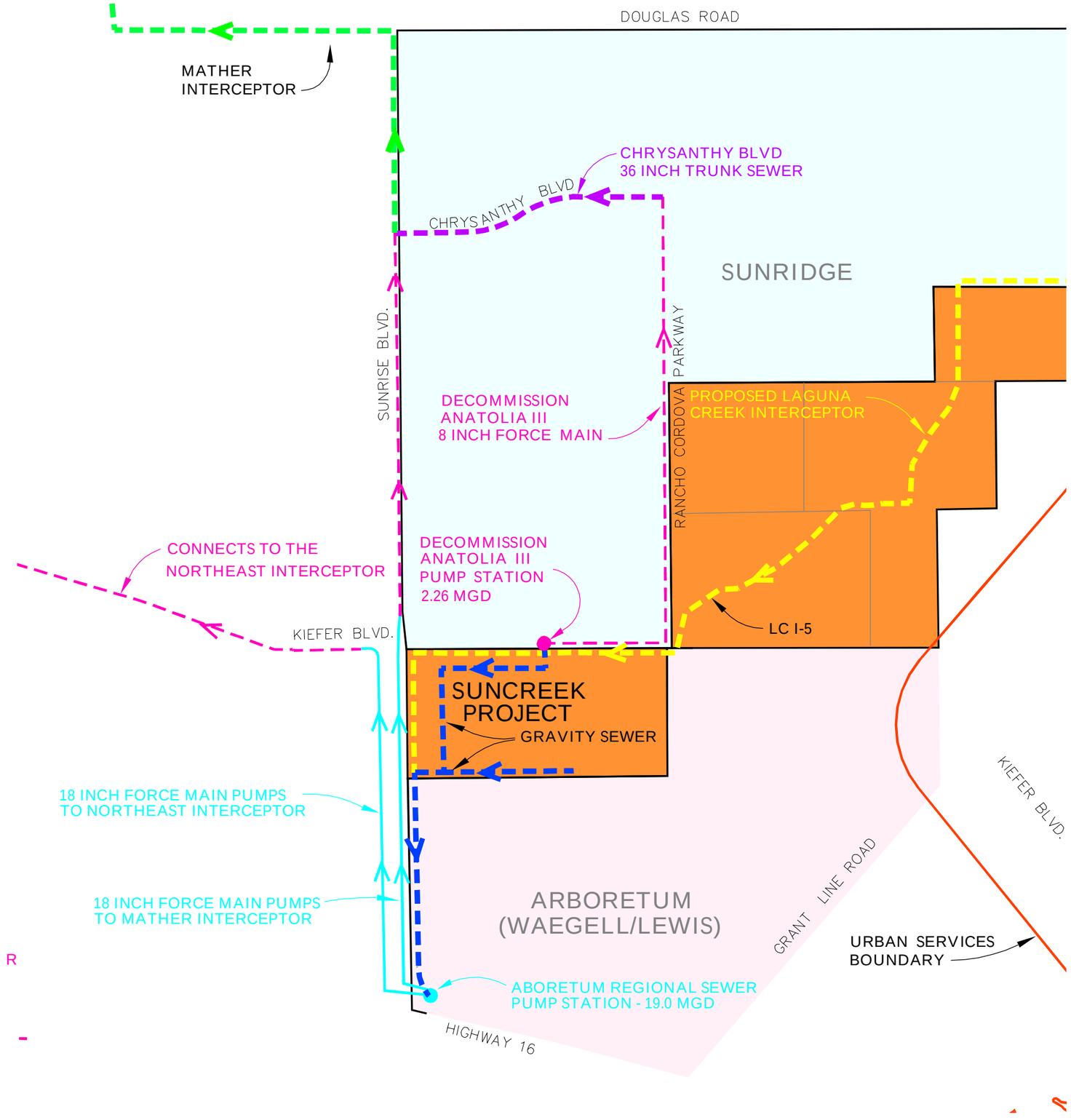

NTS

Legend

- URBAN SERVICES BOUNDARY
- SUNCREEK SPECIFIC PLAN
- SUNRIDGE SPECIFIC PLAN
- ARBORETUM (WAEGELL/LEWIS)
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- EXISTING 36 INCH TRUNK SEWER
- EXISTING FORCE MAIN
- PROPOSED INTERIM SERVICE
- PROPOSED LONG TERM SERVICE
- EXISTING PUMP STATION
- PROPOSED PUMP STATION

EXHIBIT F-9

Service Connection to
SASD & SRCSD Facilities
Scenario Two - Phase 2
(SRCSD Regional Pump Station)

SUNCREEK SPECIFIC PLAN

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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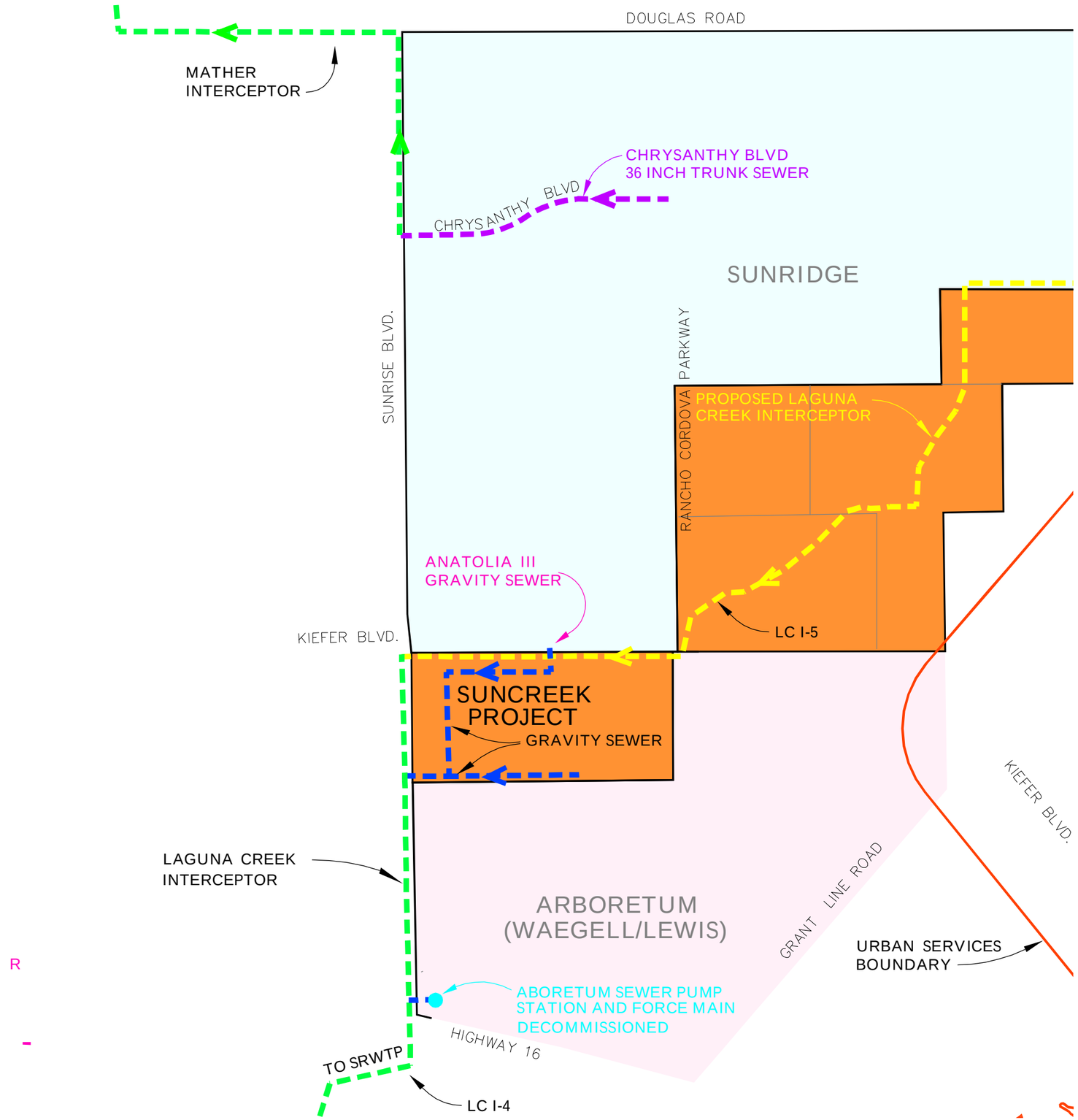

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Legend

- URBAN SERVICES BOUNDARY
- SUNCREEK SPECIFIC PLAN
- SUNRIDGE SPECIFIC PLAN
- ARBORETUM (WAEGELL/LEWIS)
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- EXISTING FORCE MAIN
- PROPOSED INTERIM SERVICE
- PROPOSED LONG TERM SERVICE
- EXISTING PUMP STATION
- PROPOSED PUMP STATION

EXHIBIT F-10

Service Connection to
SASD & SRCSD Facilities
Scenario Two - Phase 3

SUNCREEK SPECIFIC PLAN

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CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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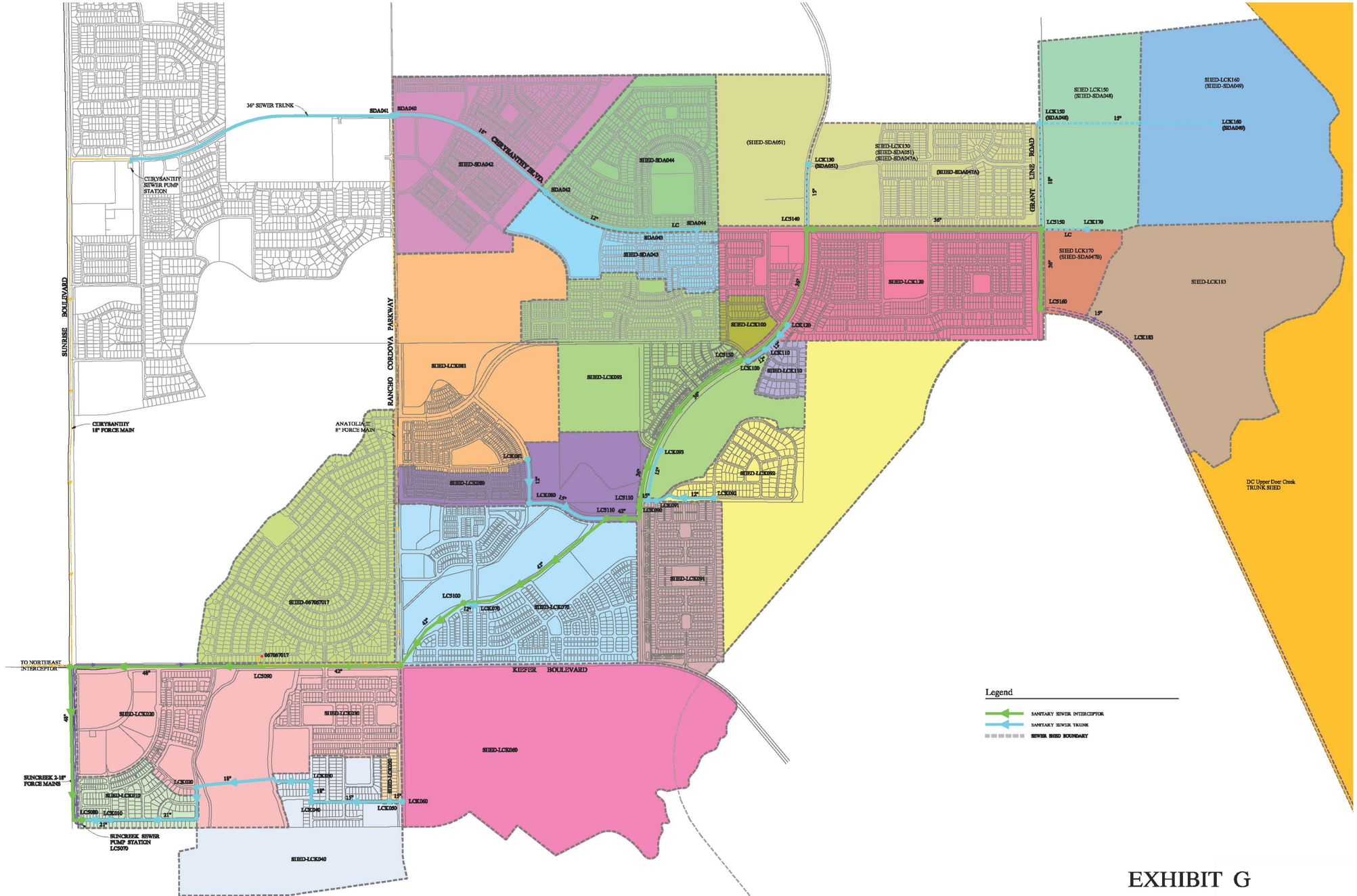

Legend

- SANITARY SEWER INTERCEPTOR
- SANITARY SEWER TRUNK
- SEWER SHED BOUNDARY

0' 250' 500' 1000'
SCALE:1"=500'

EXHIBIT G
SANITARY SEWER TRUNK SHEDS

SunCreek Specific Plan

County of Sacramento, California
March, 2009

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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3-26-2008 08:41:07 I:\Sacramento\7991\00\Master Plans\Sewer\02fin-d Sewer Trunk Sheds.dwg
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EXHIBIT H

SunCreek Specific Plan

SANITARY SEWER BACKBONE INFRASTRUCTURE

PROBABLE OPINION OF CONSTRUCTION COST

The SunCreek Ownership Group
7700 College Town Dr. Suite 220
Sacramento Ca 95826-2304

ITEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
1	5,550	l.f.	12-inch, VCP, Sanitary Trunk Sewer Pipeline[1]	$150.00	$832,500
2	3,540	l.f.	15-inch, VCP, Sanitary Trunk Sewer Pipeline	$175.00	$619,500
3	2,240	l.f.	18-inch, VCP, Sanitary Trunk Sewer Pipeline	$200.00	$448,000
4	2,480	l.f.	24-inch, VCP, Sanitary Trunk Sewer Pipeline	$300.00	$744,000
5	10,600	l.f.	36-inch, VCP, Sewer Interceptor Pipeline	$500.00	$5,300,000
6	7,410	l.f.	42-inch, VCP, Sewer Interceptor Pipeline	$550.00	$4,075,500
7	5,880	l.f.	48-inch, VCP, Sewer Interceptor Pipeline	$600.00	$3,528,000
8	100	l.f.	52-inch, VCP, Sewer Interceptor Pipeline	$650.00	$65,000
9	20	each	48-inch Sanitary Trunk Sewer Manhole	$6,000.00	$120,000
10	10	each	60-inch Sanitary Trunk Sewer Manhole	$10,000.00	$100,000
11	50	each	60-inch Sewer Interceptor Manhole	$15,000.00	$750,000
12	12	each	72-inch Sewer Interceptor Manhole	$18,000.00	$216,000
13	2	each	84-inch Sewer Interceptor Manhole	$21,000.00	$42,000
14	1	each	2.26 mgd Sanitary Sewer Pump Station	$1,000,000.00	$1,000,000
15	1	each	9.91 mgd Sanitary Sewer Pump Station	$8,000,000.00	$8,000,000
16	5,900	l.f.	8-inch Force Main	$150.00	$885,000
17	5,440	l.f.	18-inch Force Main	$225.00	$1,224,000
			SUBTOTAL SANITARY SEWER SYSTEM		**$27,949,500**
			Mobilization and Traffic Control (10%)		**$2,794,950**
			Construction Contingency (25%)		**$6,987,380**
			Engineering, Permits & Inspection (25%)		**$6,987,380**
			GRAND TOTAL CONSTRUCTION COST		**$44,719,000**

1. Quantity includes 1,770 LF of 12-inch sewer pipe to connect the Anatolia III Sewer Pump Station to the SunCreek Sewer Pump Station (Node 6-1 to Node 7-11). This sewer pipe segment is not trunk sewer but is a required component of the SunCreek Project's backbone sewer infrastructure,

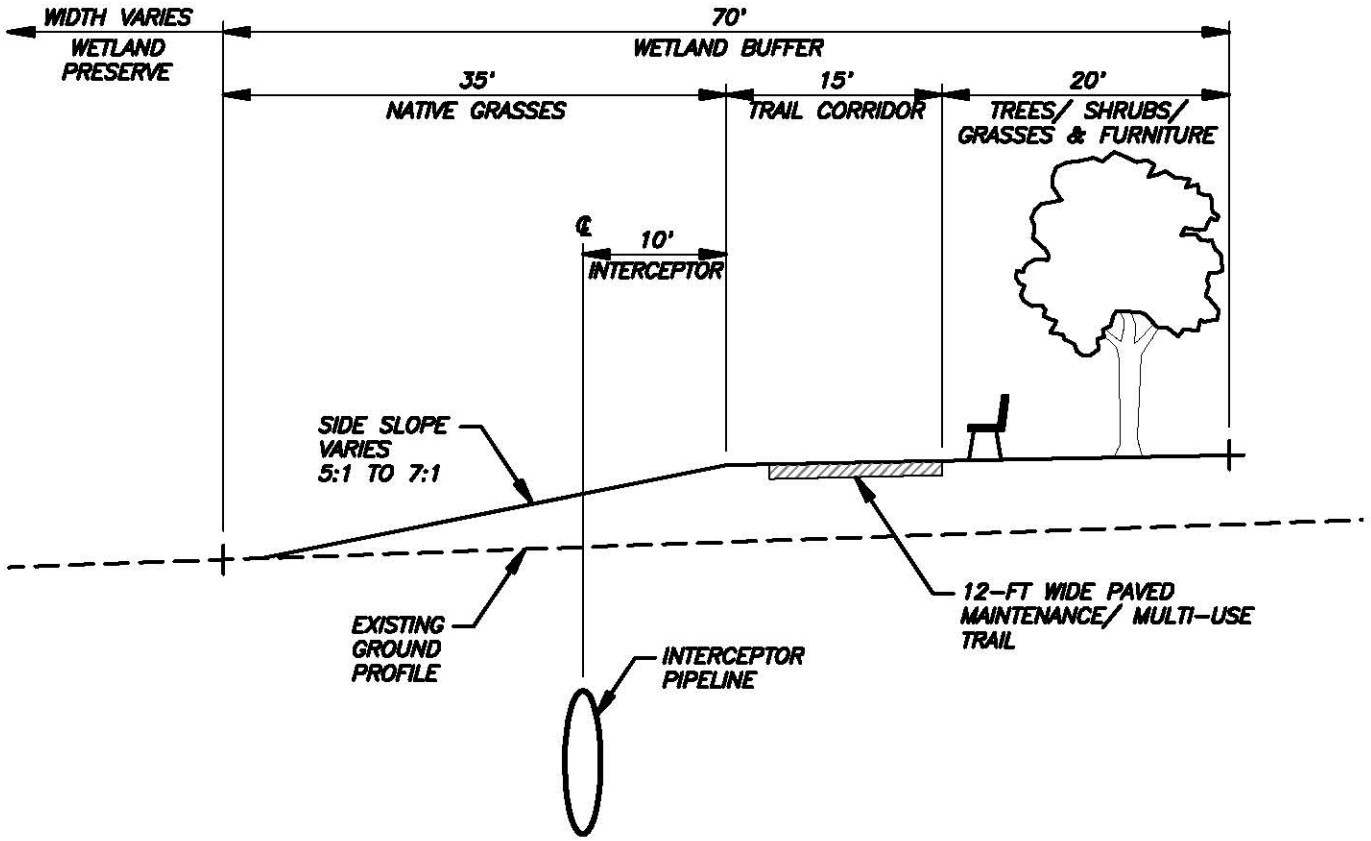

EXHIBIT I

LAGUNA CREEK INTERCEPTOR
TYPICAL WETLAND BUFFER CROSS-SECTION

SUNCREEK SPECIFIC PLAN

SCALE: N.T.S. March 2009

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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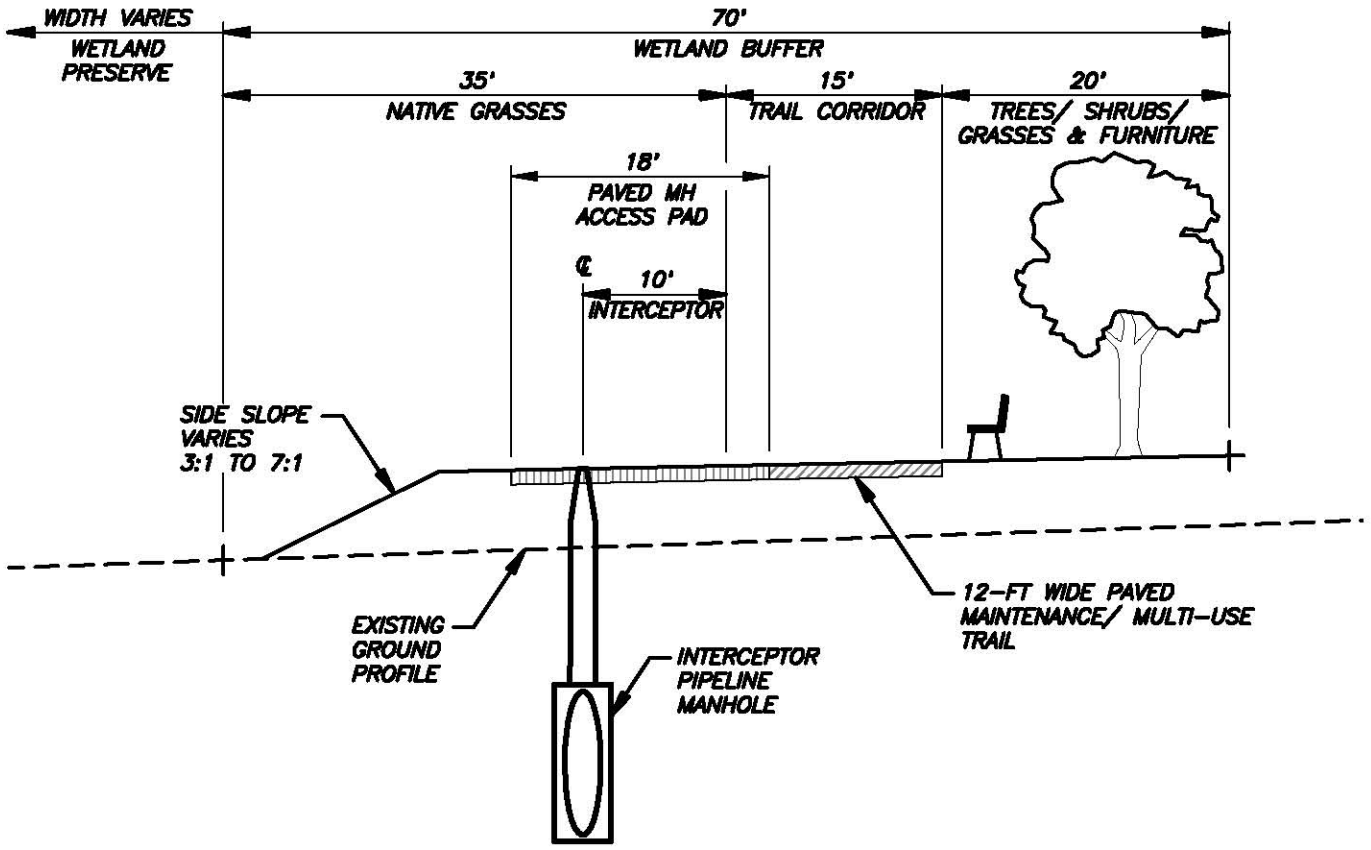

EXHIBIT J

LAGUNA CREEK INTERCEPTOR
TYPICAL WETLAND BUFFER CROSS-SECTION
AT MANHOLE

SUNCREEK SPECIFIC PLAN

SCALE: N.T.S. March 2009

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

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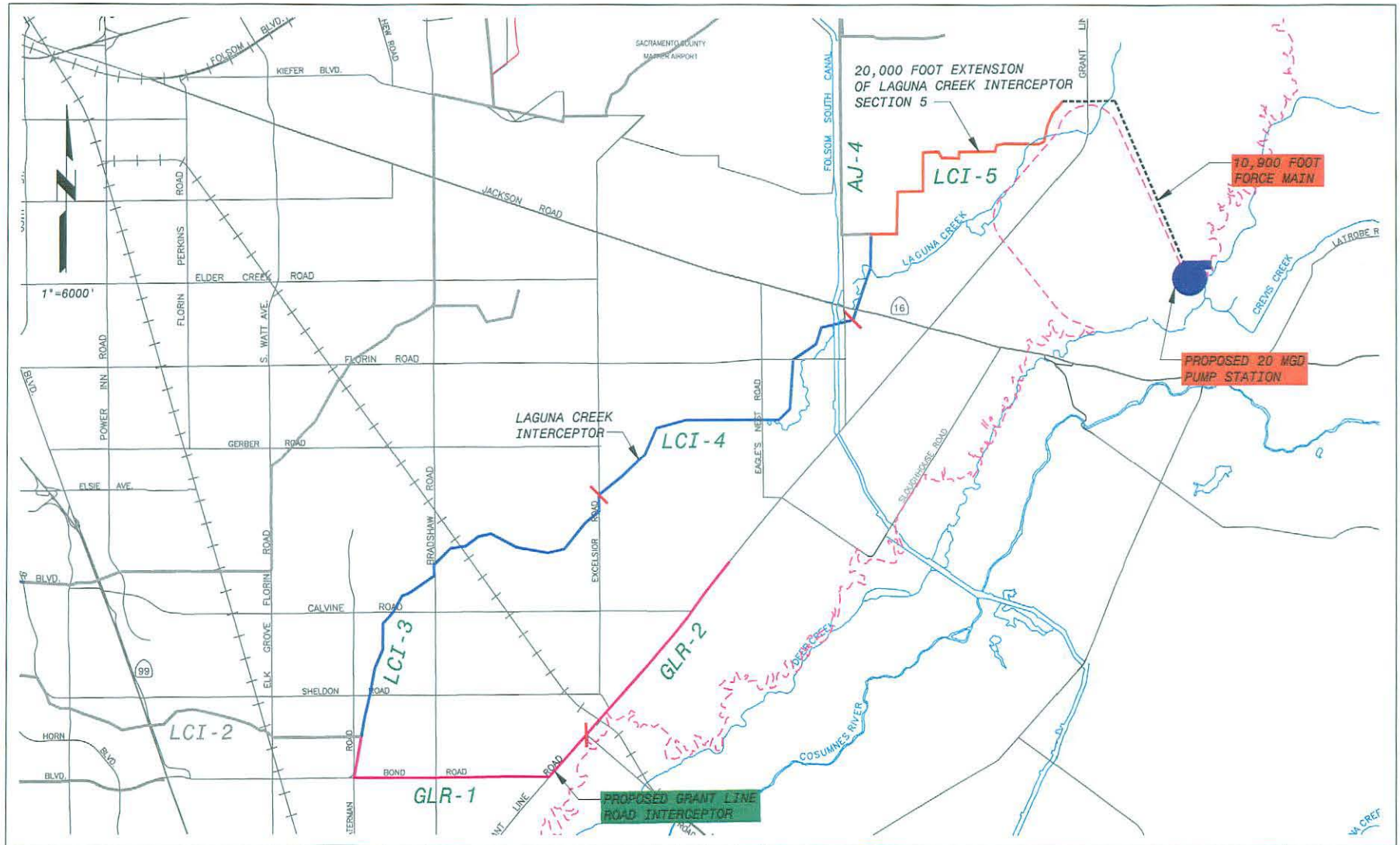
APPENDICES

Appendix A:

SRCSD Master Plan 2000-Alternative Grant Line Road
Interceptor and Revised Laguna Creek Interceptor Section 5, Figure 15



DATE	REVISION OR ISSUE	NO.	BY	CK	APP	DATE	REVISION OR ISSUE	NO.	BY	CK	APP

BLACK & VEATCH Corporation
Sacramento, California

MASTER PLAN 2000

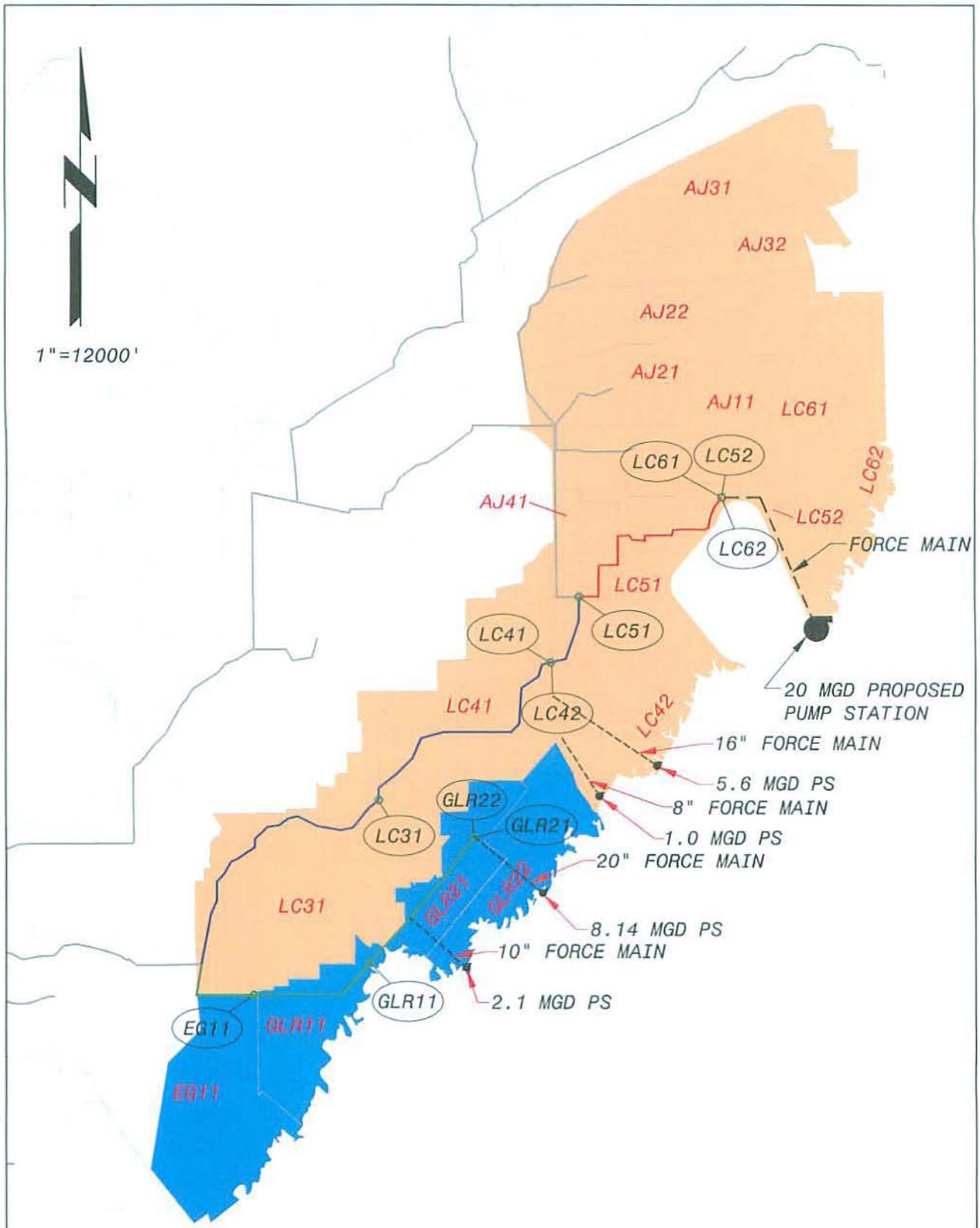
ALTERNATIVE GRANT LINE ROAD INTERCEPTOR
AND REVISED LAGUNA CREEK INTERCEPTOR
SECTION 5

FIGURE 15

B5065
FB5000

Appendix B:

SRCSD Master Plan 2000 - Laguna Creek Interceptor Sheds, Figure 4



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BLACK & VEATCH Corporation	MASTER PLAN 2000	06/05/2002
	LAGUNA CREEK & GRANT LINE ROAD INTERCEPTOR REVISED BASIN LOADING POINTS	FIGURE 4

A50005
FA5008

Appendix C:

CSD – 1 Sewerage Facilities Expansion Master Plan 2006 Update
LC Upper Laguna Creek Trunk Shed

CSD-1 SEWERAGE FACILITIES EXPANSION MASTER PLAN
2006 UPDATE

LC UPPER LAGUNA CREEK TRUNK SHED

Area Description

The LC Upper Laguna Creek Trunk Shed is located east of Sunrise Boulevard and west of the Kiefer landfill. The majority of the shed is located west of Grant Line Road. The trunk shed includes the Sunrise Douglas 2 Specific Plan area, expected to start developing within the 2011 to 2020. Areas south of Jackson Road and east of Grant Line Road are not anticipated to start developing before 2020.

Trunk System Facilities

The Sunrise Douglas 2 area would be served by two major trunk sewers (Trunks LCK and LCJ) which would flow from east to west. The area south of Jackson Road and east of Grant Line Road would be served by trunk sewers extending south on Sunrise Boulevard (Trunk LCY) and east on Jackson Road (Trunk LCZ). Most of the trunk sewers in this trunk shed would connect to Section 5 of the Laguna Creek Interceptor; Trunk LCY would connect to the upper end of Section 4 of the interceptor.

The Laguna Creek Interceptor Section 5 is not anticipated to be on line until after year 2020. Therefore interim trunk facilities would be required to serve the development in the Sunrise Douglas 2 area that occurs before that time. The interim solution would be to pump wastewater north on Sunrise Boulevard to the upstream end of the Mather Interceptor.

Trunk Projects

Four trunk projects are identified for this trunk shed, as shown in the table below.

Project ID	Diam. (in.)	Length (ft.)	Phase	Estimated Construction Cost ($)	Estimated Capital Cost ($)
LCJ	15-18	3,710	2011-2020	1,678,793	2,098,000
LCK	15-33	20,490	2011-2020	11,170,950	13,964,000
LCY	15-24	8,150	After 2020	4,908,750	6,136,000
LCZ	15-24	7,950	After 2020	5,119,931	6,400,000

Attachments

- Trunk shed map showing proposed trunk sewers, sizes, model manhole ID numbers, and sewersheds.
- Project map showing trunk projects and interim facilities (if needed).
- Trunk shed ESD projections by sewershed.
- Sewershed load manholes.
- Trunk project cost estimates.

LC Upper Laguna Creek
Sewershed Load Manholes and Land Use Projections

		2005				Buildout		
Sewershed	Load Manhole	Contributing Area (ac)	ESDs	ESD/A (ESD/ac)	% Buildout	Contributing Area (ac)	ESDs	ESD/A (ESD/ac)
Shed-067067017	067067017	0.0	0	-	0	175.1	1017	5.8
Shed-LCJ010	LCJ010	0.0	0	-	0	366.2	2197	6.0
Shed-LCJ020	LCJ020	0.0	0	-	0	120.0	720	6.0
Shed-LCJ030	LCJ030	0.0	0	-	0	210.8	1265	6.0
Shed-LCJ910	LCJ910	0.0	0	-	0	191.1	1147	6.0
Shed-LCK020	LCK020	0.0	0	-	0	381.5	2288	6.0
Shed-LCK030	LCK030	0.0	0	-	0	47.4	284	6.0
Shed-LCK031	LCK031	0.0	0	-	0	144.0	862	6.0
Shed-LCK040	LCK040	0.0	0	-	0	94.9	568	6.0
Shed-LCK060	LCK060	0.0	0	-	0	20.8	124	6.0
Shed-LCK090	LCK090	0.0	0	-	0	20.0	119	6.0
Shed-LCK091	LCK091	0.0	0	-	0	165.6	991	6.0
Shed-LCK120	LCK120	0.0	0	-	0	214.1	1283	6.0
Shed-LCK130	LCK130	0.0	0	-	0	20.5	123	6.0
Shed-LCK140	LCK140	0.0	0	-	0	76.3	456	6.0
Shed-LCK150	LCK150	0.0	0	-	0	54.5	326	6.0
Shed-LCK151	LCK151	0.0	0	-	0	196.9	1180	6.0
Shed-LCK160	LCK160	0.0	0	-	0	55.4	332	6.0
Shed-LCK180	LCK180	0.0	0	-	0	50.7	304	6.0
Shed-LCK181	LCK181	0.0	0	-	0	63.9	383	6.0
Shed-LCK182	LCK182	0.0	0	-	0	76.9	460	6.0
Shed-LCK183	LCK183	0.0	0	-	0	241.4	1448	6.0
Shed-LCK190	LCK190	0.0	0	-	0	46.4	278	6.0
Shed-LCK200	LCK200	0.0	0	-	0	17.7	106	6.0
Shed-LCK220	LCK220	0.0	0	-	0	48.7	292	6.0
Shed-LCK230	LCK230	0.0	0	-	0	26.0	155	6.0
Shed-LCK250	LCK250	0.0	0	-	0	153.7	920	6.0
Shed-LCY010	LCY010	0.0	0	-	0	243.8	1463	6.0
Shed-LCY030	LCY030	0.0	0	-	0	234.5	1407	6.0
Shed-LCY040	LCY040	0.0	0	-	0	191.9	1151	6.0
Shed-LCY050	LCY050	0.0	0	-	0	234.8	1409	6.0
Shed-LCZ020	LCZ020	0.0	0	-	0	89.4	537	6.0
Shed-LCZ030	LCZ030	0.0	0	-	0	175.2	1051	6.0
Shed-LCZ050	LCZ050	0.0	0	-	0	221.5	1329	6.0
Shed-LCZ060	LCZ060	0.0	0	-	0	137.8	827	6.0
Shed-LCZ110	LCZ110	0.0	0	-	0	232.8	1397	6.0
Total		0.0	0	-	0	5042.2	30199	6.0

LC Upper Laguna Creek.
Trunk Sewer Data and Model Results
Buildout 10-Year Design Storm

Link ID	US Manhole	DS Manhole	Link Type	Diameter (in)	Length (ft)	US Rim Elev. (ft)	US Invert (ft)	DS Rim Elev. (ft)	DS Invert (ft)	Slope, %	Full Capacity (mgd)	Peak Flow (mgd)	% Full Capacity	DS d/D
067067015.3	067067015	LC5130	Pipe	12.0	560.5	136.100	117.750	129.987	112.730	0.896	2.18	0.7365	34	0.4
LCJ010.1	LCJ010	LC5040	Pipe	18.0	2759.2	127.001	106.932	116.995	97.001	0.360	4.07	2.9880	73	0.6
LCJ020.1	LCJ020	LCJ010	Pipe	15.0	951.4	129.987	110.230	127.001	107.182	0.320	2.37	1.4198	60	0.6
LCJ030.1	LCJ030	LCJ020	Pipe	12.0	698.8	131.988	112.497	129.987	110.479	0.289	1.24	0.9055	73	0.5
LCJ910.1	LCJ910	LC5040	Pipe	12.0	98.4	116.995	95.322	116.995	95.079	0.247	1.15	0.8220	71	0.5
LCK010.1	LCK010	LC5070	Pipe	33.0	354.9	128.000	107.300	129.987	97.360	2.801	57.27	9.2348	16	0.3
LCK020.1	LCK020	LCK010	Pipe	33.0	1150.0	124.000	109.200	128.000	107.300	0.165	13.91	9.2348	66	0.5
LCK030.1	LCK030	LCK020	Pipe	30.0	700.0	126.000	110.600	124.000	109.200	0.200	11.87	7.6917	65	0.7
LCK031.1	LCK031	LCK030	Pipe	12.0	440.0	124.000	113.090	126.000	112.100	0.225	1.09	0.6171	57	0.4
LCK040.1	LCK040	LCK030	Pipe	30.0	1240.0	128.000	113.000	126.000	110.600	0.194	11.68	6.9153	59	0.6
LCK050.1	LCK050	LCK040	Pipe	30.0	690.0	130.100	115.250	128.000	113.000	0.326	15.16	6.5312	43	0.6
LCK060.1	LCK060	LCK050	Pipe	27.0	1290.0	135.000	118.000	130.100	115.500	0.194	8.82	6.5319	74	0.5
LCK070.1	LCK070	LCK060	Pipe	27.0	930.0	144.000	119.000	135.000	118.000	0.108	6.57	6.4480	98	0.6
LCK080.1	LCK080	LCK070	Pipe	27.0	420.0	132.000	119.800	144.000	119.000	0.190	8.75	6.4505	74	0.8
LCK090.1	LCK090	LCK080	Pipe	27.0	900.0	161.000	124.850	132.000	119.800	0.561	15.01	6.4535	43	0.7
LCK091.1	LCK091	LCK090	Pipe	12.0	1170.0	138.200	128.440	161.000	126.100	0.200	1.03	0.7076	69	0.4
LCK100.1	LCK100	LCK090	Pipe	27.0	1310.0	163.000	130.700	161.000	126.100	0.351	11.87	5.6772	48	0.5
LCK120.1	LCK120	LCK100	Pipe	27.0	590.0	162.000	132.200	163.000	130.700	0.254	10.10	5.6778	56	0.5
LCK130.1	LCK130	LCK120	Pipe	24.0	1380.0	150.000	133.700	162.000	132.200	0.109	4.83	4.7866	99	0.6
LCK140.1	LCK140	LCK130	Pipe	24.0	600.0	153.000	135.200	150.000	133.700	0.250	7.32	4.7046	64	0.8
LCK150.1	LCK150	LCK140	Pipe	24.0	1315.0	158.000	147.100	153.000	135.200	0.905	13.92	4.3888	32	0.6
LCK151.1	LCK151	LCK150	Pipe	12.0	590.0	162.000	149.500	158.000	148.100	0.237	1.12	0.8451	75	0.5
LCK160.1	LCK160	LCK150	Pipe	21.0	616.0	163.000	149.900	158.000	148.100	0.292	5.54	3.3267	60	0.5
LCK170.1	LCK170	LCK160	Pipe	21.0	475.0	160.000	151.400	163.000	149.900	0.316	5.76	3.0930	54	0.6
LCK180.1	LCK180	LCK170	Pipe	21.0	575.0	166.000	154.900	160.000	151.400	0.609	8.00	3.0935	39	0.5
LCK181.1	LCK181	LCK180	Pipe	15.0	1320.0	188.000	163.300	166.000	155.900	0.561	3.13	1.6356	52	0.5
LCK182.1	LCK182	LCK181	Pipe	15.0	1063.0	190.000	171.700	188.000	163.300	0.790	3.72	1.3633	37	0.5
LCK183.1	LCK183	LCK182	Pipe	15.0	1862.0	195.000	176.000	190.000	171.700	0.231	2.01	1.0353	52	0.4
LCK190.1	LCK190	LCK180	Pipe	15.0	993.0	166.000	157.200	166.000	155.400	0.181	1.78	1.2467	70	0.4
LCK200.1	LCK200	LCK190	Pipe	15.0	700.0	174.000	162.800	166.000	157.200	0.800	3.74	1.0513	28	0.6
LCK210.1	LCK210	LCK200	Pipe	15.0	1000.0	178.000	166.800	174.000	162.800	0.400	2.64	0.9762	37	0.4
LCK220.1	LCK220	LCK210	Pipe	15.0	350.0	180.000	168.600	178.000	166.800	0.514	3.00	0.9764	33	0.4
LCK230.1	LCK230	LCK220	Pipe	15.0	800.0	180.000	170.000	180.000	168.600	0.175	1.75	0.7686	44	0.4
LCK240.1	LCK240	LCK230	Pipe	12.0	612.0	184.000	174.900	180.000	170.000	0.801	2.06	0.6591	32	0.6
LCK250.1	LCK250	LCK240	Pipe	12.0	682.0	206.000	197.400	184.000	174.900	3.299	4.19	0.6598	16	0.4
LCY010.1	LCY010	LC4230	Pipe	24.0	1400.9	112.992	91.749	114.009	90.249	0.107	4.80	3.8141	79	0.4
LCY020.1	LCY020	LCY010	Pipe	21.0	2250.7	108.990	94.701	112.992	92.001	0.120	3.54	2.8029	79	0.6
LCY030.1	LCY030	LCY020	Pipe	21.0	1499.3	110.991	96.800	108.990	94.701	0.140	3.84	2.8128	73	0.7
LCY040.1	LCY040	LCY030	Pipe	18.0	1499.3	112.992	99.150	110.991	97.051	0.140	2.54	1.8223	72	0.6
LCY050.1	LCY050	LCY040	Pipe	15.0	1499.3	110.007	102.001	112.992	99.400	0.174	1.74	1.0057	58	0.6
LCZ010.1	LCZ010	LC5015	Pipe	24.0	1801.2	139.993	115.299	114.993	105.000	0.572	11.09	3.6290	33	0.4
LCZ020.1	LCZ020	LCZ010	Pipe	24.0	1499.3	139.993	117.001	139.993	115.299	0.114	4.94	3.6296	73	0.4
LCZ030.1	LCZ030	LCZ020	Pipe	21.0	1499.3	150.000	119.049	139.993	117.251	0.120	3.54	3.2564	92	0.6
LCZ040.1	LCZ040	LCZ030	Pipe	15.0	1348.4	139.993	121.850	150.000	119.551	0.171	1.73	1.5320	89	0.7
LCZ050.1	LCZ050	LCZ040	Pipe	15.0	1801.2	152.001	124.951	139.993	121.850	0.172	1.73	1.5324	89	0.7
LCZ060.1	LCZ060	LCZ050	Pipe	12.0	1801.2	150.000	129.199	152.001	125.200	0.222	1.09	0.5904	54	0.7
LCZ110.1	LCZ110	LCZ030	Pipe	12.0	1499.3	139.993	122.851	150.000	119.551	0.220	1.08	0.9921	92	0.8

TRUNK SEWER SYSTEM PROJECT DESCRIPTION

PROJECT ID:.....	LCJ TRUNK SHED.....LC Upper Laguna Creek
LOCATION:.....	North of Jackson Rd., south of Kiefer Rd., east of Sunrise Blvd., and west of Grant Line Rd. Connects to Laguna Creek Interceptor at MH LC5040.
BRIEF PROJECT DESCRIPTION:...	950 feet of 15-inch pipe and 2760 feet of 18-inch pipe.
MODEL REFERENCE:.....	LCJ020 to LC5040
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.4 mgd (upstream) to 3.0 mgd (downstream).
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Laguna Creek Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST		COST
Baseline Pipe Construction Cost						
LCJ020 to LCJ010	15	16-20	950	$ 240		$228,000
LCJ010 to LC5040	18	20-24	2760	$ 290		$800,400
Goetechnical Factors						
Cobble construction factor (undeveloped)		20% of baseline pipe cost			$	205,680
Structures						
Interceptor junction structure			1	$ 45,000	$	45,000
Subtotal					$	1,279,080
Mobilization and Demobilization				5%	$	63,954
Construction Cost Subtotal					$	1,343,034
Contingencies for Unknown Subsurface Conditions				25%	$	335,759
Construction Cost Total					$	1,678,793
Engineering, Administration, and Legal Costs				25%	$	419,698
Capital Improvement Cost Total					$	2,098,491
				rounded	$	2,098,000

TRUNK SEWER SYSTEM PROJECT DESCRIPTION

PROJECT ID:.....	LCK TRUNK SHED.....LC Upper Laguna Creek
LOCATION:.....	West of Grant Line Rd. parallel and to north of Kiefer Blvd. Along Jaeger Rd. to Kiefer Blvd. Along Kiefer Blvd. between Jaeger Rd. and Country Garden Dr. South of Kiefer Blvd. and parallel to Sunrise Blvd. Connects to Laguna Creek Interceptor at MH LC5070.
BRIEF PROJECT DESCRIPTION:...	5940 feet of 15-inch pipe, 1670 feet of 21-inch pipe, 3300 feet of 24-inch pipe, 5440 feet of 27-inch pipe, 2630 feet of 30-inch pipe, and 1510 feet of 33-inch pipe.
MODEL REFERENCE:.....	LCK200 to LCK180, LCK183 to LCK 180 and LCK180 to LC 5070.
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.0 mgd (upstream) to 9.2 mgd (downstream).
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Laguna Creek Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST	COST
Baseline Pipe Construction Cost					
LCK200 to LCK180	15	<16	1700	$ 220	$374,000
LCK183 to LCK 182	15	16-20	1860	$ 240	$446,400
LCK182 to LCK181	15	20-24	1060	$ 250	$265,000
LCK181 to LCK180	15	16-20	1320	$ 240	$316,800
LCK180 to LCK150	21	<16	1670	$ 280	$467,600
LCK150 to LCK140	24	<16	1320	$ 310	$409,200
LCK140 to LCK130	24	16-20	600	$ 330	$198,000
LCK130 to LCK120	24	20-24	1380	$ 350	$483,000
LCK120 to LCK080	27	>24	2800	$ 420	$1,176,000
LCK080 to LCK070	27	16-20	420	$ 360	$151,200
LCK070 to LCK060	27	20-24	930	$ 390	$362,700
LCK060 to LCK050	27	<16	1290	$ 340	$438,600
LCK050 to LCK020	30	<16	2630	$ 370	$973,100
LCK020 to LCK010	33	16-20	1150	$ 430	$494,500
LCK010 to LC5070	33	>24	360	$ 490	$176,400
Keifer Blvd. crossing (27" direct jack)	27	microtunnel	200	$ 961	$192,200
Jacking pits			1	$ 70,000	$70,000
Receiving pits			1	$ 45,000	$45,000
Goetechnical Factors					
Cobble construction factor (undeveloped)		20% of baseline pipe cost			$ 1,346,500
Surface Restoration					
Creek restoration			200	$ 400	$80,000
Structures					
Interceptor junction structure			1	$ 45,000	$ 45,000
Subtotal					$ 8,511,200
Mobilization and Demobilization				5%	$ 425,560
Construction Cost Subtotal					**$ 8,936,760**
Contingencies for Unknown Subsurface Conditions				25%	$ 2,234,190
Construction Cost Total					**$ 11,170,950**
Engineering, Administration, and Legal Costs				25%	$ 2,792,738
Capital Improvement Cost Total					$ 13,963,688
				rounded	$ 13,964,000

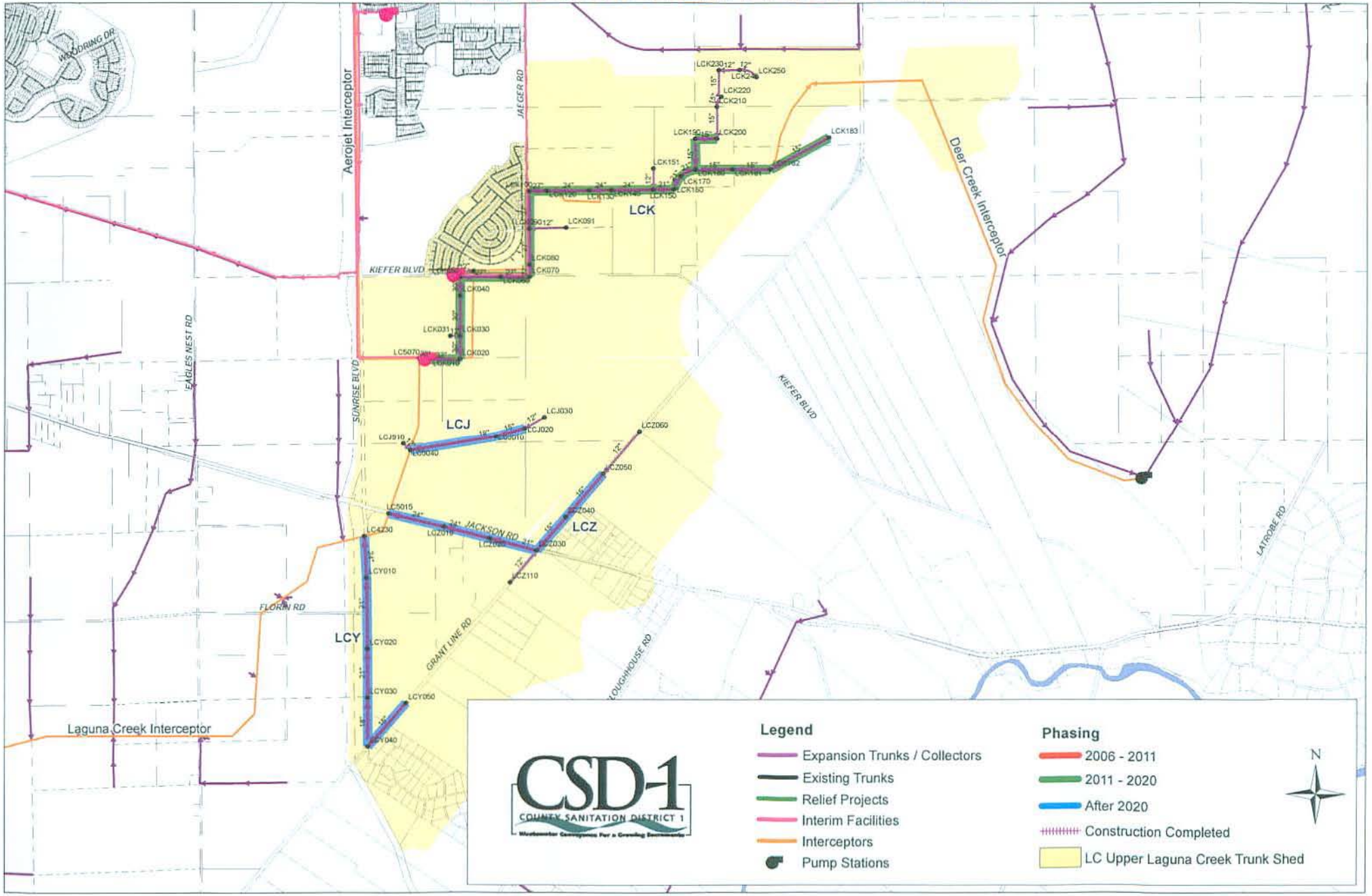
TRUNK SEWER SYSTEM PROJECT DESCRIPTION	
PROJECT ID:.....	LCY TRUNK SHED.....LC Upper Laguna Creek
LOCATION:.....	Along Grant Line Rd. to Sunrise Blvd. Along Sunrise Blvd. between Grant Line Rd. and Jackson Rd. Connects to Laguna Creek Interceptor at MH LC4230.
BRIEF PROJECT DESCRIPTION:...	1500 feet of 15-inch pipe, 1500 feet of 18-inch pipe, 3750 feet of 21-inch pipe, and 1400 feet of 24-inch pipe.
MODEL REFERENCE:.....	LCY050 to LC4230
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.0 mgd (upstream) to 3.8 mgd (downstream)
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Laguna Creek Interceptor Section 4.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST		COST
Baseline Pipe Construction Cost						
LCY050 to LCY040	15	<16	1500	$ 220		$330,000
LCY040 to LCY030	18	<16	1500	$ 250		$375,000
LCY030 to LCY020	21	<16	1500	$ 280		$420,000
LCY020 to LCY010	21	16-20	2250	$ 300		$675,000
LCY010 to LC4230	24	20-24	1400	$ 350		$490,000
Geotechnical Factors						
Cobble construction factor (undeveloped)	20% of baseline pipe cost				$	458,000
Traffic and Productivity Factors						
Increased Traffic Contol	5% of baseline pipe costs					$114,500
Congested traffic or utility corridor factor	15% of baseline pipe costs					$343,500
Surface Restoration						
Pavement Restoration		15	8150	$ 4		$489,000
Structures						
Interceptor sewer junction structure			1	$ 45,000	$	45,000
Subtotal					$	3,740,000
Mobilization and Demobilization				5%	$	187,000
Construction Cost Subtotal					**$**	**3,927,000**
Contingencies for Unknown Subsurface Conditions				25%	$	981,750
Construction Cost Total					**$**	**4,908,750**
Engineering, Administration, and Legal Costs				25%	$	1,227,188
Capital Improvement Cost Total					$	6,135,938
				rounded	**$**	**6,136,000**

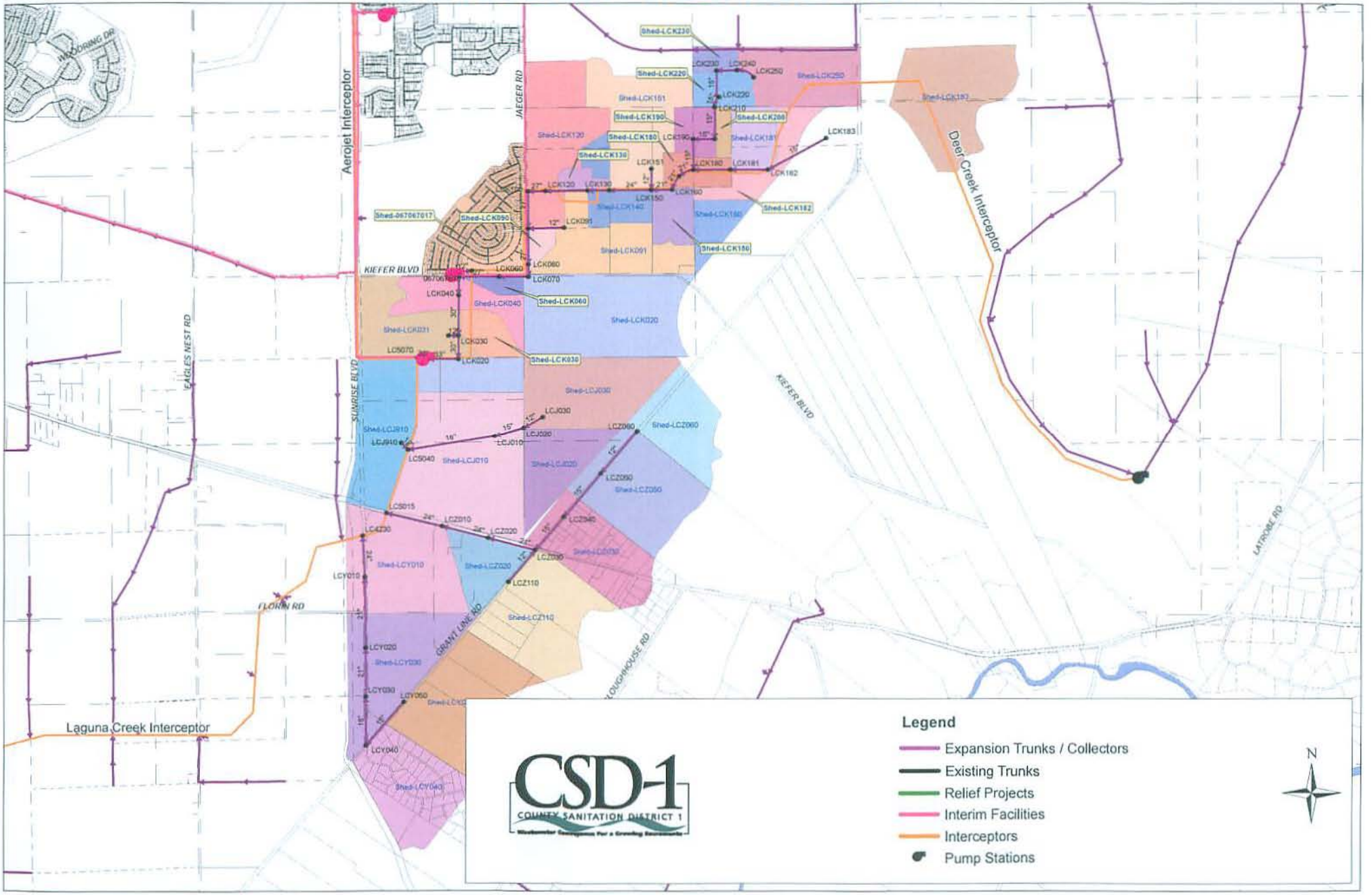
TRUNK SEWER SYSTEM PROJECT DESCRIPTION	
PROJECT ID:.....	LCZ TRUNK SHED.....LC Upper Laguna Creek
LOCATION:.....	Along Jackson Rd. between Grant Line Rd. and Sunrise Blvd.
BRIEF PROJECT DESCRIPTION:...	3150 feet of 15-inch pipe, 1500 feet of 21-inch pipe, and 3300 feet of 24-inch pipe.
MODEL REFERENCE:.....	LCZ050 to LC5015
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.5 mgd (upstream) to 3.6 mgd (downstream)
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Laguna Creek Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST	COST
Baseline Pipe Construction Cost					
LCZ050 to LCZ040	15	20-24	1800	$ 250	$450,000
LCZ040 to LCZ030	15	>24	1350	$ 270	$364,500
LCZ030 to LCZ020	21	20-24	1500	$ 320	$480,000
LCZ020 to LCZ010	24	20-24	1500	$ 350	$525,000
LCZ010 to LC5015	24	16-20	1800	$ 330	$594,000
Geotechnical Factors					
Cobble construction factor (undeveloped)	20% of baseline pipe cost				$ 482,700
Traffic and Productivity Factors					
Increased Traffic Contol	5% of baseline pipe costs				$120,675
Congested traffic or utility corridor factor	15% of baseline pipe costs				$362,025
Surface Restoration					
Pavement Restoration		15	7950	$ 4	$477,000
Structures					
Interceptor sewer junction structure			1	$ 45,000	$ 45,000
Subtotal					$ 3,900,900
Mobilization and Demobilization				5%	$ 195,045
Construction Cost Subtotal					**$ 4,095,945**
Contingencies for Unknown Subsurface Conditions				25%	$ 1,023,986
Construction Cost Total					**$ 5,119,931**
Engineering, Administration, and Legal Costs				25%	$ 1,279,983
Capital Improvement Cost Total					$ 6,399,914
				rounded	**$ 6,400,000**

LC UPPER LAGUNA CREEK PROJECT PHASING



LC UPPER LAGUNA CREEK TRUNK SHED



Appendix D:

CSD – 1 Sewerage Facilities Expansion Master Plan 2006 Update
DC Upper Deer Creek Trunk Shed

CSD-1 SEWERAGE FACILITIES EXPANSION MASTER PLAN
2006 UPDATE

DC UPPER DEER CREEK TRUNK SHED

Area Description

The DC Upper Deer Creek Trunk Shed is located between the ridgeline east of Grant Line Road and the Urban Services Boundary, north of the Kiefer Landfill. This entire trunk shed is not anticipated to develop until after 2020.

Trunk System Facilities

The trunk shed would be served by two parallel trunk systems. Trunks LCO and LCQ would serve the western portion of the trunk shed, and trunks LCP, LCN, and LCM would serve the eastern portion of the trunk shed. These trunks would connect to the upstream end of the realigned Deer Creek Interceptor.

All of Trunk DCX and most of Trunk DCY would be located in the Deer Creek and Coyote Creek Valleys, outside of the Urban Services Boundary. The Deer Creek Interceptor is anticipated to be on line by the time the trunk facilities in this trunk shed are required. Therefore the need for interim facilities is not anticipated within the planning period of this Master Plan.

Trunk Projects

Five trunk projects are identified for this trunk shed, as shown in the table below.

Project ID	Diam. (in.)	Length (ft.)	Phase	Estimated Construction Cost ($)	Estimated Capital Cost ($)
LCM	27-36	8,070	After 2020	3,579,450	4,474,000
LCN	18-27	19,200	After 2020	7,614,600	9,518,000
LCO	12-24	8,840	After 2020	3,173,888	3,967,000
LCP	10-18	8,650	After 2020	2,195,944	2,745,000
LCQ	24-30	17,000	After 2020	8,244,338	10,305,000

Attachments

- Trunk shed map showing proposed trunk sewers, sizes, model manhole ID numbers, and sewersheds.
- Project map showing trunk projects.
- Trunk shed ESD projections by sewershed.
- Sewershed load manholes.
- Trunk project cost estimates.

DC Upper Deer Creek
Sewershed Load Manholes and Land Use Projections

		2005				Buildout		
Sewershed	Load Manhole	Contributing Area (ac)	ESDs	ESD/A (ESD/ac)	% Buildout	Contributing Area (ac)	ESDs	ESD/A (ESD/ac)
Shed-LCM050	LCM050	0.0	0	-	0	166.1	997	6.0
Shed-LCM060	LCM060	0.0	0	-	0	42.9	257	6.0
Shed-LCM070	LCM070	0.0	0	-	0	77.2	463	6.0
Shed-LCM080	LCM080	0.0	0	-	0	69.2	415	6.0
Shed-LCN010	LCN010	0.0	0	-	0	343.2	2059	6.0
Shed-LCN030	LCN030	0.0	0	-	0	133.0	798	6.0
Shed-LCN050	LCN050	0.0	0	-	0	521.9	3131	6.0
Shed-LCN120	LCN120	0.0	0	-	0	144.4	866	6.0
Shed-LCO010	LCO010	0.0	0	-	0	260.0	1561	6.0
Shed-LCO020	LCO020	0.0	0	-	0	180.3	1082	6.0
Shed-LCO030	LCO030	0.0	0	-	0	237.8	1427	6.0
Shed-LCO040	LCO040	0.0	0	-	0	237.2	1423	6.0
Shed-LCO060	LCO060	0.0	0	-	0	89.7	538	6.0
Shed-LCO070	LCO070	0.0	0	-	0	128.4	770	6.0
Shed-LCO080	LCO080	0.0	0	-	0	142.3	854	6.0
Shed-LCO090	LCO090	0.0	0	-	0	94.5	567	6.0
Shed-LCO100	LCO100	0.0	0	-	0	78.7	472	6.0
Shed-LCO110	LCO110	0.0	0	-	0	118.9	714	6.0
Shed-LCP020	LCP020	0.0	0	-	0	194.2	1165	6.0
Shed-LCP030	LCP030	0.0	0	-	0	87.1	523	6.0
Shed-LCP040	LCP040	0.0	0	-	0	63.0	378	6.0
Shed-LCP070	LCP070	0.0	0	-	0	163.0	978	6.0
Shed-LCP080	LCP080	0.0	0	-	0	99.8	599	6.0
Shed-LCP090	LCP090	0.0	0	-	0	138.6	832	6.0
Shed-LCQ020	LCQ020	0.0	0	-	0	152.9	917	6.0
Shed-LCQ050	LCQ050	0.0	0	-	0	161.8	971	6.0
Shed-LCQ070	LCQ070	0.0	0	-	0	243.5	1461	6.0
Shed-LCQ090	LCQ090	0.0	0	-	0	146.2	878	6.0
Shed-LCQ120	LCQ120	0.0	0	-	0	176.7	1060	6.0
Shed-LCQ130	LCQ130	0.0	0	-	0	43.2	259	6.0
Shed-LCQ910	LCQ910	0.0	0	-	0	163.6	982	6.0
Total		0.0	0	-	0	4899.4	29397	6.0

DC Upper Deer Creek
Trunk Sewer Data and Model Results
Buildout 10-Year Design Storm

Link ID	US Manhole	DS Manhole	Link Type	Diameter (in)	Length (ft)	US Rim Elev. (ft)	US Invert (ft)	DS Rim Elev. (ft)	DS Invert (ft)	Slope, %	Full Capacity (mgd)	Peak Flow (mgd)	% Full Capacity	DS d/D
LCM020.1	LCM020	LCPS1	Pipe	36.0	60.4	102.986	89.138	103.000	88.987	0.250	21.58	20.1457	93	0.6
LCM030.1	LCM030	LCM020	Pipe	27.0	1945.3	108.005	94.751	102.986	89.888	0.250	10.02	9.1286	91	0.6
LCM040.1	LCM040	LCM030	Pipe	27.0	2030.8	112.992	99.826	108.005	94.751	0.250	10.03	8.5722	85	0.8
LCM050.1	LCM050	LCM040	Pipe	27.0	1968.5	122.014	105.741	112.992	99.826	0.300	10.99	8.5731	78	0.7
LCM060.1	LCM060	LCM050	Pipe	27.0	1968.5	125.000	110.666	122.014	105.741	0.250	10.03	7.9358	79	0.7
LCM070.1	LCM070	LCM030	Pipe	8.0	1968.5	129.987	116.460	108.005	96.749	1.001	0.78	0.6279	81	0.7
LCM080.1	LCM080	LCM070	Pipe	8.0	1181.1	145.013	131.401	129.987	116.460	1.265	0.88	0.2972	34	0.7
LCN010.1	LCN010	LCM060	Pipe	27.0	2860.9	131.004	116.093	125.000	110.666	0.190	8.73	7.7717	89	0.7
LCN020.1	LCN020	LCN010	Pipe	27.0	1860.2	131.988	118.514	131.004	116.093	0.130	7.24	6.4269	89	0.7
LCN030.1	LCN030	LCN020	Pipe	27.0	1909.4	135.007	120.994	131.988	118.514	0.130	7.23	6.4263	89	0.7
LCN040.1	LCN040	LCN030	Pipe	27.0	2201.4	141.995	123.855	135.007	120.994	0.130	7.23	5.8996	82	0.7
LCN050.1	LCN050	LCN040	Pipe	27.0	1811.0	139.993	126.207	141.995	123.855	0.130	7.23	5.9034	82	0.7
LCN060.1	LCN060	LCN050	Pipe	18.0	1738.8	147.999	135.656	139.993	126.955	0.500	4.80	3.7869	79	0.6
LCN070.1	LCN070	LCN060	Pipe	18.0	479.0	152.986	139.029	147.999	135.656	0.704	5.70	3.7889	66	0.7
LCN080.1	LCN080	LCN070	Pipe	18.0	1049.9	160.007	146.381	152.986	139.029	0.700	5.68	3.7892	67	0.6
LCN090.1	LCN090	LCN080	Pipe	18.0	1289.4	170.013	155.430	160.007	146.381	0.702	5.69	3.7899	67	0.6
LCN100.1	LCN100	LCN090	Pipe	18.0	1601.0	179.987	166.660	170.013	155.430	0.701	5.69	3.7908	67	0.6
LCN110.1	LCN110	LCN100	Pipe	18.0	1161.4	185.007	174.800	179.987	166.660	0.701	5.68	3.7919	67	0.6
LCN120.1	LCN120	LCN110	Pipe	18.0	1240.2	200.000	183.451	185.007	174.800	0.698	5.67	3.7928	67	0.6
LCO010.1	LCO010	LCQ100	Pipe	24.0	1801.2	170.013	152.726	158.005	140.679	0.669	11.99	6.6706	56	0.8
LCO020.1	LCO020	LCO010	Pipe	21.0	1909.4	179.987	162.884	170.013	152.976	0.519	7.37	5.5734	76	0.6
LCO030.1	LCO030	LCO020	Pipe	21.0	1958.7	185.007	168.747	179.987	162.884	0.299	5.60	4.8093	86	0.7
LCO040.1	LCO040	LCO030	Pipe	15.0	2030.8	200.000	185.518	185.007	169.249	0.801	3.74	3.1913	85	0.7
LCO050.1	LCO050	LCO040	Pipe	12.0	1138.5	210.007	196.047	200.000	185.771	0.903	2.19	1.7801	81	0.7
LCO060.1	LCO060	LCO050	Pipe	10.0	1509.2	220.013	206.631	210.007	196.220	0.690	1.18	0.9345	79	0.7
LCO070.1	LCO070	LCO060	Pipe	8.0	810.4	233.005	223.123	220.013	206.965	1.994	1.10	0.5517	50	0.5
LCO080.1	LCO080	LCO030	Pipe	8.0	2080.1	225.000	216.621	185.007	175.000	2.001	1.10	0.6113	56	0.5
LCO090.1	LCO090	LCO040	Pipe	8.0	2139.1	235.007	223.379	200.000	187.001	1.701	1.02	0.4058	40	0.5
LCO100.1	LCO100	LCO050	Pipe	8.0	1899.6	250.000	225.000	210.007	196.380	1.507	0.96	0.8470	88	0.7
LCO110.1	LCO110	LCO100	Pipe	8.0	1400.9	285.007	260.000	250.000	225.000	2.498	1.23	0.5111	42	0.8
LCP020.1	LCP020	LCP030	Pipe	8.0	331.4	245.013	229.659	235.007	223.041	1.997	1.10	0.8348	76	0.7
LCP030.1	LCP030	LCP040	Pipe	10.0	1118.8	235.007	222.871	225.000	212.910	0.890	1.34	1.2053	90	0.7
LCP040.1	LCP040	LCP050	Pipe	10.0	1328.7	225.000	212.910	200.000	187.661	1.900	1.95	1.4740	76	0.7
LCP050.1	LCP050	LCN120	Pipe	18.0	1361.5	200.000	186.991	200.000	183.451	0.260	3.46	3.1857	92	0.6
LCP060.1	LCP060	LCP050	Pipe	15.0	1299.2	204.987	192.188	200.000	187.244	0.381	2.58	1.7194	67	0.7
LCP070.1	LCP070	LCP060	Pipe	12.0	1440.3	220.013	206.808	204.987	192.438	0.998	2.31	1.7223	75	0.6
LCP080.1	LCP080	LCP070	Pipe	10.0	2099.7	250.000	238.533	220.013	206.972	1.503	1.74	1.0241	59	0.6
LCP090.1	LCP090	LCP080	Pipe	8.0	1171.3	279.987	269.147	250.000	238.701	2.599	1.26	0.5959	47	0.5
LCQ020.1	LCQ020	LCM020	Pipe	30.0	98.4	102.986	93.159	102.986	92.913	0.250	13.27	11.0452	83	0.6
LCQ030.1	LCQ030	LCQ020	Pipe	30.0	3203.1	121.000	102.556	102.986	93.159	0.293	14.38	10.4528	73	0.6
LCQ040.1	LCQ040	LCQ030	Pipe	30.0	3782.9	129.987	115.000	121.000	102.556	0.329	15.22	10.4533	69	0.6
LCQ050.1	LCQ050	LCQ040	Pipe	30.0	2191.6	139.993	118.720	129.987	115.000	0.170	10.93	9.8024	90	0.6
LCQ060.1	LCQ060	LCQ050	Pipe	30.0	1768.4	139.993	121.729	139.993	118.720	0.170	10.95	9.1530	84	0.7
LCQ070.1	LCQ070	LCQ060	Pipe	30.0	1250.0	139.993	123.848	139.993	121.729	0.170	10.93	9.1542	84	0.7
LCQ080.1	LCQ080	LCQ070	Pipe	24.0	1630.6	147.014	130.558	139.993	124.350	0.381	9.05	8.1674	90	0.6
LCQ090.1	LCQ090	LCQ080	Pipe	24.0	1879.9	156.004	137.694	147.014	130.558	0.380	9.03	8.1732	91	0.8
LCQ100.1	LCQ100	LCQ090	Pipe	24.0	1200.8	158.005	140.682	156.004	137.694	0.249	7.32	6.6574	91	0.8
LCQ120.1	LCQ120	LCQ090	Pipe	8.0	1338.6	179.987	163.425	156.004	142.001	1.600	0.99	0.9366	95	0.8
LCQ130.1	LCQ130	LCQ120	Pipe	8.0	1440.3	200.000	186.552	179.987	163.593	1.594	0.98	0.1854	19	0.6
LCQ910.1	LCQ910	LCQ040	Pipe	10.0	98.4	129.987	117.451	129.987	117.001	0.457	0.96	0.7038	73	0.6

TRUNK SEWER SYSTEM PROJECT DESCRIPTION	
PROJECT ID:.....	LCM TRUNK SHED.....DC Upper Deer Creek
LOCATION:.....	North of Jackson Rd., east of Grant Line Rd. and northwest of Latrobe Rd.
BRIEF PROJECT DESCRIPTION:...	7910 feet of 27-inch pipe and 60 feet of 36-inch pipe.
MODEL REFERENCE:.....	LCM060 to LCPS1
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	7.9 mgd (upstream) to 20.1 mgd (downstream).
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Deer Creek Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST		COST
Baseline Pipe Construction Cost						
LCM060 to LCM020	27	<16	7910	$ 340	$	2,689,400
LCM020 to LCPS1	36	<16	60	$ 430	$	25,800
Structures						
Trunk junction structure			1	$ 12,000	$	12,000
Subtotal					$	2,727,200
Mobilization and Demobilization				5%	$	136,360
Construction Cost Subtotal					$	2,863,560
Contingencies for Unknown Subsurface Conditions				25%	$	715,890
Construction Cost Total					$	3,579,450
Engineering, Administration, and Legal Costs				25%	$	894,863
Capital Improvement Cost Total					$	4,474,313
				rounded	$	4,474,000

TRUNK SEWER SYSTEM PROJECT DESCRIPTION		
PROJECT ID:.....	LCN	TRUNK SHED.....DC Upper Deer Creek
LOCATION:.....	Located north/west of Sacramento County Boys Ranch (Boys Ranch Rd.).	
BRIEF PROJECT DESCRIPTION:...	8560 feet of 18-inch pipe and 10640 feet of 27-inch pipe.	
MODEL REFERENCE:.....	LCN120 to LCM060	
LOCATION OF CAPACITY DEFICIENCY:...	N/A	
REASON FOR PROJECT:.....	Expansion for future development	
DESIGN FLOW:.....	3.8 mgd (upstream) to 7.8 mgd (downstream).	
PERCENT FOR EXISTING FLOW:.....	0%	
PERCENT FOR FUTURE FLOW:.....	100%	
SPECIAL CONSIDERATIONS:.....	This project requires the Deer Creek Interceptor.	
ASSUMPTIONS:.....		
ALTERNATIVES:.....		

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST		COST
Baseline Pipe Construction Cost						
LCN120 to LCN050	18	<16	8560	$ 250	$	2,140,000
LCN050 to LCN040	27	<16	1810	$ 340	$	615,400
LCN040 to LCN030	27	16-20	2200	$ 360	$	792,000
LCN030 to LCM060	27	<16	6630	$ 340	$	2,254,200
Subtotal					$	5,801,600
Mobilization and Demobilization				5%	$	290,080
Construction Cost Subtotal					$	6,091,680
Contingencies for Unknown Subsurface Conditions				25%	$	1,522,920
Construction Cost Total					$	7,614,600
Engineering, Administration, and Legal Costs				25%	$	1,903,650
Capital Improvement Cost Total					$	9,518,250
				rounded	$	9,518,000

TRUNK SEWER SYSTEM PROJECT DESCRIPTION	
PROJECT ID:.....	LCO TRUNK SHED.....DC Upper Deer Creek
LOCATION:.....	East of Grant Line Rd. crossing Glory Ln.
BRIEF PROJECT DESCRIPTION:...	1140 feet of 12-inch pipe, 2030 feet of 15-inch pipe, 3870 feet of 21-inch pipe, and 1800 feet of 24-inch pipe.
MODEL REFERENCE:.....	LCO050 to LCO010
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.8 mgd (upstream) to 6.7 mgd (downstream).
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Deer Creek Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST		COST
Baseline Pipe Construction Cost						
LCO050 to LCO040	12	<16	1140	$ 190	$	216,600
LCO040 to LCO030	15	<16	2030	$ 220	$	446,600
LCO030 to LCO010	21	16-20	3870	$ 300	$	1,161,000
LCO010 to LCQ100	24	16-20	1800	$ 330	$	594,000
Subtotal					$	2,418,200
Mobilization and Demobilization				5%	$	120,910
Construction Cost Subtotal					$	2,539,110
Contingencies for Unknown Subsurface Conditions				25%	$	634,778
Construction Cost Total					$	3,173,888
Engineering, Administration, and Legal Costs				25%	$	793,472
Capital Improvement Cost Total					$	3,967,359
				rounded	$	3,967,000

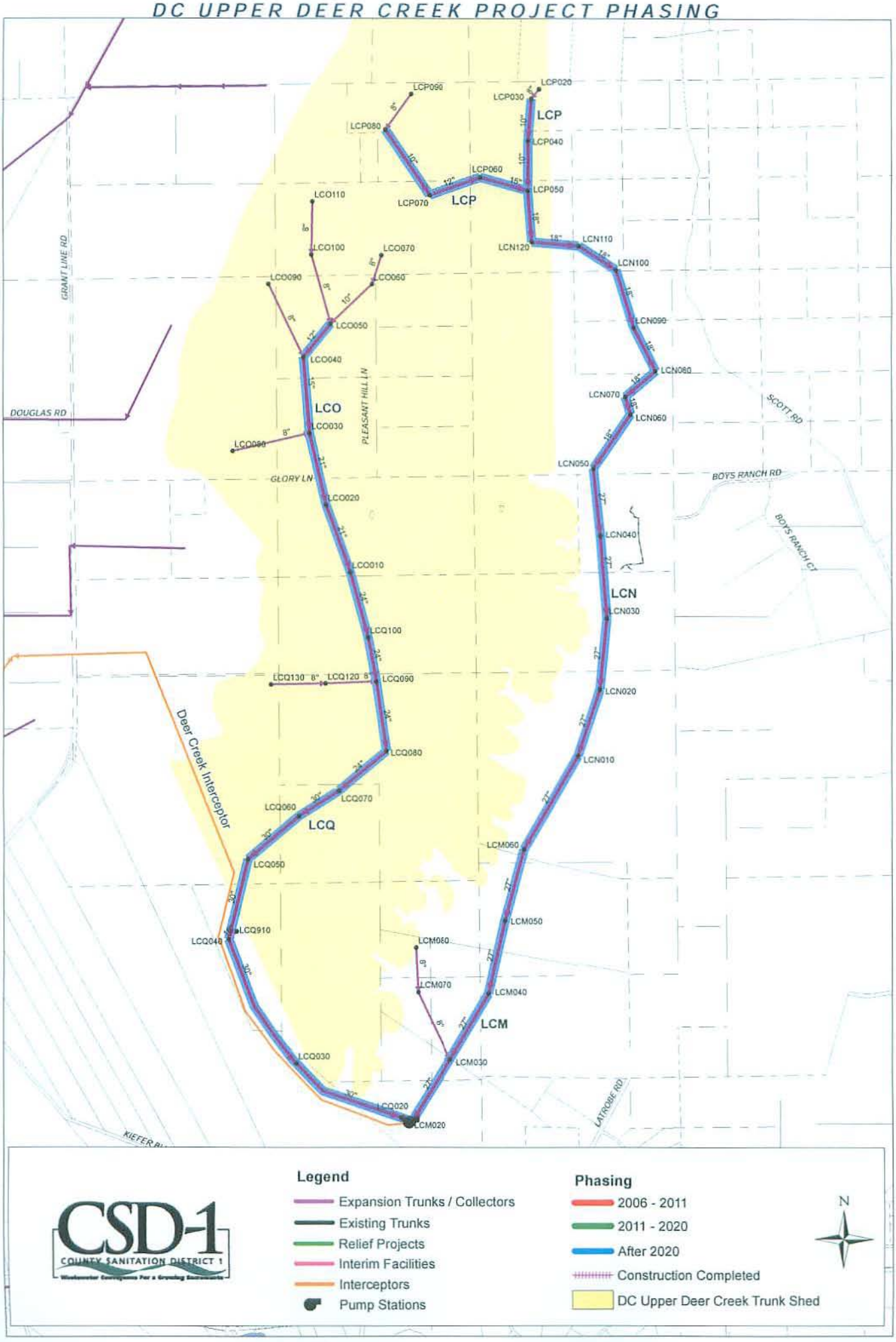
TRUNK SEWER SYSTEM PROJECT DESCRIPTION	
PROJECT ID:.....	LCP TRUNK SHED.....DC Upper Deer Creek
LOCATION:.....	Located north/west of Sacramento County Boys Ranch (Boys Ranch Rd.). East of Grantline Rd.
BRIEF PROJECT DESCRIPTION:...	4550 feet of 10-inch pipe, 1440 feet of 12-inch pipe, 1300 feet of 15-inch pipe, and 1360 feet of 18-inch pipe.
MODEL REFERENCE:.....	LCP080 to LCN120 and LCP030 to LCP050
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.0 mgd (upstream) to 3.2 mgd (downstream).
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Deer Creek Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST		COST
Baseline Pipe Construction Cost						
LCP080 to LCP070	10	<16	2100	$	170	$357,000
LCP070 to LCP060	12	<16	1440	$	190	$273,600
LCP060 to LCP050	15	<16	1300	$	220	$286,000
LCP050 to LCN120	18	<16	1360	$	250	$340,000
LCP030 to LCP050	10	<16	2450	$	170	$416,500
Subtotal						$ 1,673,100
Mobilization and Demobilization					5%	$ 83,655
Construction Cost Subtotal						$ 1,756,755
Contingencies for Unknown Subsurface Conditions					25%	$ 439,189
Construction Cost Total						$ 2,195,944
Engineering, Administration, and Legal Costs					25%	$ 548,986
Capital Improvement Cost Total						$ 2,744,930
					rounded	$ 2,745,000

TRUNK SEWER SYSTEM PROJECT DESCRIPTION	
PROJECT ID:.....	LCQ TRUNK SHED.....DC Upper Deer Creek
LOCATION:.....	East of Grantline Rd. between Glory Ln. and Kiefer Blvd.
BRIEF PROJECT DESCRIPTION:...	4710 feet of 24-inch pipe and 12290 feet of 30-inch pipe.
MODEL REFERENCE:.....	LCQ100 to LCM020
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	6.7 mgd (upstream) to 11.0 mgd (downstream)
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Deer Creek Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST	COST
Baseline Pipe Construction Cost					
LCQ100 to LCQ070	24	16-20	4710	$ 330	$1,554,300
LCQ070 to LCQ030	30	16-20	8990	$ 390	$3,506,100
LCQ030 to LCM020	30	<16	3300	$ 370	$1,221,000
Subtotal					$ 6,281,400
Mobilization and Demobilization				5%	$ 314,070
Construction Cost Subtotal					$ 6,595,470
Contingencies for Unknown Subsurface Conditions				25%	$ 1,648,868
Construction Cost Total					$ 8,244,338
Engineering, Administration, and Legal Costs				25%	$ 2,061,084
Capital Improvement Cost Total					$ 10,305,422
				rounded	$ 10,305,000

DC UPPER DEER CREEK PROJECT PHASING



CSD-1
COUNTY SANITATION DISTRICT 1

Legend

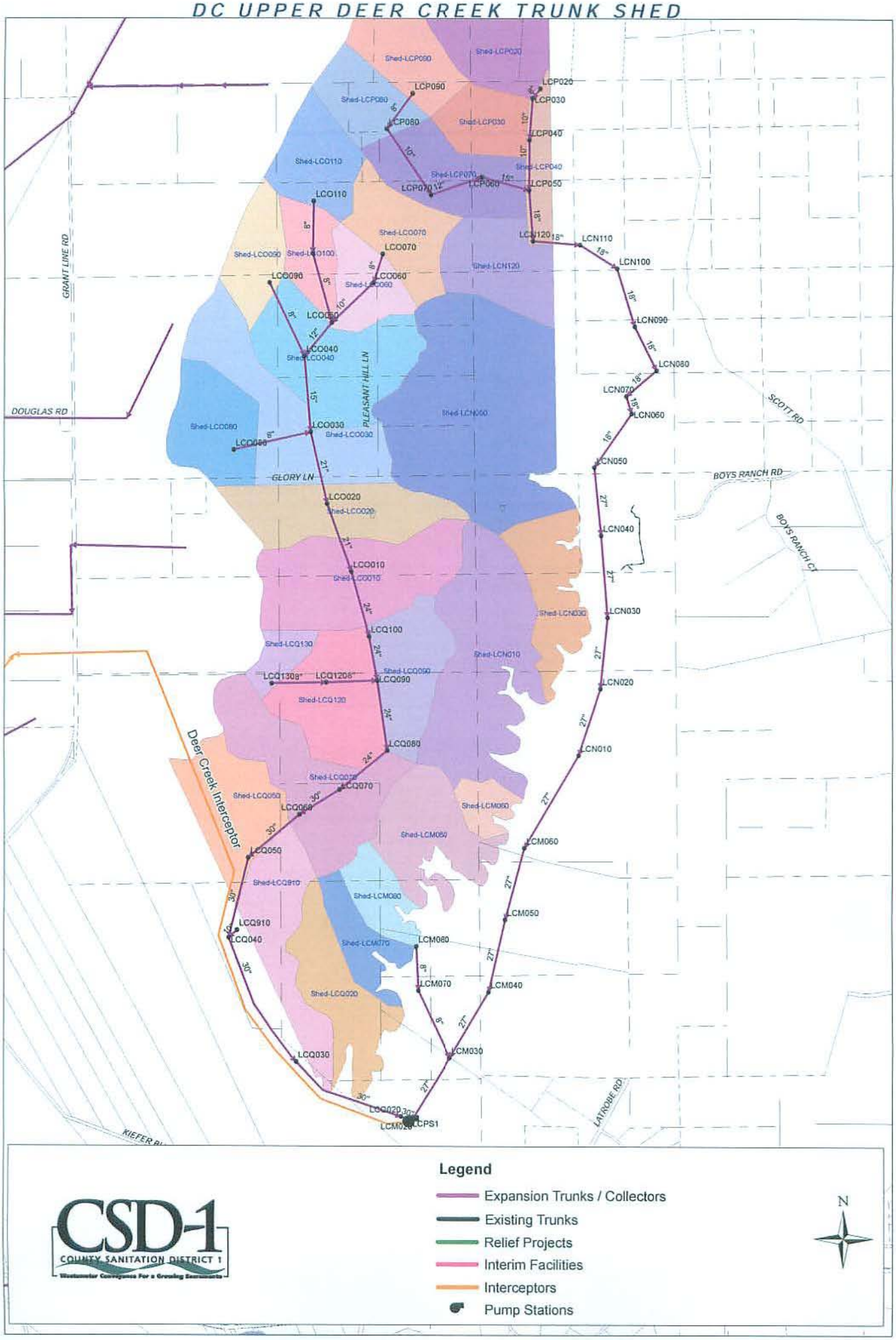
- Expansion Trunks / Collectors
- Existing Trunks
- Relief Projects
- Interim Facilities
- Interceptors
- Pump Stations

Phasing

- 2006 - 2011
- 2011 - 2020
- After 2020
- Construction Completed
- DC Upper Deer Creek Trunk Shed

N

DC UPPER DEER CREEK TRUNK SHED



Appendix E:

CSD – 1 Sewerage Facilities Expansion Master Plan 2006 Update
AJ Sunrise Douglas Trunk Shed

CSD-1 SEWERAGE FACILITIES EXPANSION MASTER PLAN
2006 UPDATE

AJ SUNRISE DOUGLAS TRUNK SHED

Area Description

The AJ Sunrise Douglas Trunk Shed is located east of Sunrise Boulevard, north of Kiefer Boulevard, and west of the Deer Creek watershed. The majority of the shed is south of Douglas Road, but a portion of the shed is located north of Douglas Road along Grant Line Road. The trunk shed includes all but the southeastern corner of the Sun Ridge Specific Plan area. The Sun Ridge area has begun developing and will continue to develop during the 2006-2011 period. Areas east of Grant Line Road are not anticipated to start developing until the 2011-2020 period.

Trunk System Facilities

The trunk shed would be served by two major trunk sewers (Trunks SDA-1 and SDA-2) which would flow from east to west. Both trunk sewers would ultimately connect to the Aerojet Interceptor in Sunrise Boulevard. Portions of the trunk sewers, including an interim lift station and force main to the Northeast interceptor, have been constructed.

Because the Aerojet Interceptor is not scheduled for construction until after 2020, interim facilities are required. An interim regional lift station is planned, which will convey wastewater north along Sunrise Blvd. to the Mather and Bradshaw interceptors. Until these facilities are in place, scheduled for 2010, the existing interim lift station will be used.

Trunk Projects

Two trunk projects are remaining for this trunk shed, as shown in the table below.

Project ID	Diam. (in.)	Length (ft.)	Phase	Estimated Construction Cost ($)	Estimated Capital Cost ($)
SDA-1	18-24	15,890	2006-2011	6,744,806	8,431,000
SDA-2	15-42	12,510	2011-2020	4,316,550	5,396,000

Attachments

- Trunk shed map showing proposed trunk sewers, sizes, model manhole ID numbers, and sewersheds.
- Project map showing trunk projects and interim facilities (if needed).
- Trunk shed ESD projections by sewershed.
- Sewershed load manholes.
- Trunk project cost estimates.

AJ Sunrise Douglas
Sewershed Load Manholes and Land Use Projections

		2005				Buildout		
Sewershed	Load Manhole	Contributing Area (ac)	ESDs	ESD/A (ESD/ac)	% Buildout	Contributing Area (ac)	ESDs	ESD/A (ESD/ac)
Shed-067043014	067043014	0.0	0	-	0	21.2	318	15.0
Shed-067043017	067043017	0.0	0	-	0	3.6	21	5.9
Shed-067043018	067043018	0.0	0	-	0	3.1	18	5.9
Shed-067046015	067046015	1.0	5	5.1	7	12.2	73	6.0
Shed-067055005	067055005	0.9	7	7.7	11	7.9	64	8.1
Shed-067055010	067055010	26.0	191	7.3	25	111.1	769	6.9
Shed-067057001	067057001	0.6	3	4.9	3	18.5	120	6.5
Shed-067057014	067057014	0.3	2	6.1	29	1.1	7	6.4
Shed-067060003	067060003	5.0	31	6.3	28	16.2	109	6.7
Shed-067060004	067060004	0.2	1	5.4	14	1.2	7	5.6
Shed-067060005	067060005	3.9	20	5.1	18	20.4	111	5.5
Shed-067060016	067060016	0.0	0	-	0	0.2	1	5.8
Shed-067060020	067060020	0.0	0	-	0	11.8	71	6.0
Shed-067063004	067063004	33.0	210	6.4	16	213.0	1341	6.3
Shed-SDA010	SDA010	0.0	0	-	0	176.3	1173	6.7
Shed-SDA030	SDA030	0.0	0		0	99.2	890	9.0
Shed-SDA042	SDA042	0.0	0	-	0	166.2	998	6.0
Shed-SDA043	SDA043	0.0	0	-	0	69.7	418	6.0
Shed-SDA044	SDA044	0.0	0	-	0	144.6	868	6.0
Shed-SDA047	SDA047	0.0	0	-	0	200.8	1205	6.0
Shed-SDA048	SDA048	0.0	0	-	0	113.3	680	6.0
Shed-SDA049	SDA049	0.0	0	-	0	238.9	1434	6.0
Shed-SDA051	SDA051	0.0	0	-	0	88.6	531	6.0
Shed-SDA084	SDA084	0.0	0	-	0	225.0	1351	6.0
Shed-SDA110	SDA110	0.0	0	-	0	78.6	472	6.0
Shed-SDA271	SDA271	0.0	0	-	0	26.4	159	6.0
Shed-SDA272	SDA272	0.0	0	-	0	226.0	1356	6.0
Shed-SDA275	SDA275	0.0	0	-	0	263.6	1600	6.1
Shed-SDA276	SDA276	0.0	0	-	0	519.5	3134	6.0
Shed-SDA291	SDA291	0.0	0	-	0	134.3	806	6.0
Shed-SDA310	SDA310	0.0	0	-	0	370.6	2247	6.1
Shed-SDB010	SDB010	0.0	0	-	0	0.0	0	-
Total		70.9	470	6.6	2	3583.0	22352	6.2

AJ Sunrise Douglas
Trunk Sewer Data and Model Results
Buildout 10-Year Design Storm

Link ID	US Manhole	DS Manhole	Link Type	Diameter (in)	Length (ft)	US Rim Elev. (ft)	US Invert (ft)	DS Rim Elev. (ft)	DS Invert (ft)	Slope, %	Full Capacity (mgd)	Peak Flow (mgd)	% Full Capacity	DS d/D
067043001 1	067043001	067043012	Pipe	18 0	206 0	168 480	141 580	168 600	139 390	1 063	7 01	2 0115	29	1 0
067043012 2	067043012	067060018	Pipe	18 0	15 0	168 600	139 390	169 120	139 120	1 800	9 12	2 0812	23	1 0
067043014 1	067043014	067043015	Pipe	15 0	200 0	165 320	143 820	165 770	143 520	0 150	1 62	1 1242	69	0 6
067043015 1	067043015	067043016	Pipe	15 0	354 0	165 770	143 470	166 200	142 950	0 147	1 60	1 1231	70	0 6
067043016 1	067043016	067043017	Pipe	15 0	212 0	166 200	142 900	167 000	142 580	0 151	1 62	1 1228	69	0 6
067043017 1	067043017	067043018	Pipe	15 0	135 0	167 000	142 530	167 500	142 330	0 148	1 61	1 1374	71	0 6
067043018 1	067043018	067043001	Pipe	15 0	319 5	167 500	142 280	168 480	141 870	0 128	1 50	1 1502	77	0 4
067046015 1	067046015	067057001	Pipe	12 0	256 0	169 500	154 500	169 550	154 000	0 195	1 02	0 6234	61	0 6
067049006 1	067049006	067060017	Pipe	36 0	696 0	169 400	140 430	169 240	139 640	0 114	14 54	13 1853	91	0 6
067050009 1	067050009	067049006	Pipe	36 0	952 5	172 000	141 470	169 400	140 530	0 099	13 56	13 1853	97	0 7
067055005 1	067055005	067057014	Pipe	12 0	228 0	170 000	155 500	169 800	155 050	0 197	1 02	0 5668	56	0 5
067055010 1	067055010	067055005	Pipe	12 0	248 0	170 280	156 180	170 000	155 550	0 254	1 16	0 5256	45	0 5
067057001 1	067057001	067060003	Pipe	12 0	300 0	169 550	153 950	169 200	153 350	0 200	1 03	0 7064	69	0 6
067057014 1	067057014	067046015	Pipe	12 0	228 0	169 800	155 000	169 500	154 550	0 197	1 02	0 5715	56	0 5
067060003 1	067060003	067060004	Pipe	12 0	211 0	169 200	153 300	169 040	152 890	0 194	1 02	0 7811	77	0 6
067060004 1	067060004	067060005	Pipe	12 0	236 0	169 040	152 840	168 330	152 380	0 195	1 02	0 7801	77	0 6
067060005 1	067060005	067060016	Pipe	12 0	86 0	168 330	152 330	168 300	152 120	0 244	1 14	0 8677	76	0 5
067060016 1	067060016	067043001	Pipe	12 0	203 3	168 300	152 120	168 480	143 080	4 447	4 86	0 8684	18	0 3
067060017 1	067060017	067060018	Pipe	36 0	17 0	169 240	139 640	169 120	139 120	3 059	75 48	13 1855	17	0 7
067060018 1	067060018	067060019	Pipe	42 0	882 0	169 120	139 120	164 000	138 238	0 100	20 59	15 0924	73	0 5
067060019 1	067060019	AJ4135	Pipe	42 0	168 8	164 000	138 238	160 500	138 069	0 100	20 60	15 0923	73	0 4
067060020 1	067060020	067060021	Pipe	8 0	70 0	166 600	150 400	167 100	147 740	3 800	1 52	0 0508	3	0 2
067060021 1	067060021	067043012	Pipe	8 0	225 0	167 100	147 640	168 600	142 500	2 284	1 18	0 0507	4	0 2
067063004 1	067063004	067043014	Pipe	15 0	140 0	164 930	144 030	165 320	143 830	0 143	1 58	0 9444	60	0 6
SDA010 1	SDA010	67050009	Pipe	36 0	547 0	172 300	142 470	172 000	141 570	0 165	17 51	13 1910	75	0 7
SDA020 1	SDA020	SDA010	Pipe	36 0	617 0	176 700	143 490	172 300	142 570	0 149	16 66	12 4537	75	0 6
SDA030 1	SDA030	SDA020	Pipe	36 0	648 0	178 700	144 560	176 700	143 990	0 150	16 70	12 4565	75	0 6
SDA040 1	SDA040	SDA030	Pipe	36 0	865 0	178 400	145 970	178 700	144 660	0 151	16 79	11 9355	71	0 6
SDA041 1	SDA041	SDA040	Pipe	27 0	141 0	179 800	146 920	178 400	146 720	0 142	7 55	4 2742	57	0 5
SDA042 1	SDA042	SDA041	Pipe	24 0	2957 7	184 000	153 230	179 800	147 910	0 180	6 21	4 2764	69	0 5
SDA043 1	SDA043	SDA042	Pipe	21 0	1817 7	187 000	157 770	184 000	153 230	0 250	5 12	3 5993	70	0 7
SDA044 1	SDA044	SDA043	Pipe	21 0	1144 0	187 230	160 630	187 000	157 770	0 250	5 13	3 3105	65	0 6
SDA045 1	SDA045	SDA044	Pipe	18 0	1460 0	193 000	172 800	187 230	160 680	0 816	6 14	2 7090	44	0 5
SDA046 1	SDA046	SDA045	Pipe	18 0	1230 0	219 550	185 150	193 000	172 850	1 000	6 80	2 3364	34	0 4
SDA047 1	SDA047	SDA046	Pipe	18 0	2600 0	229 550	211 250	219 550	185 200	1 002	6 80	2 3365	34	0 4
SDA048 1	SDA048	SDA047	Pipe	18 0	1830 0	238 960	213 260	229 550	211 350	0 104	2 20	1 4858	68	0 4
SDA049 1	SDA049	SDA048	Pipe	18 0	2850 0	250 040	218 940	238 960	213 260	0 189	3 03	1 0220	34	0 6
SDA050 2	SDA050	SDA040	Pipe	27 0	125 0	179 200	148 470	178 400	148 720	1 400	23 71	7 6738	32	0 5
SDA051 1	SDA051	SDA045	Pipe	15 0	1055 0	198 050	175 050	193 000	173 050	0 190	1 82	0 3787	21	0 4
SDA060 1	SDA060	SDA050	Pipe	27 0	493 0	177 800	155 580	179 200	148 570	1 422	23 90	7 6738	32	0 4
SDA070 1	SDA070	SDA060	Pipe	27 0	500 0	177 500	161 380	177 800	155 630	1 150	21 49	7 6736	36	0 4
SDA080 1	SDA080	SDA070	Pipe	27 0	146 0	179 200	163 110	177 500	161 430	1 151	21 50	7 6736	36	0 4
SDA081 1	SDA081	SDA080	Pipe	15 0	181 0	180 300	165 610	179 200	164 160	0 759	3 84	0 9662	27	0 4
SDA082 1	SDA082	SDA081	Pipe	15 0	557 0	183 300	166 880	180 300	165 680	0 221	1 96	0 9663	49	0 4
SDA083 1	SDA083	SDA082	Pipe	15 0	447 0	182 900	167 920	183 300	166 940	0 219	1 96	0 9669	49	0 5
SDA084 1	SDA084	SDA083	Pipe	15 0	109 0	183 000	168 210	182 900	167 970	0 220	1 96	0 9680	49	0 5
SDA090 1	SDA090	SDA080	Pipe	27 0	474 0	179 900	164 110	179 200	163 160	0 200	8 97	6 7901	76	0 5
SDA100 1	SDA100	SDA090	Pipe	27 0	473 0	182 700	165 110	179 900	164 160	0 201	8 98	6 7903	76	0 6
SDA110 1	SDA110	SDA100	Pipe	24 0	500 0	185 400	166 360	182 700	165 360	0 200	6 55	6 7904	100	0 6
SDA120 1	SDA120	SDA110	Pipe	24 0	561 0	184 970	167 410	185 400	166 410	0 178	6 18	6 4689	100	0 8
SDA130 1	SDA130	SDA120	Pipe	24 0	109 0	184 250	167 730	184 970	167 510	0 202	6 58	6 4693	99	0 9
SDA140 1	SDA140	SDA130	Pipe	24 0	225 0	185 620	168 300	184 250	167 830	0 209	6 69	6 4697	97	0 8
SDA150 1	SDA150	SDA140	Pipe	24 0	500 0	188 990	169 400	185 620	168 350	0 210	6 71	6 4913	97	0 8
SDA160 1	SDA160	SDA150	Pipe	24 0	500 0	192 740	170 500	188 990	169 450	0 210	6 71	6 4978	97	0 6
SDA170 1	SDA170	SDA160	Pipe	24 0	500 0	193 760	171 650	192 740	170 550	0 220	6 87	6 5066	95	0 8
SDA180 1	SDA180	SDA170	Pipe	24 0	500 0	195 480	172 700	193 760	171 650	0 210	6 71	6 5091	97	0 8
SDA190 1	SDA190	SDA180	Pipe	24 0	500 0	200 510	173 800	195 480	172 750	0 210	6 71	6 5098	97	0 8
SDA200 1	SDA200	SDA190	Pipe	24 0	500 0	200 510	174 900	200 510	173 850	0 210	6 71	6 5114	97	0 8
SDA210 1	SDA210	SDA200	Pipe	24 0	500 0	203 010	176 000	200 510	174 950	0 210	6 71	6 5139	97	0 6
SDA220 1	SDA220	SDA210	Pipe	24 0	500 0	200 660	177 100	203 010	176 050	0 210	6 71	6 5156	97	0 8
SDA230 1	SDA230	SDA220	Pipe	24 0	500 0	201 430	178 140	200 660	177 150	0 198	6 51	6 5178	100	0 8
SDA240 1	SDA240	SDA230	Pipe	24 0	434 0	202 790	179 100	201 430	178 190	0 210	6 70	6 5213	97	0 8
SDA250 1	SDA250	SDA240	Pipe	24 0	300 0	202 790	179 780	202 790	179 100	0 227	6 97	6 5278	94	0 8
SDA260 1	SDA260	SDA250	Pipe	24 0	445 0	204 330	180 460	202 790	179 830	0 142	5 51	6 5362	100	0 8
SDA270 1	SDA270	SDA260	Pipe	24 0	500 0	208 220	181 560	204 330	180 510	0 210	6 71	6 5495	98	0 9
SDA271 1	SDA271	SDA270	Pipe	15 0	1047 5	204 000	183 890	208 220	182 310	0 151	1 62	1 0582	65	0 9
SDA272 1	SDA272	SDA271	Pipe	12 0	743 3	200 000	185 370	204 000	183 890	0 199	1 03	0 9685	94	0 7
SDA273 1	SDA273	SDA270	Pipe	15 0	400 0	205 860	190 740	208 220	182 310	2 107	8 07	3 3509	55	0 9
SDA274 1	SDA274	SDA273	Pipe	15 0	1213 3	221 000	203 610	205 860	190 790	1 057	4 30	3 3521	78	0 7
SDA275 1	SDA275	SDA274	Pipe	15 0	1338 3	230 000	212 210	221 000	203 610	0 843	3 35	3 3531	100	0 7
SDA276 1	SDA276	SDA275	Pipe	12 0	1102 0	237 540	229 340	230 000	212 460	1 532	2 85	2 2347	78	1 0
SDA280 1	SDA280	SDA270	Pipe	18 0	500 0	208 470	184 760	208 220	182 060	0 540	4 99	2 1611	43	0 9
SDA290 1	SDA290	SDA280	Pipe	18 0	1134 9	215 360	190 190	208 470	184 810	0 474	4 68	2 1736	46	0 5
SDA291 1	SDA291	SDA290	Pipe	12 0	618 7	215 360	191 930	215 360	190 690	0 201	1 03	0 5781	56	0 4
SDA300 1	SDA300	SDA290	Pipe	18 0	2870 0	250 000	229 230	215 360	191 010	1 431	8 13	1 6010	20	0 3
SDA310 1	SDA310	SDA300	Pipe	15 0	2800 0	260 030	240 430	250 000	229 230	0 400	2 64	1 6019	61	0 5
SDB010 1	SDB010	AJ1244	Pipe	12 0	315 8	152 000	117 559	152 001	116 919	0 203	1 04	0 0000	0	0 1

TRUNK SEWER SYSTEM PROJECT DESCRIPTION

PROJECT ID:.....	SDA-1 TRUNK SHED.....AJ Sunrise Douglas
LOCATION:.....	South of Douglas Rd. between Jaeger Rd. and east of Grant Line Rd.
BRIEF PROJECT DESCRIPTION:...	9970 feet of 18-inch pipe, 2960 feet of 21-inch pipe, and 2960 feet of 24-inch pipe.
MODEL REFERENCE:.....	SDA049 to SDA041
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.0 mgd (upstream) to 4.3 mgd (downstream).
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Aerojet Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST		COST
Baseline Pipe Construction Cost						
SDA049 to SDA048	18	>24	2850	$ 310	$	883,500
SDA048 to SDA047	18	20-24	1830	$ 290	$	530,700
SDA047 to SDA045	18	>24	3830	$ 310	$	1,187,300
SDA045 to SDA044	18	16-20	1460	$ 270	$	394,200
SDA044 to SDA042	21	>24	2960	$ 340	$	1,006,400
SDA042 to SDA041	24	>24	2960	$ 380	$	1,124,800
Structures						
Trunk junction structure			1	$ 12,000	$	12,000
Subtotal					$	5,138,900
Mobilization and Demobilization				5%	$	256,945
Construction Cost Subtotal					$	5,395,845
Contingencies for Unknown Subsurface Conditions				25%	$	1,348,961
Construction Cost Total					$	6,744,806
Engineering, Administration, and Legal Costs				25%	$	1,686,202
Capital Improvement Cost Total					$	8,431,008
				rounded	$	8,431,000

TRUNK SEWER SYSTEM PROJECT DESCRIPTION

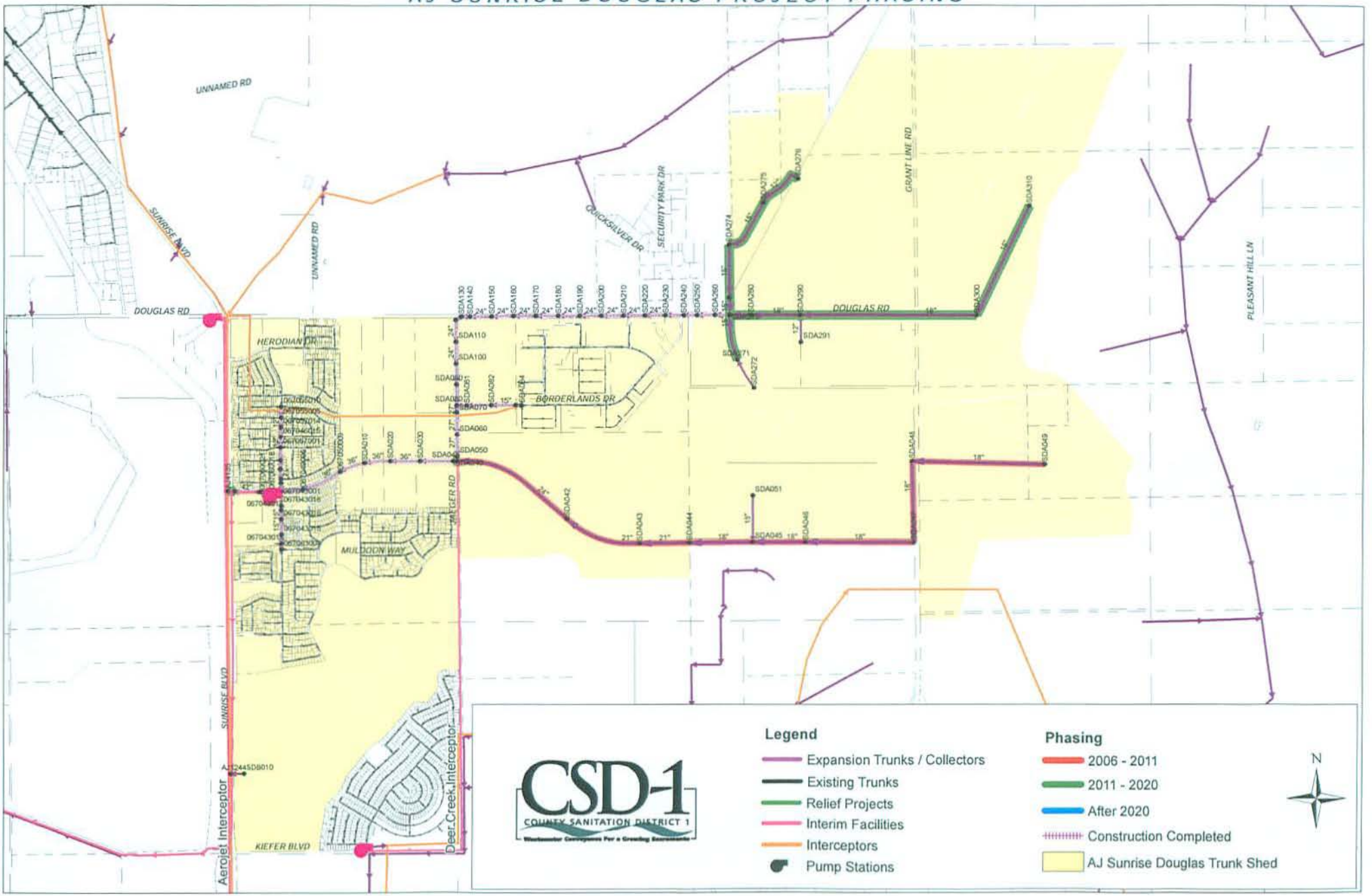
PROJECT ID:.....	SDA-2 TRUNK SHED.....AJ Sunrise Douglas
LOCATION:.....	North of Douglas Rd. between Security Park Dr. and Grant Line Rd. South of Douglas Rd. between Mather East Rd. and Grant Line Rd. Along Jaeger Rd. between Douglas Rd. and Pericles Rd. and Sunrise Blvd. at Chrysanthy Blvd. Connects to the Aerojet Interceptor at MH AJ4135.
BRIEF PROJECT DESCRIPTION:...	1100 feet of 12-inch pipe, 6800 feet of 15-inch pipe, 4300 feet of 18-inch pipe, 140 feet of 27-inch pipe, and 170 feet of 42-inch pipe.
MODEL REFERENCE:.....	SDA310 to SDA 270, SDA276 to SDA270, SDA271 to SDA270, SDA041 to SDA040 and MH 067060019 to AJ4135.
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.1 mgd (upstream) to 15.1 mgd (downstream).
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires SDA-1 and the Aerojet Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST		COST
Baseline Pipe Construction Cost						
SDA310 to SDA300	15	20-24	2800	$ 250	$	700,000
SDA300 to SDA270	18	20-24	4300	$ 290	$	1,247,000
SDA276 to SDA275	12	<16	1100	$ 190	$	209,000
SDA275 to SDA270	15	16-20	2950	$ 240	$	708,000
SDA271 to SDA270	15	16-20	1050	$ 240	$	252,000
SDA041 to SDA040	27	>24	140	$ 420	$	58,800
MH 067060019 to AJ4135	42	>24	170	$ 600	$	102,000
Structures						
Trunk junction structure			1	$ 12,000	$	12,000
Subtotal					$	3,288,800
Mobilization and Demobilization				5%	$	164,440
Construction Cost Subtotal					$	3,453,240
Contingencies for Unknown Subsurface Conditions				25%	$	863,310
Construction Cost Total					$	4,316,550
Engineering, Administration, and Legal Costs				25%	$	1,079,138
Capital Improvement Cost Total					$	5,395,688
				rounded	$	5,396,000

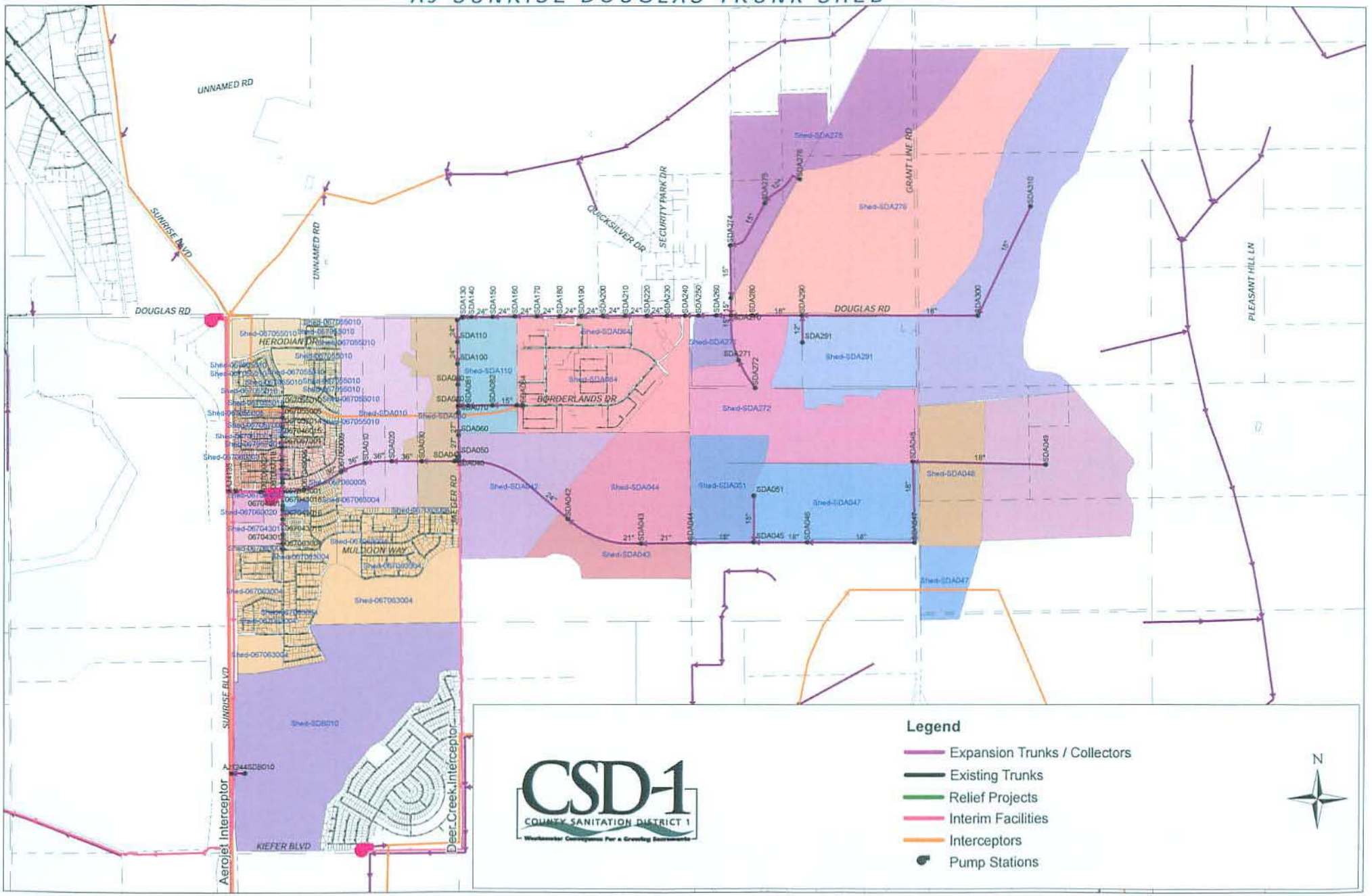
TRUNK SEWER SYSTEM PROJECT DESCRIPTION	
PROJECT ID:.....	SDPS TRUNK SHED.....AJ Sunrise Douglas
LOCATION:.....	Along Sunrise Blvd. between Douglas Rd. and Chrysanthy Blvd. Along Chrysanthy Blvd. east of Sunrise Blvd.
BRIEF PROJECT DESCRIPTION:...	4520 feet of 6-inch force main and a 0.2 mgd pump station.
MODEL REFERENCE:.....	SDCFM1 to MH 067060022
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	5.3 mgd.
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This facility will remain interim until the Aerojet Interceptor is constructed.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST	COST
Baseline Pipe Construction Cost					
SDCFM1 to MH 067060022	6	Force Main	4520		
Structures, Pits, and Pump Stations					
0.2 mgd pump station			1		

AJ SUNRISE DOUGLAS PROJECT PHASING



AJ SUNRISE DOUGLAS TRUNK SHED



Appendix F:

Permanent Shed Shift – AJ Sunrise Douglas Trunk Shed & LC Upper Laguna Creek Trunk Shed

SACRAMENTO AREA
SEWER DISTRICT
SERVING YOU 24/7

February 13, 2008
E225.000

Craig Zoller
MacKay & Somps
1771 Tribute Road, Suite E
Sacramento, CA 95815-4487

Subject: Shed Shift Request for 'SunCreek Specific Plan' Approval

Dear Mr. Zoller:

Sacramento Area Sewer District (formerly CSD-1) staff reviewed the last submittal of the Shed Shift Request for the 'SunCreek Specific Plan' and finds it sufficiently addresses previous comments, and is considered approved. Any significant change in the proposed and/or assumed land use presented in this document, which impacts the sewer design, may require a revision to this study.

A sewer study associated with this project may be submitted for review and/or approval. If you have any questions regarding these comments, please call Amandeep Singh at (916) 876-6296 or myself at (916) 876-6094.

Sincerely,

Salam Khan, P.E.
Sacramento Area Sewer District
Development Services

SK: ms

cc: SRCSD Development Services

zoller.021309.ltr

10545 Armstrong Avenue
Mather, California 95655
Tel 916.876.6000
Fax 916.876.6160
www.sacsewer.com

PERMANENT Project name: SunCreek Specific Plan

CSD-1 Master Plan Permanent Shed Shift Request Form

☒ **Expansion Area** ☐ **Relief Area** Note: (CSD-1 Master Plan does not have cost estimates or plan & profiles)

*Originator: MacKay & Somps for SunCreek Owners	Date: 7-7-2008

Requested change: Shift portion of AJ Sunrise Douglas Trunk Shed (sheds: SDA049, SDA048, SDA047 & SDA051) to LC Upper Laguna Creek Trunk Shed. Shifted Sheds will outfall to Laguna Creek Interceptor Section 5 (LCI-5) instead of SDA-1 Trunk.

Describe related facilities: (Pump station, force main, trunks, etc.)

The affected facilities are the SDA-1 Trunk, Laguna Creek Interceptor and the Aerojet Interceptor. All facilities proposed with the SunCreek development have been sized to accommodate the requested Shed shift.

Reason for change: The ultimate location of the Laguna Creek Interceptor will be within Chrysanthy Blvd which will eliminate the need for the SDA-1 Trunk east of the "Preserve" development. SASD & SRCSD participated in the decision to locate LCI-5 within Chrysanthy Blvd.

List of Trunk Sheds Impacted:

AJ Sunrise Douglas: SDA049, SDA048, SDA047, SDA051

Summary of Total Cost Impact to District, Total change in PWWF, Acreage, ESDs:

AJ Sunrise Douglas Trunk Shed cost are reduced by $6,005,000; PWWF is reduced by 2.91 mgd, area is reduced by 641.5 acres and ESD's are reduced by 3,850. LC Laguna Creek Trunk Shed cost are reduced by $4,599,000; PWWF is increased by 3.99 mgd, area is increased by 686.4 acres and the ESD's served is increased by 5,949.

* *Originator completes this side of the form.*

PERMANENT Project name: SunCreek Specific Plan

This side of the form is for DEPARTMENTAL USE ONLY:

Note: Attach modeling results before forwarding to sections 2,3,and 4.

		Initials	*Recommend* Approval (√)	*Recommend* Denial (√)
1	**Collection Systems Capacity Management & Master Planning**			
2	**CSD-1 District Design & Rehabilitation Engineering**			
3	**Major Conveyance Engineering**			
4	**Development Services**			

Reason for recommending denial:
Other comments:

This box to be completed by Section 4: ***(Development Services)***

Change ☐ approved ☐ denied BY:	Date:

CSD-1 SEWERAGE FACILITIES EXPANSION MASTER PLAN
2006 UPDATE

(REVISED) LC UPPER LAGUNA CREEK TRUNK SHED

Area Description

The LC Upper Laguna Creek Trunk Shed is located east of Sunrise Boulevard and west of the Kiefer Land fill. The majority of the shed is located west of Grant Line Road. The trunk shed includes the SunCreek Specific Plan area, the Arboretum (Weagell/Lewis) development, and is expected to start developing in 2009 through 2020. Areas east of Grant Line Road are anticipated to start developing in 2012.

Trunk System Facilities

The SunCreek Specific Plan area and the Arboretum would be served by two major trunk sewers (Trunks LCK and LCJ), which would flow from east to west. The area south of Jackson Road and east of Grant Line Road would be served by trunks extending south on Sunrise Boulevard (Trunk LCY) and east on Jackson Road (Trunk LCZ). Most of the trunk sewers in this shed would connect to Section 5 of the Laguna Creek Interceptor; Trunk LCY would connect to the upper end of Section $ of the Interceptor.

The Laguna Creek Interceptor Section 5 is anticipated to be on line in 2009 and constructed with the first phase of the SunCreek Specific Plan area development. Since the lower Sections of the Interceptor are not anticipated to in place when Section 5 is operational, interim trunk facilities would be required to serve the SunCreek Specific Plan area and the Arboretum. The interim solution would be to pump wastewater north on Sunrise Boulevard to the upstream end of the Mather Interceptor.

Trunk Projects

Project ID	Diam. (in.)	Length (ft.)	Phase	Estimated Construction Cost ($)	Estimated Capital Cost ($)
LCJ	15-18	3,710	2011-2020	1,678,793	2,098,000
LCK	12-21	16,940	2009-2020	7,491,900	9,365,000
LCY	15-24	8,150	After 2020	4,908,750	6,136,000
LCZ	15-24	7,950	After 2020	5,119,931	6,400,000

Attachments

- Trunk shed map showing proposed trunk sewers, sizes, model manhole ID numbers, and sewer sheds.
- Project map showing trunk projects and interim facilities (if needed).
- Trunk shed ESD projections by sewer shed.
- Sewer shed load manholes.
- Trunk project cost estimates.

Revised
LC Upper Laguna Creek
Sewershed Load Manholes and Land Use Projections

		2005				Buildout		
Sewershed	Load Manhole	Contributing Area (ac)	ESDs	ESD/A (ESD/ac)	% Buildout	Contributing Area (ac)	ESDs	ESD/A (ESD/ac)
Shed-067067017	67067017	0.0	0		0	197.7	1186	6
Shed-LCJ010	LCJ010	0.0	0		0	366.2	2197	6
Shed-LCJ020	LCJ020	0.0	0		0	120	720	6
Shed-LCJ030	LCJ030	0.0	0		0	210.8	1265	6
Shed-LCJ910	LCJ910	0.0	0		0	191.1	1147	6
Shed-LCK010	LCK010	0.0	0		0	36.6	220	6
Shed-LCK020	LCK020	0.0	0		0	165.2	1190	7.2
Shed-LCK030	LCK030	0.0	0		0	73.4	551	7.5
~~Shed-LCK031~~	~~LCK031~~	~~0.0~~	~~0~~		~~0~~	~~144~~	~~862~~	~~6~~
Shed-LCK040	LCK040	0.0	0		0	126.8	761	6
Shed-LCK050	LCK050	0.0	0		0	7.1	43	6
Shed-LCK060	LCK060	0.0	0		0	313.4	1880	6
Shed-LCK070	LCK070	0.0	0		0	229.6	1630	7
Shed-LCK080	LCK080	0.0	0		0	81.3	675	8.3
Shed-LCK081	LCK081	0.0	0		0	208.5	1444	6.9
~~Shed-LCK090~~	~~LCK090~~	~~0.0~~	~~0~~		~~0~~	~~20~~	~~119~~	~~6~~
Shed-LCK091	LCK091	0.0	0		0	87.4	771	8.8
Shed-LCK092	LCK092	0.0	0		0	219.1	1315	6
Shed-LCK093	LCK093	0.0	0		0	202.6	1684	8.3
Shed-LCK100	LCK100	0.0	0		0	15.2	91.6	6
Shed-LCK110	LCK110	0.0	0		0	14.8	89	6
Shed-LCK120	LCK120	0.0	0		0	217.1	1419	6.5
Shed-LCK130	LCK130	0.0	0		0	234.6	1407	6
~~Shed-LCK140~~	~~LCK140~~	~~0.0~~	~~0~~		~~0~~	~~76.3~~	~~456~~	~~6~~
Shed-LCK150	LCK150	0.0	0		0	113.3	680	6
~~Shed-LCK151~~	~~LCK151~~	~~0.0~~	~~0~~		~~0~~	~~196.9~~	~~1180~~	~~6~~
Shed-LCK160	LCK160	0.0	0		0	238.9	1434	6
Shed-LCK170	LCK170	0.0	0		0	54.8	329	6
~~Shed-LCK180~~	~~LCK180~~	~~0.0~~	~~0~~		~~0~~	~~50.7~~	~~304~~	~~6~~
~~Shed-LCK181~~	~~LCK181~~	~~0.0~~	~~0~~		~~0~~	~~63.9~~	~~383~~	~~6~~
~~Shed-LCK182~~	~~LCK182~~	~~0.0~~	~~0~~		~~0~~	~~76.9~~	~~460~~	~~6~~
Shed-LCK183	LCK183	0.0	0		0	241.4	1448	6
~~Shed-LCK190~~	~~LCK190~~	~~0.0~~	~~0~~		~~0~~	~~46.4~~	~~278~~	~~6~~
~~Shed-LCK200~~	~~LCK200~~	~~0.0~~	~~0~~		~~0~~	~~17.7~~	~~106~~	~~6~~
~~Shed-LCK220~~	~~LCK220~~	~~0.0~~	~~0~~		~~0~~	~~26~~	~~155~~	~~6~~
~~Shed-LCK230~~	~~LCK230~~	~~0.0~~	~~0~~		~~0~~	~~153.7~~	~~920~~	~~6~~
~~Shed-LCK250~~	~~LCK250~~	~~0.0~~	~~0~~		~~0~~	~~153.7~~	~~920~~	~~6~~
Shed-LCY010	LCY010	0.0	0		0	243.8	1463	6
Shed-LCY030	LCY030	0.0	0		0	234.5	1407	6
Shed-LCY040	LCY040	0.0	0		0	191.9	1151	6
Shed-LCY050	LCY050	0.0	0		0	234.8	1409	6
Shed-LCZ020	LCZ020	0.0	0		0	89.4	537	6
Shed-LCZ030	LCZ030	0.0	0		0	175.2	1051	6
Shed-LCZ050	LCZ050	0.0	0		0	221.5	1329	6
Shed-LCZ060	LCZ060	0.0	0		0	137.8	827	6
Shed-LCZ110	LCZ110	0.0	0		0	232.8	1397	6
Total						5728.6	36148	

Denotes revised data

Revised
LC Upper Laguna Creek
Trunk Sewer Data and Model Results
Buildout 10-Year Design Storm

Link ID	US Manhole	DS Manhole	Link Type	Diameter (in)	Length (ft)	US Rim Elev. (ft)	US Invert (ft)	DS Rim Elev. (ft)	DS Invert (ft)	Slope, %	Full Capacity (mgd)	Peak Flow (mgd)	% Full Capacity	DS d/D
67067015.3	67067015	LC5090	Pipe	12	30.0	137.500	120.300	137.600	120.200	0.200	1.03	0.9300	91	0.7
LCJ010.1	LCJ010	LC5040	Pipe	18	2759.2	127.001	106.932	116.995	97.001	0.360	4.07	2.9880	73	0.6
LCJ020.1	LCJ020	LCJ010	Pipe	15	951.4	129.987	110.230	127.001	107.182	0.320	2.37	1.4198	60	0.6
LCJ030.1	LCJ030	LCJ2020	Pipe	12	698.8	131.988	112.497	129.987	110.479	0.289	1.24	0.9055	73	0.5
LCJ910.1	LCJ910	LC5040	Pipe	12	98.4	116.995	95.322	116.995	95.079	0.247	1.15	0.8220	71	0.5
LCK010.1	LCK010	LC5080	Pipe	21	540.0	144.000	113.800	142.000	113.100	0.130	3.69	3.4100	92	0.7
LCK020.1	LCK020	LCK010	Pipe	21	1940.0	136.000	116.200	144.000	113.900	0.120	3.55	3.2500	92	0.7
LCK030.1	LCK030	LCK020	Pipe	18	1900.0	140.000	119.200	136.000	116.500	0.140	2.54	2.4300	96	0.8
~~LCK031.1~~	~~LCK031~~	~~LCK030~~	~~Pipe~~	~~12~~	~~440.0~~	~~124.000~~	~~113.090~~	~~126.000~~	~~112.100~~	~~0.225~~	~~1.09~~	~~0.6171~~	~~57~~	~~0.4~~
LCK040.1	LCK040	LCK030	Pipe	18	340.0	140.000	119.800	140.000	119.300	0.140	2.54	2.0500	81	0.7
LCK050.1	LCK050	LCK040	Pipe	15	1280.0	153.000	132.900	140.000	120.100	10.000	13.20	1.6800	13	0.4
LCK060.1	LCK060	LCK050	Pipe	15	210.0	156.000	133.400	153.000	133.000	0.180	1.60	1.4600	82	0.7
LCK070.1	LCK070	LC5100	Pipe	12	130.0	147.100	132.000	147.000	131.600	0.300	1.26	1.2100	96	0.8
LCK080.1	LCK080	LC5110	Pipe	15	1320.0	161.900	143.200	167.400	140.800	0.180	1.60	1.5700	89	0.7
LCK081.1	LCK081	LCK080	Pipe	12	720.0	162.900	145.200	161.900	143.500	0.240	1.12	1.0800	96	0.8
LCK090.1	LCK090	LC5120	Pipe	15	30.0	172.900	147.000	172.900	143.500	11.700	14.27	2.6800	19	0.3
LCK091.1	LCK091	LCK090	Pipe	15	200.0	171.300	147.500	172.900	147.100	0.180	1.60	1.5500	88	0.7
LCK092.1	LCK092	LCK091	Pipe	12	1000.0	170.500	150.600	171.300	147.800	0.280	1.22	1.0300	85	0.7
LCK093.1	LCK093	LCK090	Pipe	12	860.0	168.900	150.300	172.900	147.300	0.350	1.36	1.2000	88	0.7
LCK100.1	LCK100	LC5130	Pipe	12	200.0	183.300	166.800	183.300	160.500	3.150	4.08	1.2500	31	0.4
LCK110.1	LCK110	LCK100	Pipe	12	330.0	182.300	168.900	183.300	166.900	0.600	1.61	1.1500	65	0.6
LCK120.1	LCK120	LCK110	Pipe	12	540.0	183.700	172.800	182.300	169.000	0.700	1.91	1.0800	56	0.5
LCK130.1	LCK130	LC5140	Pipe	15	1060.0	202.000	183.400	196.400	181.500	0.180	1.60	1.1000	62	0.6
LCK150.1	LCK150	LC5150	Pipe	18	1730.0	239.500	220.100	231.000	217.000	0.140	2.54	1.6300	64	0.6
LCK160.1	LCK160	LCK150	Pipe	15	2850.0	245.500	225.500	239.500	220.300	0.180	1.60	1.1200	63	0.6
LCK170.1	LCK170	LC5150	Pipe	8	750.0	243.000	221.600	231.000	217.100	0.600	0.61	0.2700	45	0.4
~~LCK180.1~~	~~LCK180~~	~~LCK170~~	~~Pipe~~	~~21~~	~~575.0~~	~~166.000~~	~~154.900~~	~~160.000~~	~~151.400~~	~~0.609~~	~~8.00~~	~~3.0935~~	~~39~~	~~0.5~~
~~LCK181.1~~	~~LCK181~~	~~LCK180~~	~~Pipe~~	~~15~~	~~1320.0~~	~~188.000~~	~~163.300~~	~~166.000~~	~~155.900~~	~~0.561~~	~~3.13~~	~~1.6356~~	~~52~~	~~0.5~~
~~LCK182.1~~	~~LCK182~~	~~LCK181~~	~~Pipe~~	~~15~~	~~1063.0~~	~~190.000~~	~~171.700~~	~~188.000~~	~~163.300~~	~~0.790~~	~~3.72~~	~~1.3633~~	~~37~~	~~0.5~~
LCK183.1	LCK183	LC5160	Pipe	15	1862.0	228.000	219.250	235.000	215.900	0.180	1.60	1.1300	64	0.6
~~LCK190.1~~	~~LCK190~~	~~LCK180~~	~~Pipe~~	~~15~~	~~993.0~~	~~166.000~~	~~157.200~~	~~166.000~~	~~155.400~~	~~0.181~~	~~1.78~~	~~1.2467~~	~~70~~	~~0.4~~
~~LCK200.1~~	~~LCK200~~	~~LCK190~~	~~Pipe~~	~~15~~	~~700.0~~	~~174.000~~	~~162.800~~	~~166.000~~	~~157.200~~	~~0.800~~	~~3.74~~	~~1.0513~~	~~28~~	~~0.6~~
~~LCK210.1~~	~~LCK210~~	~~LCK200~~	~~Pipe~~	~~15~~	~~1000.0~~	~~178.000~~	~~166.800~~	~~174.000~~	~~162.800~~	~~0.400~~	~~2.64~~	~~0.9762~~	~~37~~	~~0.4~~
~~LCK220.1~~	~~LCK220~~	~~LCK210~~	~~Pipe~~	~~15~~	~~350.0~~	~~180.000~~	~~168.600~~	~~178.000~~	~~166.800~~	~~0.514~~	~~3.00~~	~~0.9764~~	~~33~~	~~0.4~~
~~LCK230.1~~	~~LCK230~~	~~LCK220~~	~~Pipe~~	~~15~~	~~800.0~~	~~180.000~~	~~170.000~~	~~180.000~~	~~168.600~~	~~0.175~~	~~1.75~~	~~0.7686~~	~~44~~	~~0.4~~
~~LCK240.1~~	~~LCK240~~	~~LCK230~~	~~Pipe~~	~~12~~	~~612.0~~	~~184.000~~	~~174.900~~	~~180.000~~	~~170.000~~	~~0.801~~	~~2.06~~	~~0.6591~~	~~32~~	~~0.6~~
~~LCK250.1~~	~~LCK250~~	~~LCK240~~	~~Pipe~~	~~12~~	~~682.0~~	~~206.000~~	~~197.400~~	~~184.000~~	~~174.900~~	~~3.299~~	~~4.19~~	~~0.6598~~	~~16~~	~~0.4~~
LCY010.1	LCY010	LC4230	Pipe	24	1400.9	112.992	91.749	114.009	90.249	0.107	4.80	3.8141	79	0.4
LCY020.1	LCY020	LCY010	Pipe	21	2250.7	108.990	94.701	112.992	92.001	0.120	3.54	2.8029	79	0.6
LCY030.1	LCY030	LCY020	Pipe	21	1499.3	110.991	96.800	108.990	94.701	0.140	3.84	2.8128	73	0.7
LCY040.1	LCY040	LCY030	Pipe	18	1499.3	112.992	99.150	110.991	97.051	0.140	2.54	1.8223	72	0.6
LCY050.1	LCY050	LCY040	Pipe	15	1499.3	110.007	102.001	112.992	99.400	0.174	1.74	1.0057	58	0.6
LCZ010.1	LCZ010	LC5015	Pipe	24	1801.2	139.993	115.299	114.993	105.000	0.572	11.09	3.6290	33	0.4
LCZ020.1	LCZ020	LCZ010	Pipe	24	1499.3	139.993	117.001	139.993	115.299	0.114	4.94	3.6296	73	0.4
LCZ030.1	LCZ030	LCZ020	Pipe	21	1499.3	150.000	119.049	139.993	117.251	0.120	3.54	3.2564	92	0.6
LCZ040.1	LCZ040	LCZ030	Pipe	15	1348.4	139.993	121.850	150.000	119.551	0.171	1.73	1.5320	89	0.7
LCZ050.1	LCZ050	LCZ040	Pipe	15	1801.2	152.001	124.951	139.993	121.850	0.172	1.73	1.5324	89	0.7
LCZ060.1	LCZ060	LCZ050	Pipe	12	1801.2	150.000	129.199	152.001	125.200	0.222	1.09	0.5904	54	0.7
LCZ110.1	LCZ110	LCZ030	Pipe	12	1499.3	139.993	122.851	150.000	119.551	0.022	1.08	0.9921	92	0.8

Denotes revised data and results

TRUNK SEWER SYSTEM PROJECT DESCRIPTION	
PROJECT ID:.....	LCJ TRUNK SHED.....LC Upper Laguna Creek
LOCATION:.....	North of Jackson Rd., south of Kiefer Rd., east of Sunrise Blvd., and west of Grant Line Rd. Connects to Laguna Creek Interceptor at MH LC5040.
BRIEF PROJECT DESCRIPTION:...	950 feet of 15-inch pipe and 2760 feet of 18-inch pipe.
MODEL REFERENCE:.....	LCJ020 to LC5040
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.4 mgd (upstream) to 3.0 mgd (downstream).
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Laguna Creek Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST		COST
Baseline Pipe Construction Cost						
LCJ020 to LCJ010	15	16-20	950	$ 240		$228,000
LCJ010 to LC5040	18	20-24	2760	$ 290		$800,400
Goetechnical Factors						
Cobble construction factor (undeveloped)		20% of baseline pipe cost			$	205,680
Structures						
Interceptor junction structure			1	$ 45,000	$	45,000
Subtotal					$	1,279,080
Mobilization and Demobilization				5%	$	63,954
Construction Cost Subtotal					$	1,343,034
Contingencies for Unknown Subsurface Conditions				25%	$	335,759
Construction Cost Total					$	1,678,793
Engineering, Administration, and Legal Costs				25%	$	419,698
Capital Improvement Cost Total					$	2,098,491
				rounded	$	2,098,000

Revised

TRUNK SEWER SYSTEM PROJECT DESCRIPTION

PROJECT ID:.....	LCK TRUNK SHED.....LC Upper Laguna Creek
LOCATION:.....	West of Grant Line Rd. north of Kiefer Blvd and east of Jaeger Rd. North of Chrysanthy Blvd.and parallel to Americanos Blvd.. Parallel and south of Kiefer Blvd. Connects to Laguna Creek Interceptor at MH's 5080, 5100, 5110, 5120, 5130, 5140, 5150, and 5160.
BRIEF PROJECT DESCRIPTION:.....	3780 feet of 12-inch pipe, 8610 feet of 15-inch pipe, 2070 feet of 18-inch pipe and 2480 feet of 21-inch pipe.
MODEL REFERENCE:.....	LCK183 to LC5160, LCK160 to LC5150, LCK130 to LC5140, LCK120 to LC5130, LCK092 to LC5120, LCK081 to LC5110, LCK070 to LC5100, LCK060 to LC5080
LOCATION OF CAPACITY DEFICIENCY:..	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.0 mgd (upstream) to 3.4 mgd (downstream)
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Laguna Creek Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	Length (feet)	UNIT COST	COST
Baseline Pipe Construction Cost					
LCK183 to LC5160	15	16-20	1860	$240	$446,400
LCK160 to LCK150	15	20-24	2850	$250	$712,500
LCK150 to LC5150	18	20-24	1730	$290	$501,700
LCK130 to LC5140	15	20-24	1060	$250	$265,000
LCK120 to LC5130	12	16-20	1070	$210	$224,700
LCK092 to LCK090	12	20-24	1000	$220	$220,000
LCK093 to LCK090	12	20-24	860	$220	$189,200
LCK090 to LC5120	15	24-28	30	$260	$7,800
LCK081 to LCK080	12	16-20	720	$210	$151,200
LCK080 to LC5110	15	20-24	1320	$250	$330,000
LCK070 to LC5100	12	16-20	130	$210	$27,300
LCK060 to LCK040	15	20-24	1490	$250	$372,500
LCK040 to LCK020	18	20-24	340	$290	$98,600
LCK020 to LC5080	21	24-28	2480	$340	$843,200
Subtotal Baseline Pipe Construction Cost					$4,390,100
Geotechnical Factors					
Cobble construction factor (undeveloped)	20% of baseline pipe cost				$878,000
Surface Restoration					
Creek Restoration			200	$400	$80,000
Structures					
Interceptor junction structure			8	$45,000	$360,000
Subtotal					$5,708,100
Mobilization and Demobilization				5%	$285,400
Construction Cost Subtotal					**$5,993,500**
Contingencies for unknown subsurface conditions				25%	$1,498,400
Construction Cost Total					**$7,491,900**
Engineering, Administration and Legal Costs				25%	$1,873,000
Capital Improvement Cost Total				rounded	**$9,365,000**

TRUNK SEWER SYSTEM PROJECT DESCRIPTION	
PROJECT ID:.....	LCY TRUNK SHED.....LC Upper Laguna Creek
LOCATION:.....	Along Grant Line Rd. to Sunrise Blvd. Along Sunrise Blvd. between Grant Line Rd. and Jackson Rd. Connects to Laguna Creek Interceptor at MH LC4230.
BRIEF PROJECT DESCRIPTION:...	1500 feet of 15-inch pipe, 1500 feet of 18-inch pipe, 3750 feet of 21-inch pipe, and 1400 feet of 24-inch pipe.
MODEL REFERENCE:.....	LCY050 to LC4230
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.0 mgd (upstream) to 3.8 mgd (downstream)
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Laguna Creek Interceptor Section 4.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

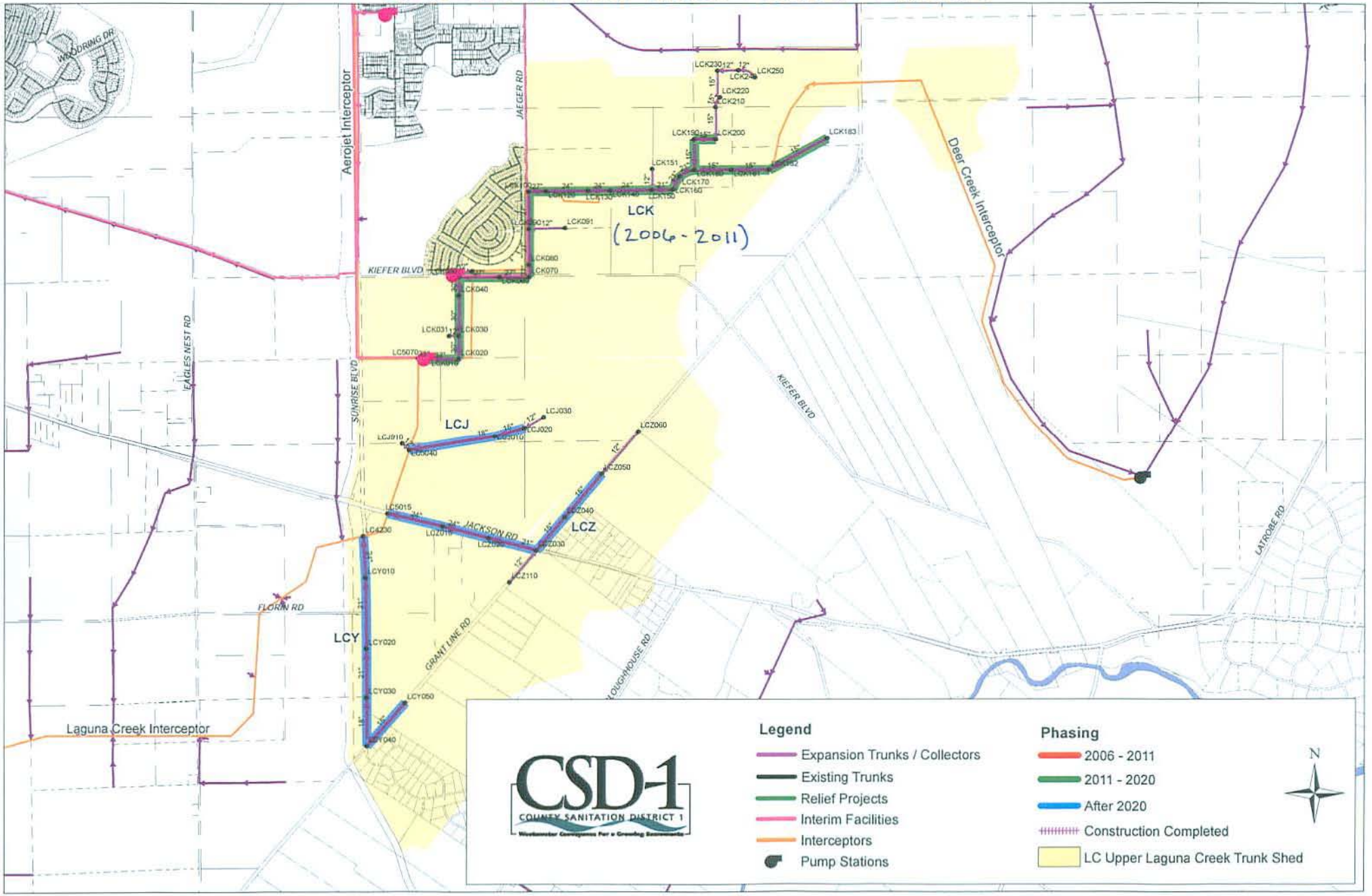
MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST	COST
Baseline Pipe Construction Cost					
LCY050 to LCY040	15	<16	1500	$ 220	$330,000
LCY040 to LCY030	18	<16	1500	$ 250	$375,000
LCY030 to LCY020	21	<16	1500	$ 280	$420,000
LCY020 to LCY010	21	16-20	2250	$ 300	$675,000
LCY010 to LC4230	24	20-24	1400	$ 350	$490,000
Geotechnical Factors					
Cobble construction factor (undeveloped)	20% of baseline pipe cost				$ 458,000
Traffic and Productivity Factors					
Increased Traffic Contol	5% of baseline pipe costs				$114,500
Congested traffic or utility corridor factor	15% of baseline pipe costs				$343,500
Surface Restoration					
Pavement Restoration		15	8150	$ 4	$489,000
Structures					
Interceptor sewer junction structure			1	$ 45,000	$ 45,000
Subtotal					$ 3,740,000
Mobilization and Demobilization				5%	$ 187,000
Construction Cost Subtotal					$ 3,927,000
Contingencies for Unknown Subsurface Conditions				25%	$ 981,750
Construction Cost Total					$ 4,908,750
Engineering, Administration, and Legal Costs				25%	$ 1,227,188
Capital Improvement Cost Total					$ 6,135,938
				rounded	$ 6,136,000

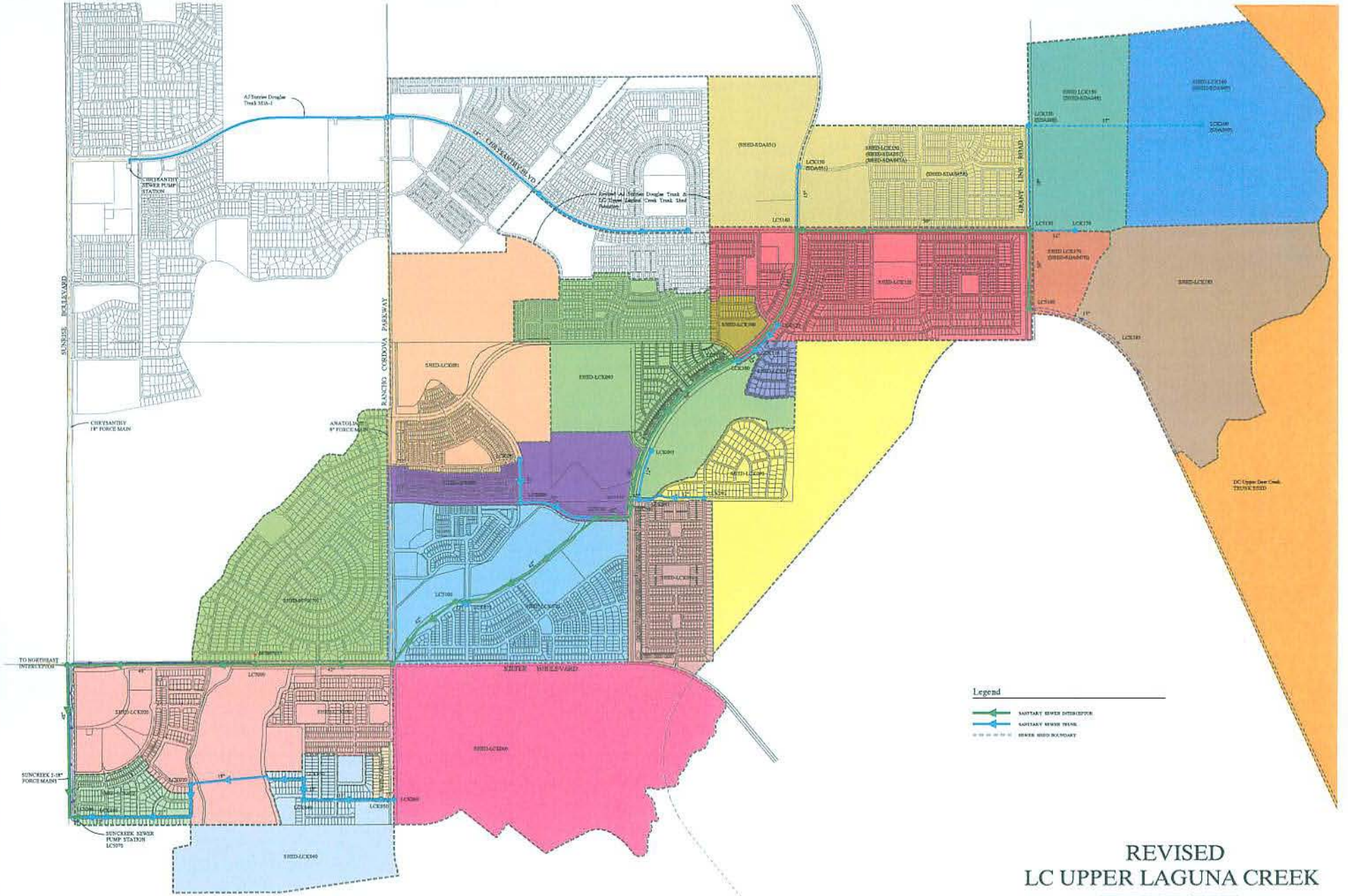
TRUNK SEWER SYSTEM PROJECT DESCRIPTION		
PROJECT ID:.....	LCZ	TRUNK SHED.....LC Upper Laguna Creek
LOCATION:.....	Along Jackson Rd. between Grant Line Rd. and Sunrise Blvd.	
BRIEF PROJECT DESCRIPTION:...	3150 feet of 15-inch pipe, 1500 feet of 21-inch pipe, and 3300 feet of 24-inch pipe.	
MODEL REFERENCE:.....	LCZ050 to LC5015	
LOCATION OF CAPACITY DEFICIENCY:...	N/A	
REASON FOR PROJECT:.....	Expansion for future development	
DESIGN FLOW:.....	1.5 mgd (upstream) to 3.6 mgd (downstream)	
PERCENT FOR EXISTING FLOW:.....	0%	
PERCENT FOR FUTURE FLOW:.....	100%	
SPECIAL CONSIDERATIONS:.....	This project requires the Laguna Creek Interceptor.	
ASSUMPTIONS:.....		
ALTERNATIVES:.....		

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST	COST
Baseline Pipe Construction Cost					
LCZ050 to LCZ040	15	20-24	1800	$ 250	$450,000
LCZ040 to LCZ030	15	>24	1350	$ 270	$364,500
LCZ030 to LCZ020	21	20-24	1500	$ 320	$480,000
LCZ020 to LCZ010	24	20-24	1500	$ 350	$525,000
LCZ010 to LC5015	24	16-20	1800	$ 330	$594,000
Geotechnical Factors					
Cobble construction factor (undeveloped)	20% of baseline pipe cost				$ 482,700
Traffic and Productivity Factors					
Increased Traffic Contol	5% of baseline pipe costs				$120,675
Congested traffic or utility corridor factor	15% of baseline pipe costs				$362,025
Surface Restoration					
Pavement Restoration		15	7950	$ 4	$477,000
Structures					
Interceptor sewer junction structure			1	$ 45,000	$ 45,000
Subtotal					$ 3,900,900
Mobilization and Demobilization				5%	$ 195,045
Construction Cost Subtotal					**$ 4,095,945**
Contingencies for Unknown Subsurface Conditions				25%	$ 1,023,986
Construction Cost Total					**$ 5,119,931**
Engineering, Administration, and Legal Costs				25%	$ 1,279,983
Capital Improvement Cost Total					$ 6,399,914
				rounded	**$ 6,400,000**

REVISED

LC UPPER LAGUNA CREEK PROJECT PHASING





REVISED
LC UPPER LAGUNA CREEK TRUNK SHED

SunCreek Specific Plan

County of Sacramento, California
July, 2008

MacKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 629-8080

7991-00

CSD-1 SEWERAGE FACILITIES EXPANSION MASTER PLAN
2006 UPDATE

(REVISED) AJ SUNRISE DOUGLAS TRUNK SHED

Area Description

The AJ Sunrise Douglas Truck is located east of Sunrise Boulevard, north of Kiefer Boulevard, and west of the Deer Creek watershed. The majority of the shed is south of Douglas Road, but a portion of the shed is located north of Douglas Road along Grant Line Road. The trunk shed includes all but the southeastern corner of the Sunridge Specific Plan area. The Sunridge area has begun developing and will continue to develop during the 2006-2011 period. Areas east of Grant Line Road are not anticipated to start developing until the 2011-2020. period.

Trunk System Facilities

The trunk shed would be served by two major trunk sewers (Trunks SDA-1 and SDA-2) which would flow from east to west. Both trunk sewers would ultimately connect to the Aerojet Interceptor in Sunrise Boulevard. Portions of the trunk sewers, including an interim lift station and force main to the Northeast Interceptor have been constructed.

Because the Aerojet Interceptor is not scheduled for construction until after 2020, interim facilities are required. An interim regional lift station is planned, which will convey wastewater north along Sunrise Blvd. to the Mather Interceptor. Until this facilities is in place, scheduled for 2010, the existing interim lift station will be used.

Trunk Projects

Project ID	Diam. (in.)	Length (ft.)	Phase	Estimated Construction Cost ($)	Estimated Capital Cost ($)
SDA-1	12-18	4,780	2006-2011	1,620,1550	2,426,000
SDA-2	15-42	12,510	2011-2020	4,316,550	5,396,000

Attachments

- Trunk shed map showing proposed trunk sewers, sizes, model manhole ID numbers, and sewer sheds.
- Project map showing trunk projects and interim facilities (if needed).
- Trunk shed ESD projections by sewer shed.
- Sewer shed load manholes.
- Trunk project cost estimates.

AJ Sunrise Douglas
Sewershed Load Manholes and Land Use Projections

		2005				Buildout		
Sewershed	Load Manhole	Contributing Area (ac)	ESDs	ESD/A (ESD/ac)	% Buildout	Contributing Area (ac)	ESDs	ESD/A (ESD/ac)
Shed-067043014	067043014	0.0	0	-	0	21.2	318	15.0
Shed-067043017	067043017	0.0	0	-	0	3.6	21	5.9
Shed-067043018	067043018	0.0	0	-	0	3.1	18	5.9
Shed-067046015	067046015	1.0	5	5.1	7	12.2	73	6.0
Shed-067055005	067055005	0.9	7	7.7	11	7.9	64	8.1
Shed-067055010	067055010	26.0	191	7.3	25	111.1	769	6.9
Shed-067057001	067057001	0.6	3	4.9	3	18.5	120	6.5
Shed-067057014	067057014	0.3	2	6.1	29	1.1	7	6.4
Shed-067060003	067060003	5.0	31	6.3	28	16.2	109	6.7
Shed-067060004	067060004	0.2	1	5.4	14	1.2	7	5.6
Shed-067060005	067060005	3.9	20	5.1	18	20.4	111	5.5
Shed-067060016	067060016	0.0	0	-	0	0.2	1	5.8
Shed-067060020	067060020	0.0	0	-	0	11.8	71	6.0
Shed-067063004	067063004	33.0	210	6.4	16	213.0	1341	6.3
Shed-SDA010	SDA010	0.0	0	-	0	176.3	1173	6.7
Shed-SDA030	SDA030	0.0	0		0	99.2	690	9.0
Shed-SDA042	SDA042	0.0	0	-	0	166.2	998	6.0
Shed-SDA043	SDA043	0.0	0	-	0	69.7	418	6.0
Shed-SDA044	SDA044	0.0	0	-	0	144.6	868	6.0
~~Shed-SDA047~~	~~SDA047~~	~~0.0~~	~~0~~	~~-~~	~~0~~	~~200.8~~	~~1205~~	~~6.0~~
~~Shed-SDA048~~	~~SDA048~~	~~0.0~~	~~0~~	~~-~~	~~0~~	~~113.3~~	~~680~~	~~6.0~~
~~Shed-SDA049~~	~~SDA049~~	~~0.0~~	~~0~~	~~-~~	~~0~~	~~238.9~~	~~1434~~	~~6.0~~
~~Shed-SDA051~~	~~SDA051~~	~~0.0~~	~~0~~	~~-~~	~~0~~	~~88.6~~	~~531~~	~~6.0~~
Shed-SDA084	SDA084	0.0	0	-	0	225.0	1351	6.0
Shed-SDA110	SDA110	0.0	0	-	0	78.6	472	6.0
Shed-SDA271	SDA271	0.0	0	-	0	26.4	159	6.0
Shed-SDA272	SDA272	0.0	0	-	0	226.0	1356	6.0
Shed-SDA275	SDA275	0.0	0	-	0	263.6	1600	6.1
Shed-SDA276	SDA276	0.0	0	-	0	519.5	3134	6.0
Shed-SDA291	SDA291	0.0	0	-	0	134.3	806	6.0
Shed-SDA310	SDA310	0.0	0	-	0	370.6	2247	6.1
Shed-SDB010	SDB010	0.0	0	-	0	0.0	0	-
Total		70.9	470	6.6	2	~~3583.0~~ 2941.5	~~22352~~ 18502	6.2

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AJ Sunrise Douglas
Trunk Sewer Data and Model Results
Buildout 10-Year Design Storm

Link ID	US Manhole	DS Manhole	Link Type	Diameter (in)	Length (ft)	US Rim Elev. (ft)	US Invert (ft)	DS Rim Elev. (ft)	DS Invert (ft)	Slope, %	Full Capacity (mgd)	Peak Flow (mgd)	% Full Capacity	DS d/D
0670943001 1	0670943001	0670943012	Pipe	18.0	206.0	168.480	141.560	168.600	139.360	1.063	7.01	2.0115	29	1.0
0670943012 2	0670943012	0670960018	Pipe	18.0	15.0	168.400	139.260	168.120	139.130	1.800	8.12	2.0612	33	1.0
0670943014 1	0670943014	0670943015	Pipe	15.0	209.8	165.320	142.820	165.770	142.320	0.330	1.62	1.1242	69	0.8
0670943015 1	0670943015	0670943016	Pipe	15.0	354.0	165.770	142.470	166.290	142.050	0.167	1.80	1.1731	76	0.9
0670943016 1	0670943016	0670943017	Pipe	15.0	212.0	166.290	142.900	167.000	142.580	0.151	1.62	1.1728	68	0.9
0670943017 1	0670943017	0670943018	Pipe	15.0	139.9	167.000	142.530	167.500	142.330	0.140	1.61	1.1374	71	0.9
0670943018 1	0670943018	0670943001	Pipe	15.0	318.5	167.500	142.280	168.480	141.610	0.178	1.50	1.1302	77	0.9
0670948013 1	0670948013	0670957001	Pipe	12.0	256.0	169.500	154.500	169.550	154.000	0.195	1.02	0.8734	81	0.9
0670948008 1	0670948008	0670960017	Pipe	36.0	886.0	166.400	140.430	166.240	139.640	0.114	14.54	13.1853	91	0.9
0670950008 1	0670950008	0670948008	Pipe	36.0	952.5	172.800	141.470	169.400	140.530	0.099	13.96	13.1853	97	0.9
0670950005 1	0670950005	0670957014	Pipe	12.0	274.0	178.600	155.500	178.800	154.050	0.187	1.02	0.9868	96	0.9
0670952012 1	0670952012	0670950005	Pipe	12.0	244.2	179.290	156.180	178.600	155.560	0.254	1.16	0.5756	49	0.5
0670957001 1	0670957001	0670960003	Pipe	12.0	300.0	169.550	153.950	169.500	153.350	0.200	1.03	0.7864	68	0.8
0670957014 1	0670957014	0670948013	Pipe	12.0	276.0	169.800	155.000	169.500	154.350	0.187	1.02	0.3715	36	0.5
0670960003 1	0670960003	0670960004	Pipe	12.0	211.0	169.200	153.300	169.040	152.880	0.184	1.02	0.7811	77	0.8
0670960004 1	0670960004	0670960007	Pipe	12.0	236.0	169.040	152.840	168.330	152.380	0.195	1.02	0.7861	77	0.8
0670960005 1	0670960005	0670960016	Pipe	12.0	46.9	168.330	152.330	168.300	152.120	0.244	1.14	0.8677	76	0.9
0670960016 1	0670960016	0670943001	Pipe	12.0	203.3	168.300	152.120	168.480	143.080	4.447	4.86	0.8684	18	0.3
0670960017 1	0670960017	0670960018	Pipe	36.0	17.0	169.240	139.640	169.120	139.120	3.059	75.48	13.1855	17	0.7
0670960018 1	0670960018	0670960016	Pipe	42.0	882.0	169.130	139.120	168.900	138.734	0.100	20.59	15.0624	73	0.5
0670960019 1	0670960019	AJ4135	Pipe	42.0	168.8	164.000	139.738	160.500	138.089	0.100	20.60	15.0673	73	0.4
0670960020 1	0670960020	0670960021	Pipe	8.0	70.0	168.600	150.400	167.100	147.740	3.860	1.52	0.0536	3	0.2
0670960021 1	0670960021	0670943012	Pipe	8.0	275.0	167.100	147.640	168.800	142.500	2.284	1.18	0.0507	4	0.2
0670963004 1	0670963004	0670943014	Pipe	15.0	140.0	164.930	144.038	165.320	143.830	0.143	1.54	0.9444	60	0.8
SDA010 1	SDA010	67050009	Pipe	30.0	347.0	172.300	142.470	172.000	141.570	0.185	17.51	13.1910	75	0.7
SDA020 1	SDA020	SDA010	Pipe	30.0	617.0	178.700	143.480	172.300	142.570	0.149	16.06	12.4117	77	0.8
SDA030 1	SDA030	SDA020	Pipe	30.0	648.0	178.700	144.980	178.700	143.980	0.150	16.10	12.4365	77	0.8
SDA040 1	SDA040	SDA030	Pipe	30.0	865.0	178.400	145.870	178.700	144.980	0.151	16.19	11.6112	71	0.8
SDA041 1	SDA041	SDA040	Pipe	27.0	141.0	176.800	146.600	178.400	146.506	0.142	1.65	4.7747	57	0.9
SDA042 1	SDA042	SDA041	Pipe	24.0	2657.7	184.400	153.230	179.800	147.910	0.221	4.21	4.2184	88	0.8
SDA043 1	SDA043	SDA042	Pipe	21.0	1617.7	187.600	157.770	184.000	153.720	0.250	3.12	3.8993	70	0.746
SDA044 1	SDA044	SDA043	Pipe	21.0	1344.0	187.230	160.630	187.000	157.770	0.250	3.13	3.3409	60	0.6
SDA045 1	SDA045	SDA044	Pipe	18.0	1460.0	183.600	172.600	187.230	160.660	0.816	6.14	2.1660	44	0.6
SDA046 1	SDA046	SDA045	Pipe	18.0	1230.0	216.450	185.150	183.000	173.850	0.800	6.00	2.3364	54	0.4
SDA047 1	SDA047	SDA046	Pipe	18.0	2600.0	320.550	311.250	310.560	289.200	1.000	6.30	2.3301	54	0.6
SDA048 1	SDA048	SDA047	Pipe	18.0	1830.0	336.060	242.080	329.550	313.350	0.484	3.70	1.1938	68	0.4
SDA049 1	SDA049	SDA048	Pipe	18.0	2850.0	350.040	318.940	336.060	313.360	0.480	3.63	1.8330	34	0.5
SDA050 2	SDA050	SDA040	Pipe	27.0	170.0	178.200	146.470	178.400	146.720	1.400	22.71	7.6738	32	0.5
SDA051 1	SDA051	SDA041	Pipe	48.0	1089.0	184.650	175.062	183.000	173.980	0.100	1.82	0.3787	21	0.4
SDA060 1	SDA060	SDA050	Pipe	27.0	483.0	177.800	155.562	178.200	146.570	1.422	23.80	7.6738	32	0.4
SDA070 1	SDA070	SDA060	Pipe	27.0	500.0	177.500	161.350	177.800	155.650	1.150	21.49	7.6736	36	0.4
SDA080 1	SDA080	SDA070	Pipe	27.0	446.0	179.200	163.110	177.500	161.430	1.151	21.50	7.6736	36	0.4
SDA081 1	SDA081	SDA080	Pipe	18.0	181.0	180.300	165.510	179.200	164.160	0.756	3.64	0.9951	27	0.4
SDA082 1	SDA082	SDA081	Pipe	15.0	567.0	183.300	166.660	180.300	165.960	0.221	1.96	0.9951	49	0.4
SDA083 1	SDA083	SDA082	Pipe	15.0	447.0	182.600	167.970	183.300	166.840	0.218	1.95	0.9956	49	0.5
SDA084 1	SDA084	SDA083	Pipe	15.0	109.0	183.000	168.210	182.900	167.970	0.220	1.96	0.9960	49	0.5
SDA090 1	SDA090	SDA080	Pipe	27.0	474.0	178.600	164.110	179.200	163.150	0.200	9.67	6.7901	70	0.5
SDA100 1	SDA100	SDA090	Pipe	27.0	473.0	182.700	165.110	179.600	164.150	0.201	9.68	6.7903	70	0.6
SDA110 1	SDA110	SDA100	Pipe	24.0	500.0	185.400	166.360	182.700	165.360	0.200	8.55	6.7904	100	0.6
SDA120 1	SDA120	SDA110	Pipe	24.0	561.0	184.670	167.410	185.400	166.410	0.178	8.18	6.4886	100	0.8
SDA130 1	SDA130	SDA120	Pipe	24.0	180.0	184.750	167.730	184.670	167.510	0.202	8.58	6.4881	90	0.9
SDA140 1	SDA140	SDA130	Pipe	24.0	271.0	185.820	168.300	184.750	167.830	0.209	8.68	6.4887	97	0.8
SDA150 1	SDA150	SDA140	Pipe	24.0	580.0	188.860	169.400	185.820	168.350	0.210	8.71	6.4913	97	0.9
SDA160 1	SDA160	SDA150	Pipe	24.0	500.0	182.740	170.500	188.860	169.450	0.210	8.71	6.4878	97	0.8
SDA170 1	SDA170	SDA160	Pipe	24.0	500.0	183.760	171.650	182.740	170.550	0.220	8.87	6.5098	95	0.8
SDA180 1	SDA180	SDA170	Pipe	24.0	502.8	185.480	172.720	183.760	171.650	0.210	8.71	6.5091	97	0.8
SDA190 1	SDA190	SDA180	Pipe	24.0	500.0	200.510	173.830	185.480	172.730	0.219	8.71	6.5088	97	0.8
SDA200 1	SDA200	SDA190	Pipe	24.0	500.0	200.510	174.600	200.510	173.830	0.219	8.71	6.5114	97	0.9
SDA210 1	SDA210	SDA200	Pipe	24.0	500.0	203.010	176.000	200.510	174.950	0.219	8.71	6.5139	97	0.9
SDA220 1	SDA220	SDA210	Pipe	24.0	500.0	200.860	177.100	203.010	176.090	0.219	8.71	6.5156	97	0.8
SDA230 1	SDA230	SDA220	Pipe	24.0	500.0	201.430	178.140	200.860	177.190	0.198	8.51	6.5178	100	0.8
SDA240 1	SDA240	SDA230	Pipe	24.0	434.0	202.780	179.190	201.430	178.190	0.210	8.70	6.5213	97	0.8
SDA250 1	SDA250	SDA240	Pipe	24.0	366.0	202.780	179.780	202.780	179.190	0.227	8.97	6.5278	94	0.8
SDA260 1	SDA260	SDA250	Pipe	24.0	443.0	204.330	182.440	202.780	179.830	0.142	5.51	6.5362	120	0.8
SDA270 1	SDA270	SDA260	Pipe	24.0	500.0	206.220	181.560	204.330	180.510	0.210	8.71	6.5435	98	0.9
SDA271 1	SDA271	SDA270	Pipe	15.0	1047.5	204.000	183.880	206.220	182.310	0.151	1.62	1.0742	85	0.8
SDA272 1	SDA272	SDA271	Pipe	12.0	743.3	200.000	185.370	204.000	183.880	0.199	1.01	0.6681	84	0.7
SDA273 1	SDA273	SDA270	Pipe	15.0	400.0	203.880	180.740	206.220	182.310	2.197	6.07	3.3509	55	0.9
SDA274 1	SDA274	SDA273	Pipe	15.0	1213.3	221.000	203.610	203.880	180.780	1.057	4.30	3.3321	78	0.7
SDA275 1	SDA275	SDA274	Pipe	15.0	1336.7	230.000	212.210	221.000	203.610	0.843	3.35	3.3331	100	0.7
SDA276 1	SDA276	SDA275	Pipe	12.0	1102.0	237.540	229.340	230.000	212.460	1.532	2.83	2.2347	78	1.0
SDA280 1	SDA280	SDA270	Pipe	18.0	500.0	208.470	184.760	206.220	182.060	0.549	4.99	2.1911	43	0.9
SDA290 1	SDA290	SDA280	Pipe	18.0	1134.9	215.260	190.160	208.470	184.810	0.474	4.68	2.1730	46	0.9
SDA291 1	SDA291	SDA290	Pipe	12.0	616.7	215.360	191.950	215.260	190.890	0.201	1.03	0.5781	56	0.4
SDA300 1	SDA300	SDA290	Pipe	18.0	2579.0	250.000	226.230	215.360	191.910	1.431	8.15	1.6010	20	0.3
SDA310 1	SDA310	SDA300	Pipe	15.0	2600.0	280.030	248.430	250.000	229.730	0.486	2.64	1.6010	61	0.5
SDB010 1	SDB010	AJ1244	Pipe	12.0	319.8	152.000	117.554	152.001	116.819	0.201	1.04	0.0000	0	0.1

REVISED SEE ATTACHED

DELETED

Revised
AJ Sunrise Douglas
Trunk Sewer Data and Model Results
Buildout 10-Year Design Storm

Link ID	US Manhole	DS Manhole	Link Type	Diameter (in)	Length (ft)	US Rim Elev. (ft)	US Invert (ft)	DS Rim Elev. (ft)	DS Invert (ft)	Slope, %	Full Capacity (mgd)	Peak Flow (mgd)	% Full Capacity	DS d/D
SDA041.1	SDA041	SDA040	Pipe	18	140.0	179.800	147.670	178.400	147.470	0.140	2.54	1.760	69	0.6
SDA042.1	SDA042	SDA041	Pipe	18	2820.0	184.000	151.720	179.800	147.770	0.140	2.54	1.760	69	0.6
SDA043.1	SDA043	SDA042	Pipe	12	1820.0	187.000	156.590	184.000	152.220	0.240	1.03	1.010	98	0.7

Revised

TRUNK SEWER SYSTEM PROJECT DESCRIPTION

PROJECT ID:.....	SDA-1 TRUNK SHED.....AJ Sunrise Douglas
LOCATION:.....	South of Doglas Rd. between Jaeger Rd. and 6,440 feet of Grant Line Road.
BRIEF PROJECT DESCRIPTION:.....	1820 feet of 12-inch pipe and 2960 feet of 18-inch pipe.
MODEL REFERENCE:.....	SDA042 to SDA 041
LOCATION OF CAPACITY DEFICIENCY:..	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.0 mgd (upstream) to 2.4 mgd (downstream)
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires the Areojet Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	Length (feet)	UNIT COST	COST
Baseline Pipe Construction Cost					
SDA043 to SDA 042	12	16-20	1820	$200	$364,000
SDA042 to SDA041	18	20-24	2960	$290	$858,400
Subtotal Baseline Pipe Construction Cost					$1,222,400
Geotechnical Factors					
Cobble construction factor (undeveloped)	20% of baseline pipe cost				$244,500
Structures					
Trunk junction structure			1	$12,000	$12,000
Subtotal					$1,478,900
Mobilization and Demobilization				5%	$73,900
Construction Cost Subtotal					$1,552,800
Contingencies for unknown subsurface conditions				25%	$388,200
Construction Cost Total					$1,941,000
Engineering, Administration and Legal Costs				25%	$485,300
Capital Improvement Cost Total				rounded	$2,426,000

TRUNK SEWER SYSTEM PROJECT DESCRIPTION

PROJECT ID:.....	SDA-2 TRUNK SHED.....AJ Sunrise Douglas
LOCATION:.....	North of Douglas Rd. between Security Park Dr. and Grant Line Rd. South of Douglas Rd. between Malher East Rd. and Grant Line Rd. Along Jaeger Rd. between Douglas Rd. and Pericles Rd. and Sunrise Blvd. at Chrysanthy Blvd. Connects to the Aerojet Interceptor at MH AJ4135.
BRIEF PROJECT DESCRIPTION:...	1100 feet of 12-inch pipe, 6800 feet of 15-inch pipe, 4300 feet of 18-inch pipe, 140 feet of 27-inch pipe, and 170 feet of 42-inch pipe.
MODEL REFERENCE:.....	SDA310 to SDA 270, SDA276 to SDA270, SDA271 to SDA270, SDA041 to SDA040 and MH 067060019 to AJ4135.
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	1.1 mgd (upstream) to 15.1 mgd (downstream).
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW.....	100%
SPECIAL CONSIDERATIONS:.....	This project requires SDA-1 and the Aerojet Interceptor.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

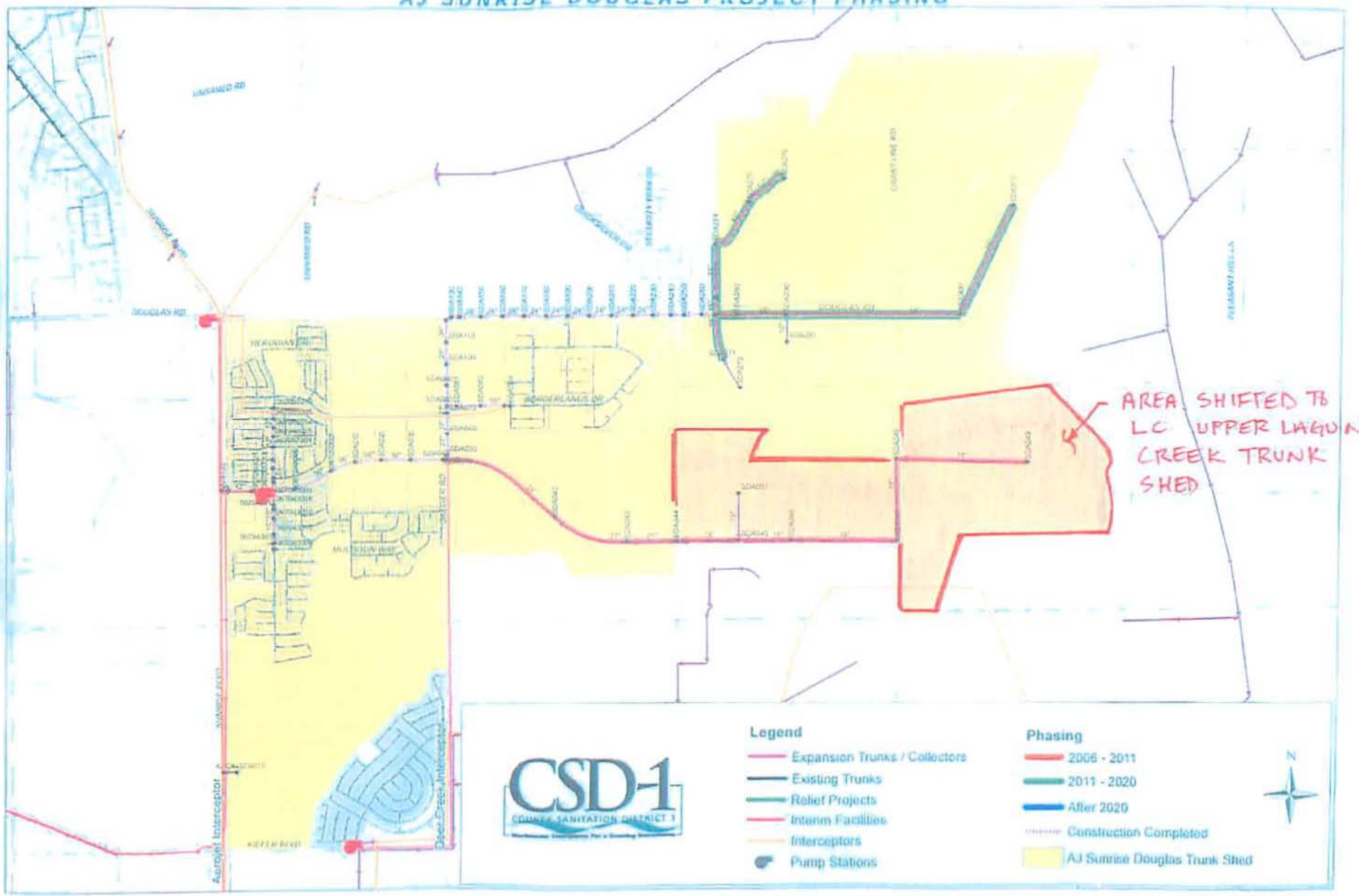
MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST		COST
Baseline Pipe Construction Cost						
SDA310 to SDA300	15	20-24	2800	$ 250	$	700,000
SDA300 to SDA270	18	20-24	4300	$ 290	$	1,247,000
SDA276 to SDA275	12	<16	1100	$ 190	$	209,000
SDA275 to SDA270	15	16-20	2950	$ 240	$	708,000
SDA271 to SDA270	15	16-20	1050	$ 240	$	252,000
SDA041 to SDA040	27	>24	140	$ 420	$	58,800
MH 067060019 to AJ4135	42	>24	170	$ 600	$	102,000
Structures						
Trunk junction structure			1	$ 12,000	$	12,000
Subtotal					$	3,288,800
Mobilization and Demobilization				5%	$	164,440
Construction Cost Subtotal					$	3,453,240
Contingencies for Unknown Subsurface Conditions				25%	$	863,310
Construction Cost Total					$	4,316,550
Engineering, Administration, and Legal Costs				25%	$	1,079,138
Capital Improvement Cost Total					$	5,395,688
				rounded	$	5,396,000

TRUNK SEWER SYSTEM PROJECT DESCRIPTION	
PROJECT ID:.....	SDPS TRUNK SHED.....AJ Sunrise Douglas
LOCATION:.....	Along Sunrise Blvd. between Douglas Rd. and Chrysanthy Blvd. Along Chrysanthy Blvd. east of Sunrise Blvd.
BRIEF PROJECT DESCRIPTION:...	4520 feet of 6-inch force main and a 0.2 mgd pump station.
MODEL REFERENCE:.....	SDCFM1 to MH 067060022
LOCATION OF CAPACITY DEFICIENCY:...	N/A
REASON FOR PROJECT:.....	Expansion for future development
DESIGN FLOW:.....	5.3 mgd.
PERCENT FOR EXISTING FLOW:.....	0%
PERCENT FOR FUTURE FLOW:.....	100%
SPECIAL CONSIDERATIONS:.....	This facility will remain interim until the Aerojet Interceptor is constructed.
ASSUMPTIONS:.....	
ALTERNATIVES:.....	

MAJOR ITEMS	DIA. (in)	DEPTH (feet)	LENGTH (feet)	UNIT COST	COST
Baseline Pipe Construction Cost					
SDCFM1 to MH 067060022	6	Force Main	4520		
Structures, Pits, and Pump Stations					
0.2 mgd pump station			1		

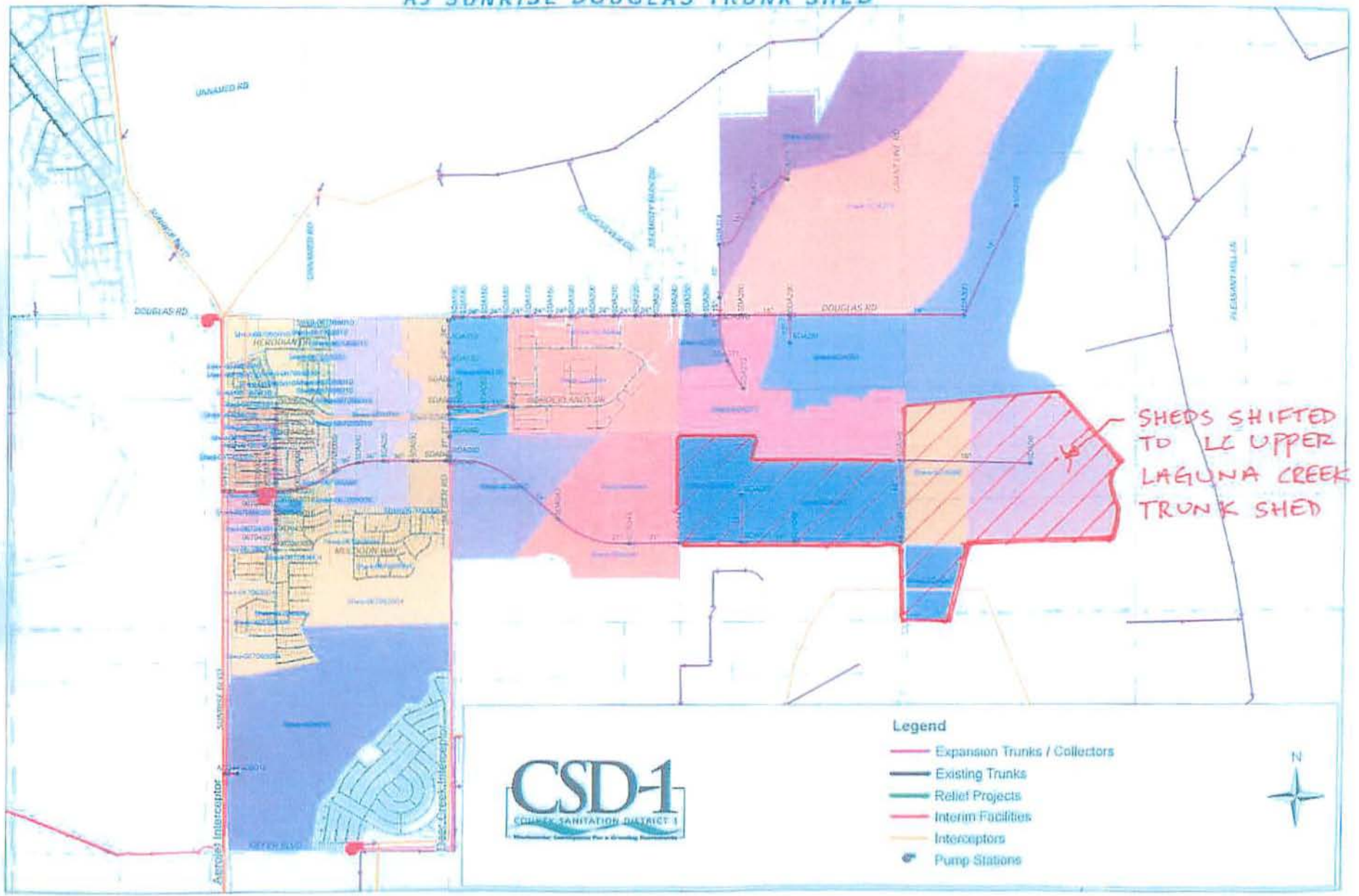
REVISED

AJ SUNRISE DOUGLAS PROJECT PHASING



REVISED

AJ SUNRISE DOUGLAS TRUNK SHED



Appendix G:

SunCreek Specific Plan – Sanitary Sewer Master Plan Exhibit E

36" SEWER TRUNK

CHRYSANTHY SEWER PUMP STATION

SUNRISE BOULEVARD

RANCHO CORDOVA PARKWAY

CHRYSANTHY 18" FORCE MAIN

ANATOLIA III 8" FORCE MAIN

CHRYSANTHY 18" FORCE MAIN

TO NORTHEAST INTERCEPTOR

APPROXIMATE POINT OF CONNECTION TO CHRYSANTHY FORCE MAINS

APPROXIMATE POINT OF CONNECTION TO ANATOLIA III FORCE MAIN

ANATOLIA III SEWER PUMP STATION

ANATOLIA III 8" FORCE MAIN

SUNCREEK 8" FORCE MAIN

SUNCREEK 2-18" FORCE MAINS

SUNCREEK SEWER PUMP STATION

KIEFER BOULEVARD

GRANT LINE ROAD

OFF-SITE SHED 4-1
85.5 ± AC.
513.0 ESDs

THE PRESERVE
OFF-SITE SHED 3-10
68.5 ± AC.
835 ESDs

OFF-SITE SHED-SDA051
88.6 ± AC.
531 ESDs

OFF-SITE SHED-SDA047a
146.0 ± AC.
876 ESDs

OFF-SITE SHED-SDA048
113.3 ± AC.
680 ESDs

OFF-SITE SHED-SDA049
238.9 ± AC.
1434 ESDs

OFF-SITE SHED-SDA047b
54.8 ± AC.
329 ESDs

OFF-SITE SHED-LCK183
241.4 ± AC.
1448 ESDs

OFF-SITE SHED 3-2
55.9 ± AC.
335.4 ESDs

OFF-SITE SHED 3-1
67.6 ± AC.
405.6 ESDs

OFF-SITE SHED 3-3
48.3 ± AC.
289.8 ESDs

OFF-SITE DC Upper Deer Creek
4899.4 ± AC.
29397 ESDs

OFF-SITE ARBORETUM-SHED 1
(input node 7-4)
313.4 ± AC.
1880.4 ESDs
(See "The Arboretum" Sewer Design Report, prepared by Wood Rodgers, dated 05/2008)

OFF-SITE ARBORETUM-SHED 2
(input node 7-6)
83.3 ± AC.
499.8 ESDs
(See "The Arboretum" Sewer Design Report, prepared by Wood Rodgers, dated 05/2008)

47.9 ± AC.
294.2 ESDs

36.0 ± AC.
249.8 ESDs

10.0± AC
81 ESDs

19.3 ± AC.
135 ESDs

24.9 ± AC.
157.2 ESDs

32.4 ± AC.
216.2 ESDs

25.0 ± AC.
156.4 ESDs

19.4 ± AC.
116.4 ESDs

15.2 ± AC.
91.6 ESDs

9.3 AC.
13.2 ESDs

14.8 ± AC.
88.8 ESDs

32.4 ± AC.
239.2 ESDs

6.6 AC. 39.6 ESDs

50.1 ± AC.
300.6 ESDs

48.0 ± AC.
288.0 ESDs

35.9 ± AC.
193 ESDs

35.8 ± AC.
214.8 ESDs

51.3 ± AC.
523.0 ESDs

30.3 ± AC.
368.8 ESDs

51.0 ± AC.
306.0 ESDs

47.3 ± AC.
283.8 ESDs

4.6 ± AC. 27.6 ESDs

55.3 ± AC.
500.0 ESDs

32.9 ± AC.
197.4 ESDs

15.2 ± AC.
91.2 ESDs

11.1 ± AC.
81.0 ESDs

22.4 ± AC.
134.4 ESDs

18.5 ± AC.
119.0 ESDs

17.6 ± AC.
125.2 ESDs

41.0 ± AC.
264 ESDs

15.6 ± AC.
118.0 ESDs

44.2 ± AC.
367.6 ESDs

43.2 ± AC.
403.2 ESDs

13.7 ± AC.
82.2 ESDs

19.9 ± AC.
119.4 ESDs

54.6 ± AC.
526.4 ESDs

77.0 ± AC.
462.0 ESDs

10.2± AC
81.0 ESDs

63.2 ± AC.
470.4 ESDs

50.6 ± AC.
303.6 ESDs

36.6 ± AC.
219.6 ESDs

Legend

- SANITARY SEWER INTERCEPTOR
- SANITARY SEWER TRUNK
- SANITARY SEWER COLLECTOR
- SCHEMATIC SANITARY SEWER
- PROPOSED FORCE MAIN
- EXISTING FORCE MAIN
- SEWER SHED BOUNDARY
- MANHOLE/NODE NUMBER
- CONTRIBUTING AREA (ACRES)
- CONTRIBUTING EQUIVALENT SINGLE FAMILY DWELLINGS
- CUMULATIVE AREA (ACRES)
- CUMULATIVE EQUIVALENT SINGLE FAMILY DWELLINGS
- PEAK WET WEATHER FLOW (MILLION GALLONS PER DAY)

NOTES

1. All inverts shown are out inverts unless otherwise specified.
2. The elevations and topography shown are per NGVD 88.

0' 250' 500' 1000'
SCALE: 1" = 500'

EXHIBIT E

SANITARY SEWER MASTER PLAN

SunCreek Specific Plan

County of Sacramento, California

March, 2009

MACKAY & SOMPS
CIVIL ENGINEERS, INC.
SACRAMENTO, CALIFORNIA (916) 929-6092

7991-00

3-25-2009 09:45:50 L:\Sacramento\7991\100 Master Plans\Sewer\Exh-E Sewer Master Plan.dwg
I:\L:\Sacramento\7991\100 Boundary\Base Map.dwg [3] L:\Sacramento\7991\100 Utilities - Plans\Sewer\Sewer Splits - topo-none enlarged for sewer exhibit 10152007.dwg [3]

Appendix H:

The Preserve at SunRidge – Sewer Study Exhibit (Wood-Rodgers 2006)

EXHIBIT E

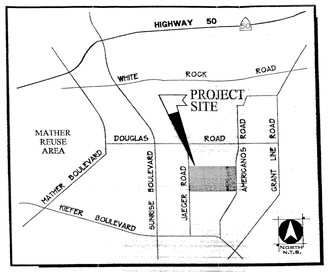
THE PRESERVE AT SUNRIDGE

SEWER STUDY (SOUTH)

CITY OF RANCHO CORDOVA CALIFORNIA

JUNE, 2006

SHEET 2 OF 2



VICINITY MAP
N.T.S.

LEGEND

- 278' @ 8"S, S=0.0018 — PIPE LENGTH; PROPOSED SEWER PIPE (INCHES); PIPE SLOPE
- INV=154.59, RIM=61.5, D=13.1 — PIPE INVERT; MANHOLE RIM ELEV.; DEPTH
- PROPOSED SEWER MANHOLE
- INDIVIDUAL SHED BOUNDARY
- PROJECT BOUNDARY
- A =0.00 ac., ΣA =19.9 ac., ESD=1.7, ΣESD =108, Q =0.09mgd — NODE NUMBER; POINT ACREAGE; CUMULATIVE ACREAGE; POINT ESD; CUMULATIVE ESD; PEAK WET WEATHER FLOW (MGD)

SEE SHEET 1 OF 2

COMMUNITY PARK
28.1 AC

WETLAND PRESERVE
82.5 AC

2.7 AC PARK

PROPOSED LIFT STATION (EAST)
GROUND EL=175.0
INV 156.16 10"IN(S)

PROPOSED LIFT STATION (EAST) TO SERVE THE SOUTHEAST PORTION OF THE PRESERVE PROJECT. THE FORCEMAIN DUMPS INTO THE TRUNK SYSTEM ON CHRYSANTHY BLVD.

-THE MAJORITY OF SEWER FLOWS FROM THE SOUTHEAST PORTION OF THE PROJECT ARE APART OF THE UPPER LAGUNA CREEK TRUNK SEWER SHED AND WILL ULTIMATELY GRAVITY TO THE SOUTH.

- Pump Sizes
- Screening Issues (Odors)
- Maintenance Access
- Prelim Layout

SCALE: 1" = 100'

CSD-1 JUN 15 2006 RECEIVED

EXHIBIT E
SEWER STUDY (SOUTH)

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
3301 C St, Bldg. 100-B Tel 916.341.7760
Sacramento, CA 95816 Fax 916.341.7767