



Master Drainage Plan

City of Wildomar



Prepared by Interest
Consulting Group

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Supplemental to RCFC&WCD
MDPs of 1980 and 1982

MASTER DRAINAGE PLAN
Supplemental to
Riverside County Flood Control and
Water Conservation District MDPs of 1980 and 1982



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Executive Summary

To provide the residents of the City of Wildomar with a high level of flood protection, the City Council and City Management initiated a Master Drainage Plan study that would identify needed drainage facilities and address financing options to implement the plan. The results of the study will be used by City Management to schedule and budget for drainage improvements as well as provide a guide for the requirements of future development.

A Citywide GIS base map was developed with street, parcel and contour elevation data. An important element of the plan was the establishment of an existing drainage facility inventory and map. An extensive research effort was required to collect the necessary data and then input it into a GIS layer for future reference and use. While this effort is still a work in progress, a majority of existing drainage facilities have been inventoried and mapped and have been used for reference in this plan.

The City was divided into four major drainage Regions based on the boundaries established by the previous master plan studies prepared by the Riverside County Flood Control and Water Conservation District (District). These Regions have been designated as Region M, W, S and A. Each Region was divided into drainage area Subregions for study. Runoff was determined, and proposed facilities identified based on an established flood control level criterion. These Regions and Subregions are shown on Exhibit A in the Appendix.

The facility study has been completed for all four Regions and proposed facilities identified. The proposed and existing facilities for each Region are shown on Exhibit B maps in the Appendix. The study did not analyze existing facilities to determine deficiencies. This is an additional phase that can be performed at a later date if warranted.

Cost estimates were prepared for each of the proposed facilities and summarized by Subregion and Region. Costs include design, environmental studies, construction, inspection and management. Right of Way costs, if any, are not included in the estimates.

The following table summarizes the costs for each Region and total costs for all Regions:

Table 1 - MDP Cost Summary by Region

Region	Proposed Facility Cost
W	\$18,800,000
S	\$29,300,000
M	\$6,900,000
A	\$4,700,000
Total	\$59,700,000

Funding of the proposed facilities is provided by the following funding sources:

1. Riverside County Flood Control District as a part of the construction of their Master Plan Facilities.
2. Development constructed facilities required by conditions of development
3. Development Impact Fees collected as a condition of development.
4. Capital Improvement Project fund

I. Introduction

The City of Wildomar was incorporated in 2008. At the time of incorporation, the population was approximately 32,000 and as of January 2019 the population was approximately 37,000. Prior to incorporation regional drainage planning, priorities, construction of new facilities and maintenance was provided by the Riverside County Flood Control and Water Conservation District (District). In addition, some local facilities were constructed and maintained by the County Transportation Department or local development. These local facilities became the responsibility of the City upon incorporation. As development in the area began to accelerate in the late 1970s the District developed several Master Drainage Plans in the area that were partially or totally within what was to become the City of Wildomar. These studies are entitled:

- Master Drainage Plan for the Wildomar Area, Zone 7, August 1980
- Master Drainage Plan for the Sedco Area, Zone 3, March 1982
- Murrieta Creek Area Drainage Plan, March 1986
- Master Drainage Plan for the Murrieta Creek Area, Zone 7, March 1986

All these studies identified various drainage facilities for construction to provide a level of flood protection that in general would maintain 10-year runoff within the street curbs and 100-year runoff within the street right of way. For the most part the studies looked at large drainage areas and the runoff paths of these areas. Therefore, the facilities recommended can be generally classified as regional facilities. Since the implementation of these reports several of the recommended systems have been constructed providing an increased level of flood protection and significant benefit to the area.

The City of Wildomar has determined that in order to provide an adequate level of local flood control for the existing developed areas as well as new developed areas a detailed Master Drainage Plan (MDP) was needed that would study and identify the local flood control facilities required to meet the level of flood control established.

II. Purpose

In general, the purpose of the Wildomar MDP is to identify areas that are deficient in meeting the flood control protection criteria established and recommend sub-regional and local drainage facilities that will mitigate the deficiencies and provide the level of flood protection established. In addition, the plan will identify costs and address financing. The plan will act as an implementation guide for the City and future developers.

There are several specific elements associated with the development of the City of Wildomar MDP. These include:

- The MDP study area covers the entire City and includes the information presented in the previous Master Drainage Plans developed by the District. Therefore, the entire City's Drainage Plan will be in one document.
- The development of a MDP requires knowledge of what drainage facilities are existing. Since the City did not have an existing facility's map or inventory the preparation of an Existing Facilities Map showing existing District and City maintained facilities became an important purpose of the MDP process
- It was not the purpose of this initial MDP study to evaluate existing facilities for deficiencies. This would be the subject of a future phase. However, in some cases an existing facility became

part of a new proposed facility in which case the existing facility was evaluated for sufficient capacity.

- Estimate the cost of each proposed facility including design, construction and administration costs.
- Develop a priority list of projects for each Region and Citywide.
- Address financing with funding for project implementation.

III. Scope

This is a limited scope study. The study is limited to identifying proposed master plan facilities based on the 1978 Riverside County Flood Control & Water Conservation District Hydrology Manual and established criteria. There has been no attempt to identify potential retention / detention basins to reduce flows and reduce facility sizes. This is left to the final design of each facility where the feasibility of such facilities can be studied. There has also been no consideration for water quality mitigation basins or facilities. This is also left for final design.

The scope of this study did not include the evaluation of existing facilities to determine if they are deficient to convey the runoff from their tributary area. Priority was placed on identifying new facilities to provide an additional level of flood control protection. Evaluation of existing facilities is an additional phase of the study that can be performed later if determined to be warranted.

IV. Criteria

The following general criteria have been established by the City of Wildomar for the development of the Master Drainage Plan.

1. The Riverside County Flood Control Hydrology Manual Rational Method was used for the development of runoff quantities.
2. Runoff was calculated based on existing land uses. Runoff from undeveloped sites was calculated using pre-development land use. The City of Wildomar policy is that the 10 year and 100-year post-development runoff leaving the site may not exceed the pre-development runoff. Therefore, the runoff used in the Master Drainage Plan is the pre-development runoff. See the Section on Land Use for details on dwelling units per acre used for the various land uses.
3. In general, the level of protection is to provide 100-year flood protection for all dwelling units. The City Subdivision Ordinance requires this level of protection for all new subdivisions. Due to the nature of existing development and existing uncontrolled flow paths in the older portions of the City, providing this level of protection for all existing units will depend on the improvement of existing unimproved roadways or on the construction of improved drainage courses or facilities.
4. There is a substantial amount of undeveloped and unpaved roadways in the City. When flow paths occur in these roadways the use of the ultimate improved City. Standard Street Sections were used to calculate travel times, runoff quantities and flow depths as well as determining the need for drainage facilities.
5. When existing flow paths appear to deviate from existing undeveloped roadways the condition was noted on the Hydrology Maps indicating the existing flow paths may differ from the ultimate paths as indicated in the Master Plan.
6. To meet the general protection level criteria, the following working criteria has been established:
 - Contain 100-year runoff within the street right of way as shown on Plate 1A of the Hydrology Manual

- Contain 10-year runoff within the street curbs as shown on Plate 1A of the Hydrology Manual
 - 10-year storm runoff within Arterial Highways shall be restricted to the curb side lanes. Maintain one lane clear in each direction.
7. In general, a storm drain facility was proposed when runoff exceeded any of the criteria in Item 6 above. Special cases are noted on the Hydrology Maps.
 8. In general, proposed facilities were not indicated on undeveloped parcels with natural channels traversing them. It was assumed that upon development these channels would be maintained, relocated or replaced as part of the development process. The channels are designated on the maps as a “Natural Channel”.

V. Description of the Study Area

The City of Wildomar has an area of 24 square miles. Terrain is flat to moderately hilly with some steeper mountainous areas on the east and west. Some major channels, storm drains and detention and debris basins exist, designed and constructed in accordance with Master Drainage Plans by the Riverside County Flood Control & Water Conservation District in the 1980s or early 1990s. Others remain proposed. In the present study, areas tributary to those existing major facilities were not restudied; only areas bypassing them.

The northwestern portion of the City (Region S) lies in the Santa Ana River watershed. In general storm runoff flows westerly into the City of Lake Elsinore and its namesake Lake. The central, eastern and southern portion (Regions W and M) lie in the Santa Margarita watershed. Runoff flows southwesterly or northeasterly to Murrieta Channel/Creek. The northeastern portion (Region A) lies northeast of the northeast mountain ridge. Runoff flows to the north to the City of Lake Elsinore and west to the City of Menifee. See the “Regions” section below for detail.

VI. GIS Base Maps

Prior to beginning the study, a suitable base map of the City was needed. Initial base map information was obtained with the cooperation of the County of Riverside including street and parcel data as well as contour mapping. This information was placed into a GIS and became the starting base map for the MDP study. Additional layers were added as the study progressed including the following:

- Regional Drainage Boundaries from the prior master plan reports prepared by the District.
- Existing land use data used for hydrology calculations
- Subdivision data
- Soils data
- Sub regional drainage boundaries
- Hydrology data
- Existing facility locations and data
- Proposed Facilities

The result has been a comprehensive GIS layered map that can be used by City staff for many purposes. The layers can be modified as new subdivisions or drainage facilities are added or as other updates are made to the data. This effort is ongoing as a work in progress.

VII. Regions

The City was divided into four Regions for study. The Regions represent major drainage areas. Each of the regions was divided into Subregions representing a specific study area. A general description of each Region is described below. A map showing the Regions and Subregions is included in the Appendix as Exhibit A.

Region S

Region S (“Sedco”) in general, is bounded by the drainage boundaries of the 1982 Master Drainage Plan for the Sedco Area prepared by the District. It lies within the Santa Ana River watershed. The Region contains approximately 2900 acres and was divided into six Subregions for study. These Subregions are labeled S1 through S6 as shown on Exhibit A.

Region W

Region W (“Wildomar”), in general, is bounded by the drainage boundaries of the 1980 Wildomar Area Master Drainage Plan prepared by the District. It lies within the Santa Margarita River watershed. The Region contains approximately 3200 acres and was divided into eight Subregions for study. These Subregions are labeled W1 through W8 as shown on Exhibit A.

Region M

Region M (“Murrieta”), in general, is bounded by the drainage boundary of Region W and the southeastern City limit. It lies within the Santa Margarita watershed. The Region contains approximately 3620 acres and was divided into five Subregions for study. These Subregions are labeled M1 through M5 as shown on Exhibit A.

Region A

Region A, in general, is bounded by the drainage boundaries of Regions S and W on the south and the city limits with the City of Lake Elsinore to the north and the City of Menifee on the east. It lies within the Santa Ana River watershed. The Region was divided into four Subregions for study. These Subregions are labeled A1 through A4 as shown on Exhibit A.

VIII. Existing Facilities

An important element of the MDP is to identify existing facilities in the City. Due to the lack of available information, this task became a considerable effort and will continue to be a work in progress as new facilities are added. The effort was a combination of obtaining existing information from the District and County Road Department, obtaining Caltrans plans to verify drainage facilities under the 15 Freeway, researching existing subdivisions and obtaining improvement plans as well as field observations and verification of existing facilities. The identified existing facilities are shown on the Existing and Proposed Facility maps for each Region located in the Appendix as Exhibits B1 through B4. All the information obtained was placed into various existing facility data layers in the GIS Maps.

IX. Study Methodology

Storm water runoff flow rates were computed using the Rational Method as presented in the 1978 Riverside County Flood Control & Water Conservation District Hydrology Manual. The software used was RMH-RC version 9.5 for Windows by Jack P. Norris. Areas exceeding about 500 acres were further analyzed by synthetic unit hydrograph calculations using Civildesign software version 9.0.

The Rational Method formula is the classic $Q=CIA$ where:

- Q is runoff in cubic feet per second
- C is the coefficient of runoff (the ratio of runoff to rainfall). The coefficient of runoff is a function of pervious cover fraction (determined by land use), and of soil infiltration rate determined by soil type and rainfall intensity.
- I is rainfall intensity in inches per hour
- A is drainage area in acres.

X. Rainfall Model

The rainfall models used in this study are those of the Riverside County Flood Control & Water Conservation District’s 1978 Hydrology Manual. Any updated rainfall is left to final design as directed by the City. Calculated runoff is unattenuated by future detention facilities and that also is left to final design.

XI. Hydrology Studies

Hydrology studies were performed for each of the Subregions to determine runoff quantities and facility needs. Hydrology maps were prepared and the data entered into the GIS maps. Hydrology calculations and maps are included in the Technical Data Volume of the MDP (separate cover) and are also saved electronically in the City files.

XII. Soils

Soil types were taken from the current database of the National Resources Conservation Service, as recommended by the Flood Control District, not from the soil group maps in the Hydrology Manual. Copies of the Soils Maps are included in the Technical Data Volume of this report.

XIII. Land Use

Land uses are as existing on February 2016 plus approved undeveloped sites at the time of the hydrology input data. When sites are developed the peak post-development runoff must not exceed the pre-development peak runoff. The specific densities used in the runoff calculations for the various land uses are as follows:

Table 2 - Land Use Impervious Fractions

Land Use	Impervious Fraction
Rural, Conservation, Open Space	0.0
Estate Density Residential	0.1
Very Low Density Residential	0.2
High School	0.4
Low Density Residential	0.4
Medium Density Residential	0.5
Medium High Density Residential	0.55
High Density Residential	0.6
Very High Density Residential	0.8
Commercial, Industrial	0.9

XIV. Proposed Storm Drain Facility Criteria

Approximate sizes for proposed storm drains shown on the maps are based on direct runoff calculations by the Rational Method without peak flow attenuation by future detention. However, attenuation by existing detention facilities was accounted for in the calculations. The feasibility and location of potential detention basin sites are to be determined during final design of the major facilities. Some debris basins are presently proposed.

Street Flow

Street sections are ultimate sections per the City's General Plan Circulation Element. Street capacities are based on the maximum flows that can be contained within the right-of-way for 100-year storms, and for 10-year storms within top of curb or clear of any dry travel lane required.

Subarea runoff is assumed to enter the street uniformly along the length of the reach. Street gradients are assumed to be straight graded from elevations of the 4' contour maps at the node points.

If street capacity is exceeded by the end of the reach a parallel pipe is added to carry the excess. Time of concentration is determined from the shorter travel time of the two.

Pipe Flow

The entire subarea is assumed to enter the stream at the downstream end of the reach; therefore, the flow rate at the upstream end is the flow rate in the pipe for the entire length. Pipe sizes are approximate, being based on pipe slope by existing ground elevations of the 4' contour maps at the node points unless noted otherwise and hydraulic calculations of flow use simple steady flow at normal depth for the entire length.

Channel Flow

Subarea runoff enters either uniformly with side inflow or at the end as indicated in the hydrology printouts. Proposed freeboard for prismatic channels varies from a minimum of 1 foot for small, low gradient channels to 3'+ for steep, twisting, high flow channels or those below steep debris-producing hills. This criteria was used to obtain channel sizing for costing purposes.

V-Ditches

In some locations where the runoff is relatively low but a facility is recommended a concrete v-ditch facility has been shown on the maps. In these locations a small diameter underground pipe could also be used if the design elevations allow it and a pipe is preferred instead of an open concrete ditch. These decisions are left for final design.

XV. Subregion Discussion and Results

This Section will provide a description of each Subregion and the study results including a summary of the proposed facilities and cost. Exhibits for each Region are included in the Appendix that show existing and proposed facilities. Additional discussion regarding each Subregion as well as detailed hydrology maps showing the drainage areas, land use, flow paths, hydrology nodes as well as existing and proposed facilities with more detail are included in the Technical Data Volume (separate cover) of this report.

An estimated cost for each proposed facility was prepared. Costs were based on the District cost estimating schedule used for subdivision bonding. An allocation for design, environmental studies, administration and construction inspection was added to each estimate. Potential right of way cost is

not included. Detailed cost estimates for each facility are included in the Technical Data Volume of this report.

Region W

Region W consists of eight (8) Subregions. The existing and proposed facilities for this Region are shown on Exhibits B1-1 and B1-2 in the Appendix. Total cost of the proposed facilities for Region W is \$18,800,000.

Subregion W1

The area studied in Subregion W1 comprises 387 acres. Existing land uses are Rural Mountainous (10-acre min.) in the southwestern mountains, Estate Density Residential (2-acre min.), Low Density Residential (1/2-acre min.) and Commercial in the flat, flood prone area southwest of Palomar St., and Very Low Density Residential (1 acre min.) northeast of Palomar St. Existing land uses were used in this study; runoff from future development must not exceed existing runoff. The existing Wildomar Channel and Sheila Lane Storm Drain run easterly through the area. An extension of Wildomar Channel with a detention basin is proposed. In the present study areas tributary to those existing and proposed major facilities were not restudied; only areas downstream of them.

Most of the runoff begins in the mountain area along the southern boundary of Subregion W1 and continues northeasterly in streets with adequate capacity to a proposed pipe in Alameda del Monte from Los Olivos Ln (Black Ranch Rd on the street name sign) southeasterly to Wesley St. (Line W1-C) The pipe then continues northeasterly in Wesley St. to Wildomar Channel.

Runoff from the mountainous area in the west drains to Enderlein St. and the proposed District MDP extension of Wildomar Channel and detention basin. A pipe is proposed in this Wildomar MDP in Enderlein St./Hanson Pl. (Line W1- D) continuing northeasterly to existing District pipe and Wildomar Channel Stage 6. The basin was not included in the present calculations. Existing 48" CMPs in Enderlein St and on private property should be abandoned.

In development of the Master Plan runoff it was assumed that a large natural depression located in Subregion W3 and partially in W1, north of Palomar St. and Wesley St., will be filled in the future. The portion of this area within W1 northeast of Palomar St., flows to Shay Lane and then southwesterly to proposed catch basins and culvert under Palomar St. then to a proposed channel southeasterly to Wildomar Channel at Wesley St. Durango Ct. from Union St. also flows through an existing V-ditch to this proposed channel.

The runoff from the remainder of Subregion W1 drains directly into existing facilities and therefore was not studied. These facilities are Wildomar Channel, Sheila Ln. storm drain, and a local storm drain in and near Fox Den Rd.

A summary of the proposed facilities and estimated cost is shown below.

Table 3 - Subregion W1 Facilities Summary

Facility ID	Facility Description	Cost
Line W1-A	Wesley St. Storm Drain (Grand Ave. to Wildomar Channel)	\$667,150
Line W1-B	Grand Ave. Storm Drain (Hixon St. to Wesley St.)	\$317,336
Line W1-C	Alameda del Monte/Wesley St. Storm Drain (Los Olivos Ln. to Grand Ave.)	\$930,229
Line W1-D	Enderlein St. Storm Drain (West of Enderein St. to Wildomar Channel)	\$952,215
Line W1-E	Channel Southwest of Palomar St.	\$372,488
Line W1-F	Shay Ln./Palomar St. Crossing Storm Drain	\$111,183
Total		\$3,350,600→\$3,400,000

(Does not include right of way acquisition costs, if any.)

Subregion W2

The studied area of Subregion W2 comprises 120 acres of mostly flat terrain and small very steep undeveloped portion on the west. Existing land uses are Estate Density Residential (2 acre min.) and Low Density Residential (1/2 acre min.). Existing land uses were used in this study because runoff from future development must not exceed existing runoff. Existing Wildomar Channel Lateral A and proposed Lateral A Basin lie in the south and along the southeast boundary of the studied area and drain the large mountainous area in the southern portion of Subregion W2. Existing Wildomar Channel lies on the northeast boundary. In the present study areas tributary to those existing and proposed major facilities were not restudied; only areas downstream of them.

A summary of the proposed facilities and estimated cost is shown below.

Table 4 - Subregion W2 Facilities Summary

Facility ID	Facility Description	Cost
Line W2-A	Celeste Way Storm Drain	\$573,526
Line W2-B	Grand Ave. Storm Drain	\$135,809
Total		\$709,335→\$800,000

(Does not include right of way acquisition costs, if any.)

Subregion W3

Subregion W3 consists of 194 acres of flat to hilly terrain. Existing land uses are Low Density Residential (1/2 acre min.), Very Low Density Residential (1 acre min.), Medium Density Residential (2-5 du/ac), and one small Commercial area. Existing Wildomar Channel lies along the southwest boundary. Existing land uses were used in this study because runoff from future development must not exceed existing runoff.

A large area east of Orange St. which was tabled into the subregion W3 area in the TR 30460 drainage report by Canty Engineering Group dated March 2004 ultimately will not drain into W3 because it will be intercepted by storm drain facilities being proposed in Orange Street within Subregion W5, therefore the runoff in the shaped swale through TR 30460 to Laguna Road calculated in this Master Plan study is substantially less than that of the Tr 30460 Canty study.

It is assumed a large natural depression within Subregion W3 and partially within W1, north of Palomar St. and Wesley St., will be filled in the future.

A summary of the proposed facilities and estimated cost is shown below.

Table 5 - Subregion W3 Facilities Summary

Facility ID	Facility Description	Cost
Line W3-A	Wesley St. Channel	\$261,415
Line W3-B	Cert St. Storm Drain	\$636,240
Line W3-C	Boggs Ln. Storm Drain	\$83,586
Total		\$981,241→\$1,000,000

(Does not include right of way acquisition costs, if any.)

Subregion W4

The area studied in Subregion W4 contains 150 acres of fairly flat terrain except for a small steep portion on the west where runoff begins. Existing uses are Estate Density Residential (2 acre min.), Low Density Residential (1/2 acre min.), and Medium Density Residential (2-5 du/ac), with Natural in the western mountainous portion. Existing land uses were used in this study; runoff from future development must not exceed existing runoff. Existing facilities, Wildomar Channel Lateral B group, its detention basin, and Wildomar Pumice Ln Storm Drain, intercept major runoff from the mountains on the south; Wildomar Channel lies on the northeast boundary, and Lateral A on the northwest boundary. In the present study areas tributary to those existing and proposed major facilities were not restudied; only areas downstream of them.

When Avenida Del Monte (presently a dirt road) is improved, it will be required to be graded to drain to Gruwell St at 1% minimum to allow runoff to be conveyed in the streets thus eliminating a pipe in Avenida Del Monte to Gruwell St. and Gruwell St. to Grand Av.

Runoff in Pasadena St. turns southeasterly to an existing storm drain of adequate capacity in Quartz Way, therefore no additional facilities are proposed there. Likewise, Starlight St., Willow Bay Rd., Canyon Crest St., and Virgo Way northeast of Grand Ave., are drained through exist facilities to Wildomar Channel, therefore no additional facilities are proposed.

A summary of the proposed facilities and estimated cost is shown below.

Table 6 - Subregion W4 Facilities Summary

Facility ID	Facility Description	Cost
Line W4-A	Gruwell St. Storm Drain	\$487,589
Line W4-B	Elm St./Darby St. Storm Drain	\$688,628
Line W4-C	Penrose St. Storm Drain	\$512,600
Total		\$1,688,816→\$1,700,000

(Does not include right of way acquisition costs, if any.)

Subregion W5

Subregion W5 contains 379 acres and drains to Wildomar Channel which lies on the southwesterly boundary. The I-15 freeway abuts the northeast corner. Terrain ranges (in the direction of flow) from moderate to hilly to flat. Existing Land Uses are Very Low Density Residential (1-acre min.), Low Density Residential (1/2 acre min.), Medium Density Residential (2-5 du/ac), some Medium High Density Residential (5-8 du/ac) and Commercial. Existing land uses were used in this study; runoff from future development must not exceed existing runoff. The area in the south corner of this subregion, south of Palomar and Pasadena Streets, drains to an existing storm drain and was therefore not studied.

A summary of the proposed facilities and estimated cost is shown below.

Table 7 - Subregion W5 Facilities Summary

Facility ID	Facility Description	Cost
Line W5-A	Gruwell St. Storm Drain	\$2,431,289
Line W5-B	Orange St. Storm Drain	\$1,739,416
Line W5-C	Central St., Como St., Palomar St. NW Storm Drain	\$1,076,515
Line W5-D	Penrose St. Storm Drain	\$131,574
Line W5-E	Palomar St. SE Storm Drain	\$305,690
Total		\$5,684,484→\$5,700,000

(Does not include right of way acquisition costs, if any.)

Subregion W6

Subregion W6 contains 126 acres of mountainous, hilly and very flat terrain. Existing land use is Estate Density Residential (2 acre min.), and some natural cover in the mountainous southern portion. Existing land uses were used in this study; runoff from future development must not exceed existing runoff. Wildomar Channel is the northeast boundary. The upper half of Wildomar Channel Lateral B-1 lies on the west boundary. In the present study areas tributary to those existing major facilities were not restudied; only areas downstream of them.

Runoff begins in the mountains at the south corner of Subregion W6, into a proposed improved channel where the terrain flattens. The proposed channel continues to Grand Ave. and McVicar St. A small pipe is proposed in Grand Ave. from 1025' northwesterly of McVicar to the McVicar St. intersection where the proposed channel connects to the proposed storm drain. The proposed storm drain continues from this junction northeasterly in McVicar to Wildomar Channel.

The north portion of the subregion drains directly to Wildomar Channel and was not studied.

A summary of the proposed facilities and estimated cost is shown below.

Table 8 - Subregion W6 Facilities Summary

Facility ID	Facility Description	Cost
Line W6-A	McVicar St. Storm Drain	\$595,279
Line W6-B	Grand Ave. Storm Drain	\$314,655
Line W6-C	Channel South of Grand Ave. and McVicar St.	\$389,166
Total		\$1,299,100→\$1,300,000

(Does not include right of way acquisition costs, if any.)

Subregion W7

Subregion W7 is bounded on the north by a mountain ridge to Region A, on the northeast by a drainage divide to Subregion W8, on the east by Subregion M5, on the south by Subregions M2, M1 and W8, on the southwest by Murrieta Creek, and on the west by Subregions W5, S5 and S4. I-15 traverses northwest to southeast through the Region.. The studied portion contains approximately 1459 acres. The portion southwest of the freeway is fully developed and therefore was not studied. Other portions consisting of private property draining to freeway culverts, and south of Baxter Rd., in which no MDP facilities are proposed were also not studied.

The terrain ranges from mountainous to moderately hilly. Maximum relief in the studied area is 740 feet along a flowpath approximately 10,300 feet long. The area is mostly undeveloped. Land use in the studied area is predominantly natural with some low to medium density residential. Existing land uses were used in this study; runoff from future development must not exceed existing runoff.

A draft plan, “Bundy Canyon Road Improvement Project” was partially used in the present MDP study, using elevations and pipe lengths from that more detailed plan. However proposed MDP storm drain facilities are somewhat different. These differences should be reviewed and rectified during the plan check process of the improvement plans, and provision made for 10-year dry lanes.

A summary of the proposed facilities and estimated cost is shown below.

Table 9 - Subregion W7 Facilities Summary

Facility ID	Facility Description	Cost
Line W7-A	Monte Vista Dr. Storm Drain (Southerly from Bundy Canyon Rd.)	\$215,325
Line W7-B	Via Carnaghi, Monte Vista Dr. South Storm Drain and Channel	\$859,898
Line W7-C	Sauer Rd., Baxter Rd., O’Neal Rd., Killarney Way Storm Drains and Culverts	\$953,384
Line W7-D	Bundy Canyon Rd. Culverts and Channels	\$968,952
Line W7-E	Raciti Rd., Vista del Agua Culverts	\$267,160
Line W7-F	Oak Circle Dr. Culverts and Channel	\$523,036
Total		\$3,787,754→\$3,800,000

(Does not include right of way acquisition costs, if any.)

Subregion W8

The studied portion of W8 contains approximately 357 acres, 317 in the north portion and 40 in the south. The subregion is bounded on the north by a mountain ridge bordering W7, on the east by a ridge to M1 and M2, on the west by a divide to W7, and on the south by Wildomar Channel. The studied portion in the north extends southerly to Peggy Lane; the south portion from just above Charles St to Palomar St. The middle portion is fully developed with existing storm drains and was not studied. The terrain ranges from mountainous to moderately flat. The longest water course is in the north, approximately 5040 feet, falling 780 feet. Riverside County Flood Control and Water Conservation District MDP Lateral C-1 exists in the south portion. Existing land uses are Natural and Estate Density Residential. Existing land uses were used in this study; runoff from future development must not exceed existing runoff.

A summary of the proposed facilities and estimated cost is shown below.

Table 10 - Subregion W8 Facilities Summary

Facility ID	Facility Description	Cost
Line W8-A	North of I-15 Freeway (Throughout)	\$816,791
Line W8-B	South of I-15 Freeway (Palomar St.)	\$275,949
	Total	\$1,092,740→\$1,100,000

(Does not include right of way acquisition costs, if any.)Region S

Region S

Region S consists of six (6) Subregions. The existing and proposed facilities for this Region are shown on Exhibit B3 in the Appendix. Total cost of the proposed facilities for Region S is \$29,400,000.

Subregion S1

Subregion S1 comprises 306 acres. Existing land uses are Rural Mountainous in the steep hills in the northeast, Estate Density Residential northeast of the I-15 freeway, Medium High Density Residential, Very High Density Residential and some Commercial in the flatter area between the I-15 freeway and Mission Trail, the City Limit. Existing land uses were used in this study because runoff from future development must not exceed existing runoff. The elevation change is 620 feet along a maximum flow path length of 4920 feet. An area outside the City, northwest of the City limit and northeast of the I-15 freeway, drains into the City through an existing freeway culvert and is part of the total subregion area.

The District's Master Drainage Plan for the Sedco Area dated March 1982 proposes Lines A, B and C as shown on Exhibit B3. These facilities were reevaluated with this study and the revised proposed pipe sizes are shown on Exhibit B3.

Runoff begins in the northeast hills and flows southwesterly, through existing freeway culverts, then through channels and pipes proposed in the present study along the alignments of the District Lines A, B and C, to Mission Trail. A portion of the subregion in the south flows into subregion S2 through Crescent Avenue. A private pond on the southwest side of the freeway at Sedco Blvd. is not a part of the proposed drainage system.

A summary of the proposed facilities and estimated cost is shown below.

Table 11 - Subregion S1 Facilities Summary

Facility ID	Facility Description	Cost
Line S1-A	Sylvester Rd. Storm Drain (Sedco MDP Line A)	\$811,443
Line S1-B	Elberta St. Storm Drain (Sedco MDP Line B)	\$596,695
Line S1-C	Sedco Blvd. Storm Drain (Sedco MDP Line C)	\$897,298
	Total	\$2,305,436→\$2,300,000

(Does not include right of way acquisition costs, if any.)

Subregion S2

Subregion S2 comprises 623 acres. Existing land uses are Open Space and Rural Mountainous in the northeast mountainous area, Estate Density Residential northeast of the I-15 freeway, Medium Density Residential, Medium High Density Residential, Very High Density Residential and some Commercial in the flatter area between the I-15 freeway and Mission Trail, the City Limit. Existing land uses were used in this study; runoff from future development must not exceed existing runoff. The southwest subareas are shown on the subregion Hydrology S3 map in the Technical Data Volume. Elevation drop from the high point to Mission Trail is approximately 925 feet.

In the District's Master Drainage Plan for the Sedco Area dated March 1982 Line D/D1 exists westerly of the freeway. Subregion runoff begins in the northeast mountains and flows westerly. All the area to and including the freeway is intercepted by Line D1 which runs along the southwest side of the freeway. Maximum flow path length to Line D is approximately 6200 feet. Line D/D1 was not evaluated with this study.

A summary of the proposed facilities and estimated cost is shown below.

Table 12 - Subregion S2 Facilities Summary

Facility ID	Facility Description	Cost
Line S2-B	Victorian Ln./Mission Trail Storm Drain	\$1,234,537
Line S2-A	Tokay Rd./Crescent Ave./Olive St./Lakeview Terr. Storm Drain	\$918,610
Line S2-C	Sedco Heights Dr./Loquat St./Olive St. Storm Drain	\$574,901
Line S2-D	Grape Spur Ln. Storm Drain	\$359,494
Total		\$3,087,542→\$3,100,000

(Does not include right of way acquisition costs, if any.)

Subregion S3

Subregion S3 comprises 622 acres. Existing land uses are Rural Mountainous in the northeast mountainous area, Very Low Density Residential, Medium Density Residential, Medium High Density Residential, and Commercial in the flatter area between Mission Trail, the City Limit, and the I-15 Freeway. Existing land uses were used in this study because runoff from future development must not exceed existing runoff. Maximum elevation difference is approximately 1020 feet; longest flow path approximately 13620 feet. The I-15 freeway bisects the subregion.

The District's Master Drainage Plan for the Sedco Area dated March 1982 proposes Line E, E1 and E2 from the freeway westerly. Pipes and channel proposed in the present MDP follows those Line E alignments.

In heavy rains mud flows down, Lost Road and Lemon St. To reduce that mud flow two debris basins are proposed on Lost Road, one on each of the two main flowlines to that location. It is recommended that these debris basins be enlarged to provide detention thus to reduce proposed downstream facilities.

A summary of the proposed facilities and estimated cost is shown below.

Table 13 - Subregion S3 Facilities Summary

Facility ID	Facility Description	Cost
Line S3-A	Sedco MDP Line E, Loquat St. Storm Drain	\$3,069,858
Line S3-B	Lemon St. to Mission Trail Storm Drain	\$455,318
Line S3-C	Waite St., Mission Trail Storm Drain	\$1,054,969
Line S3-D	Lemon St. Storm Drain, Lost Rd. Channel	\$3,013,904
Total		\$7,594,048→\$7,600,000

(Does not include right of way acquisition costs, if any.)

Subregion S4

Subregion S4 comprises 338 acres. Existing land uses are Rural Mountainous and Rural Residential in the northeast mountainous area, Very Low Density Residential, Medium Density Residential and Commercial. Existing land uses were used in this study because runoff from future development must not exceed existing runoff. The I-15 freeway traverses the western portion of the subregion. The area that lies west of the freeway plus a small portion on the east side contains 91 acres with an elevation drop of 100 feet. Runoff begins at Waite and Cherry Streets just northeast of the freeway and flows westerly 5230 feet, mostly along Bundy Canyon Road through the flatter area in the west, to Mission Trail where the proposed pipe in Bundy Canyon turns southerly into subregion S5.

A summary of the proposed facilities and estimated cost is shown below.

Table 14 - Subregion S4 Facilities Summary

Facility ID	Facility Description	Cost
Line S4-A	Bundy Canyon Rd., Mission Trail Storm Drain to Line F	\$1,817,613
Line S4-B	Bundy Canyon Rd. (Sedco MDP Line F) (Sellers Rd. to I-15 Storm Drain)	\$407,853
Line S4-C	Winding Way Storm Drain	\$105,559
Total		\$2,331,024→\$2,400,000

(Does not include right of way acquisition costs, if any.)

Subregion S5

Subregion S5 contains approximately 739 acres. It is bounded on the east by Monte Vista Dr, on the west by Corydon St (the city limit), on the north by Bundy Canyon Rd plus the triangular portion shown on the map of subregion S4A north of Bundy Canyon Rd between Mission Trail and Corydon, and on the south by the irregular line of the Sedco Area drainage divide. The I-15 freeway traverses the eastern portion. Terrain is flat, with a relief of approximately 165 feet over about 9000 feet. Runoff flows westerly. Existing land uses are Commercial/Industrial/Mixed Use, Public Facilities (Elsinore High School), Medium Density Residential, Low Density Residential & Very Low Density Residential. Existing land uses were used in this study because runoff from future development must not exceed existing runoff.

Major runoff from subregion S4 northeast of the freeway enters subregion S5 at Bundy Canyon Rd and the freeway. The drainage area therefore consists of that portion of S4 and all of S5. This is further discussed in the Technical Data Volume.

The District's Master Drainage Plan for the Sedco Area dated March 1982 proposes a Line F and a Line G from Corydon to Mission Trail. These proposed facilities were reevaluated and replaced with the proposed facilities shown on Exhibit B3.

A summary of the proposed facilities and estimated cost is shown below.

Table 15 - Subregion S5 Facilities Summary

Facility ID	Facility Description	Cost
Line S5-A	Bryant St./Melinda Ln. and Corydon St. Storm Drain	\$1,885,001
Line S5-B	Canyon Dr., Sunrise Dr., Line G Storm Drain	\$3,907,056
Line S5-C	Line F, Mission Trail Storm Drain	\$975,315
Line S5-D	Bryant St., Lorena Ln., Mission Trail Storm Drain	\$2,521,131
Line S5-E	Walnut St. & Mission Trail Storm Drain	\$323,015
Line S5-F	Overland from Orchard St to TR 31345 (Canyon Village Estates) Storm Drain	\$198,825
Line S5-G	Orange St. Storm Drain	\$183,343
Line S5-H	Sedco Tract 1 Storm Drain	\$2,039,455
Total		\$12,033,141→\$12,100,000

(Does not include right of way costs, if any)

Subregion S6

Subregion S6 is bounded on the south and southeast by subregion W1, on the southwest by a mountain ridge within the City of Lake Elsinore just beyond the city limit, on the northwest by the city limit in Corydon St., and on the northeast by subregion S5.

The studied portion consists of six separate areas containing approximately 265 acres. Terrain ranges from mountainous to flat. Areas not studied are already served by existing drainage facilities. Existing land uses are predominately Medium to Very Low Residential and vacant. Existing land uses were used in this study because runoff from future development must not exceed existing runoff. There are no District master planned facilities.

A summary of the proposed facilities and estimated cost is shown below.

Table 16 - Subregion S6 Facilities Summary

Facility ID	Facility Description	Cost
Line S6-A	Sheets Ln. Channel to Corydon St.	\$463,664
Line S6-B	Grand Ave. West Storm Drain	\$274,901
Line S6-C	Batson Ln. South & Union St. East Storm Drain	\$651,970
Line S6-D	Webb Dr., Vivian Dr. Storm Drain	\$209,275
Line S6-E	Batson Ln. North & Northwest of Bryant St. Storm Drain	\$138,848
Line S6-F	Corydon St. Culvert (near Cathy Ln.)	\$36,919
Total		\$1,775,576→\$1,800,000

(Does not include right of way acquisition costs, if any.)

Region M

Region M consists of five (5) Subregions. The existing and proposed facilities for this Region are shown on Exhibit B2 in the Appendix. Total cost of the proposed facilities for Region M is \$6,900,000.

Subregion M1

The studied portion of Subregion M1 contains approximately 550 acres in 2 independent drainage areas, 350 acres in one drainage area and 200 in the other. It is bounded on the north by a mountain ridge, on the southwest by Murrieta Creek, and on the east and west by irregular drainage divides. The I-15 freeway traverses southwesterly in the southern portion. Terrain ranges from mountainous to flat. The longest watercourse is approximately 14,500 feet, falling approximately 890 feet. There are some existing District facilities in this Subregion. These include the George Ave Storm Drain, the Westpark Street Storm Drain; and the Line H Stage 1 Storm Drain in El Diamonte St. in Tr 23310. Existing land uses are predominately medium density residential, commercial and natural. Existing land uses were used in this study because runoff from future development must not exceed existing runoff.

A summary of the proposed facilities and estimated cost is shown below.

Table 17 - Subregion M1 Facilities Summary

Facility ID	Facility Description	Cost
Line M1-A	Palomar St. Storm Drain and Channel	\$448,099
Line M1-B	Hidden Springs Rd. Culvert	\$90,888
Line M1-C	Susan Dr. Culvert	\$69,279
Line M1-D	La Estrella Rd. Culvert	\$65,780
Line M1-E	Porras Rd. Culvert	\$22,055
	Total	\$696,101→\$700,000

(Does not include right of way acquisition costs, if any.)

Subregion M2

The studied portion of Subregion M2 contains approximately 1020 acres. It is bounded on the north by a mountain ridge, on the southwest by Murrieta Creek, and on the east and west by irregular drainage divides. The portion southwest of Murrieta Creek was excluded since no facilities would be proposed. The I-15 freeway traverses southwesterly in the southern portion. Terrain ranges from mountainous to flat. The longest watercourse is approximately 17,300 feet, falling approximately 875 feet. There are no existing no master planned facilities; Riverside County Flood Control & Water Conservation District MDP Line H is proposed from Palomar St. southerly to Murrieta Creek. Existing land uses are Natural, Medium Density Residential, Very High Density Residential, and Commercial/Industrial. Existing land uses were used because runoff from future development must not exceed existing runoff.

A summary of the proposed facilities and estimated cost is shown on the next page.

Table 18 - Subregion M2 Facilities Summary

Facility ID	Facility Description	Cost
Line M2-A	Palomar St. Creek Channel	\$1,181,488
Line M2-B	Robin Scott Rd./Watkins Cir./Corduoy Rd. Storm Drain and Channel	\$323,304
Line M2-C	Wyman Rd. Storm Drains	\$678,329
Line M2-D	Yamas Dr. Storm Drain	\$44,220
Line M2-E	Bunny Trail Storm Drains	\$336,325
Line M2-F	Inland Valley Dr. Culvert	\$66,344
Line M2-G	Clinton Keith Rd. Culvert	\$36,094
Line M2-H	Salida del Sol Culvert	\$54,992
Line M2-I	Miguel Rd. Culvert	\$61,903
Total		\$2,782,997→\$2,800,000

(Does not include right of way acquisition costs, if any.)

Subregion M3

The entire subregion is bounded on the north by a mountain ridge, on the southwest by Murrieta Creek and City limits, on the east and west by irregular drainage divides, and on the southeast by the Wildomar/Murrieta city limit. The studied portion of Subregion M3 contains approximately 572 acres. Some areas were omitted for the various reasons stated on the maps. Terrain ranges from mountainous to flat. The longest watercourse studied is approximately 7,570 feet, falling approximately 795 feet. Existing land uses were used since runoff from future development must not exceed existing runoff. Those land uses are predominately natural, medium density residential, some industrial and 2- to 5-acre lots. There are no existing RCFCD master planned facilities. The I-15 freeway traverses southwesterly in the southern portion.

A summary of the proposed facilities and estimated cost is shown on the next page.

Table 19 - Subregion M3 Facilities Summary

Facility ID	Facility Description	Cost
Line M3-A	Palomar St./Starbuck Cir. Storm Drain	\$1,040,641
Line M3-B	Prelipp Rd. Culvert and Storm Drain	\$132,853
Line M3-C	Cheyenne Cir. Culvert	\$170,390
Line M3-D	Bunny Trail Culvert	\$190,190
Line M3-E	Ave Terazzo Culvert	\$16,198
Line M3-F	Jana Ln. Culvert	\$16,819
Line M3-G	Loring Rd. Culvert	\$188,771
Line M3-H	La Estrella Rd. Culvert	\$327,503
Total		\$2,083,364→\$2,100,000

(Does not include right of way acquisition costs, if any.)

Subregion M4

The subregion is bounded on the northeast by Murrieta Creek, on the southeast by Clinton Keith Road, on the south by a ridge in County territory and the city limit with Murrieta, and on the northwest by the drainage divide with Region W. The drainage area studied contains 174 acres and lies on the southwest side of Grand Avenue. The longest flow path is approximately 5,940 feet, falling approximately 773 feet. Terrain ranges from mountainous to flat. Existing land uses were used since runoff from future development must not exceed existing runoff. Those land uses are predominately natural, estate density residential, and a tiny amount of industrial. There are no existing District facilities or detention facilities.

The proposed facilities estimated cost is shown below.

Table 20 - Subregion M4 Facilities Summary

Facility ID	Facility Description	Cost
Line M4-A	Grand Ave. (West) Storm Drain and Channel	\$752,125
Line M4-B	Grand Ave. (East)/Clinton Keith Rd. Storm Drain	\$336,738
Total		\$1,088,863→\$1,100,000

(Does not include right of way acquisition costs, if any.)

Subregion M5

The studied area of this subregion is bounded on the north by a mountain ridge, on the east by a ridge in the city of Murrieta and an existing tract in Wildomar, on the west by subregions M1-4 and region W, and on the south by Clinton Keith Rd. It contains 1300 acres with a relief of 835 feet along a 14,500-foot flow path, all approximate. Terrain is mostly mountainous natural ground, with a 30-foot-deep natural channel to Clinton Keith. The subregion is vacant except for a very small portion of Medium Density Residential in the south. Existing land uses were used in this study because runoff from future development must not exceed existing runoff.

The purpose of the study of this subregion was to evaluate the adequacy of the existing double 84" concrete pipe culvert and to design augmenting facilities if needed. A synthetic unit hydrograph was calculated for the entire studied area. The governing 100-year storm was the 1-hour duration storm. The Clinton Keith road embankment forms a detention basin in the natural channel. The existing culvert can convey the peak Q100 of 1500 cfs at 19.5 ft/sec in the pipes, with a ponding depth in the channel of 16 feet. This is less than the 28-foot depth of the basin below the road surface, so a routing analysis of the basin was unnecessary for the present purpose. A riprap apron at the outlet is proposed.

The proposed facilities estimated cost is shown below.

Table 21 - Subregion M5 Facilities Summary

Facility ID	Facility Description	Cost
M5	Catch Basins and Culvert Rip-Rap	\$159,913
Total		\$159,913→\$200,000

(Does not include right of way acquisition costs, if any.)

Region A

Region A consists of four (4) Subregions. The existing and proposed facilities for this Region are shown on Exhibit B4 in the Appendix. Total cost of the proposed facilities for Region A is \$4,700,000.

Subregions A1-A3

Subregions A1-A3 are bounded on the south by Subregions S1-S4 and W7, and on the north by the city limits with the City of Lake Elsinore. These Subregions are zoned Rural Mountainous, Open Space and Conservation Habitat. These Subregions were not studied. The area has steep terrain and development will be sparse. Drainage facilities will need to be determined in the future in conjunction with individual residential or City road development.

Subregion A4

Subregion A4 is bounded on the south and southwest by a drainage divide in subregion W7, on the northwest and north by a drainage divide west and north of the city limit in the City of Lake Elsinore, and on the east by a drainage divide east of the city limit within the City of Menifee. A4 South map includes a portion of "The Farm" residential development which drains to a group of detention basins at Bundy Canyon Road proposed by that development. The output from the basins drains into A4 North.

The studied area of A4 is comprised of 751 acres north of Bundy Canyon Road. The land use is about half medium density residential (MDR) and half barren undeveloped land.

The primary drainage facility in the area is a natural channel that flows from Bundy Canyon Road north and northwest to the northwest corner of the subregion. Several smaller natural channels are tributary to the main channel.

Development in the area consists of a pattern of small to medium size lots and paper streets, some of which are drivable dirt. There are no paved streets. The area is sparsely developed with homes. The drainage patterns on the dirt streets is random, primarily following the natural contours.

The rainfall models used in this study are those of the Riverside County Flood Control & Water Conservation District's 1978 Hydrology Manual. For the A4 Subregion the values used were those of the Murrieta-Temecula region. Any updated rainfall is left to final design as directed by the City. Calculated runoff is unattenuated by future detention facilities and that also is left to final design.

Due to the unique characteristics of the area development of a typical Master Drainage Plan was not considered practical. The proposed concept is a series of culverts where the various tributaries and main channel cross the streets. Seventy-five culverts were located. In the event of a major development in the area additional drainage facilities may be necessary to meet current standards.

Analysis of the culverts for Subregion A4 was also unique in this MDP. It was not considered economically practical to perform Rational Method hydrology to size each of the 75 proposed culverts, rather a Synthetic Unit Hydrograph was computed to the discharge point at the northwest corner of the Subregion, Output from the detention basins on Bundy Canyon of 20 cfs per a preliminary drainage study of Tract 36388 by JLC Engineering dated April 15, 2015 were added as base flow. A culvert size was estimated at that discharge point and culvert sizes along the reach of the main channel from the detention basins on Bundy Canyon were roughly prorated along that reach. Culverts in subareas tributary to the main channel were estimated based on estimated tributary areas. The estimated cost of the culverts was determined using the average size and length of all the culverts. The cost of all the proposed facilities included catch basins, head/end walls riprap and a channel. Costs are very rough estimates.

The proposed facilities estimated cost is shown below.

Table 22 - Subregion A4 Facilities Summary

Facility ID	Facility Description	Cost
A4	Various Culverts and Channels	\$4,650,834
Total		\$4,650,834→\$4,700,000

(Does not include right of way acquisition costs, if any.)

XVI. Facility Cost Summary

The following is a summary of the proposed storm drains facilities by Subregion:

Table 23 - Subregion Facilities Cost Summary

Region W		Region S		Region M		Region A	
W1	\$3,400,000	S1	\$2,300,000	M1	\$700,000	A1	*
W2	\$800,000	S2	\$3,100,000	M2	\$2,800,000	A2	*
W3	\$1,000,000	S3	\$7,600,000	M3	\$2,100,000	A3	*
W4	\$1,700,000	S4	\$2,400,000	M4	\$1,100,000	A4	\$4,700,000
W5	\$5,700,000	S5	\$12,100,000	M5	\$200,000		
W6	\$1,300,000	S6	\$1,800,000				
W7	\$3,800,000						
W8	\$1,100,000						
Total	\$18,800,000	Total	\$29,300,000	Total	\$6,900,000	Total	\$4,700,000

* Facilities not developed for these Subregions. See discussion for Region A.

Costs are based on January 1, 2018 unit prices. Costs shall be adjusted each year based on a suitable inflation index such as the Engineering New Record construction cost index.

XVII. Financing

Funding of the approximately \$60,000,000 in proposed improvements is provided by the following funding sources:

1. Riverside County Flood Control District as part of the construction of their Master Plan Facilities
2. Developer constructed facilities required by conditions of the developments
3. Development Impact Fees collected as a condition of development
4. Capital Improvement project fund.

Additional funding methods should be investigated in order to provide adequate funds to complete construction of the identified improvements.

Appendix

Exhibit A

Region and Subregion Map

CITY OF WILDOMAR

MASTER DRAINAGE PLAN

EXHIBIT A

REGIONS AND SUBREGIONS

LEGEND

REGION BOUNDARY	SUBREGION BOUNDARY
A	A1 - A4
S	M1 - M5
M	S1 - S6
W	W1 - W8
PARKS	
SCHOOLS	
CITY BOUNDARY	



1 inch = 2,000 feet

0 2,000 4,000 6,000 8,000 Feet

Date: October 2019

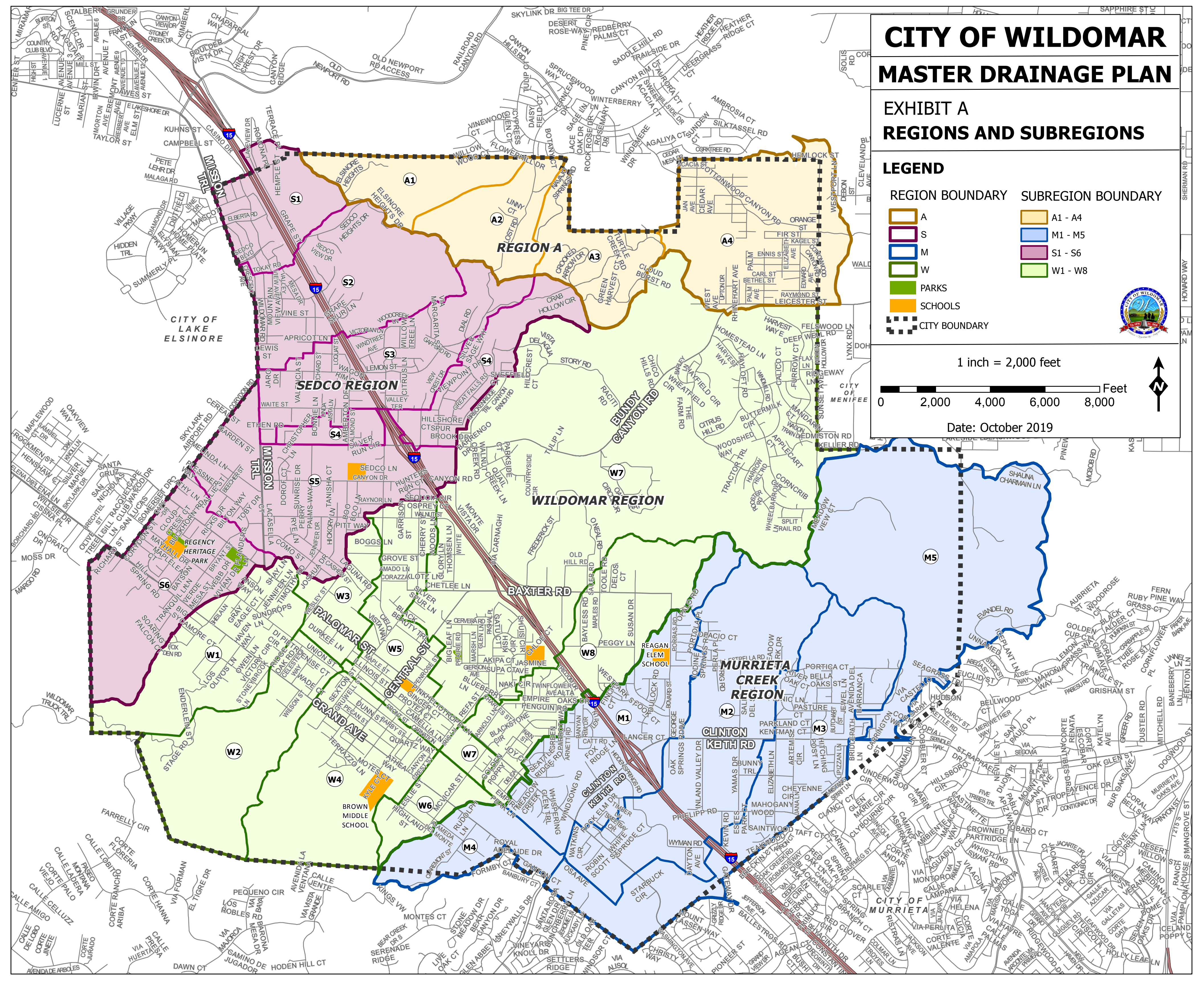


Exhibit B1-1

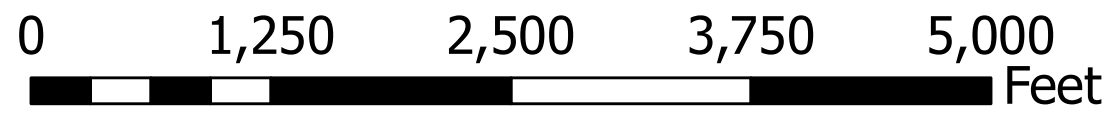
Region W (West) Proposed and Existing Facility Map

City of Wildomar

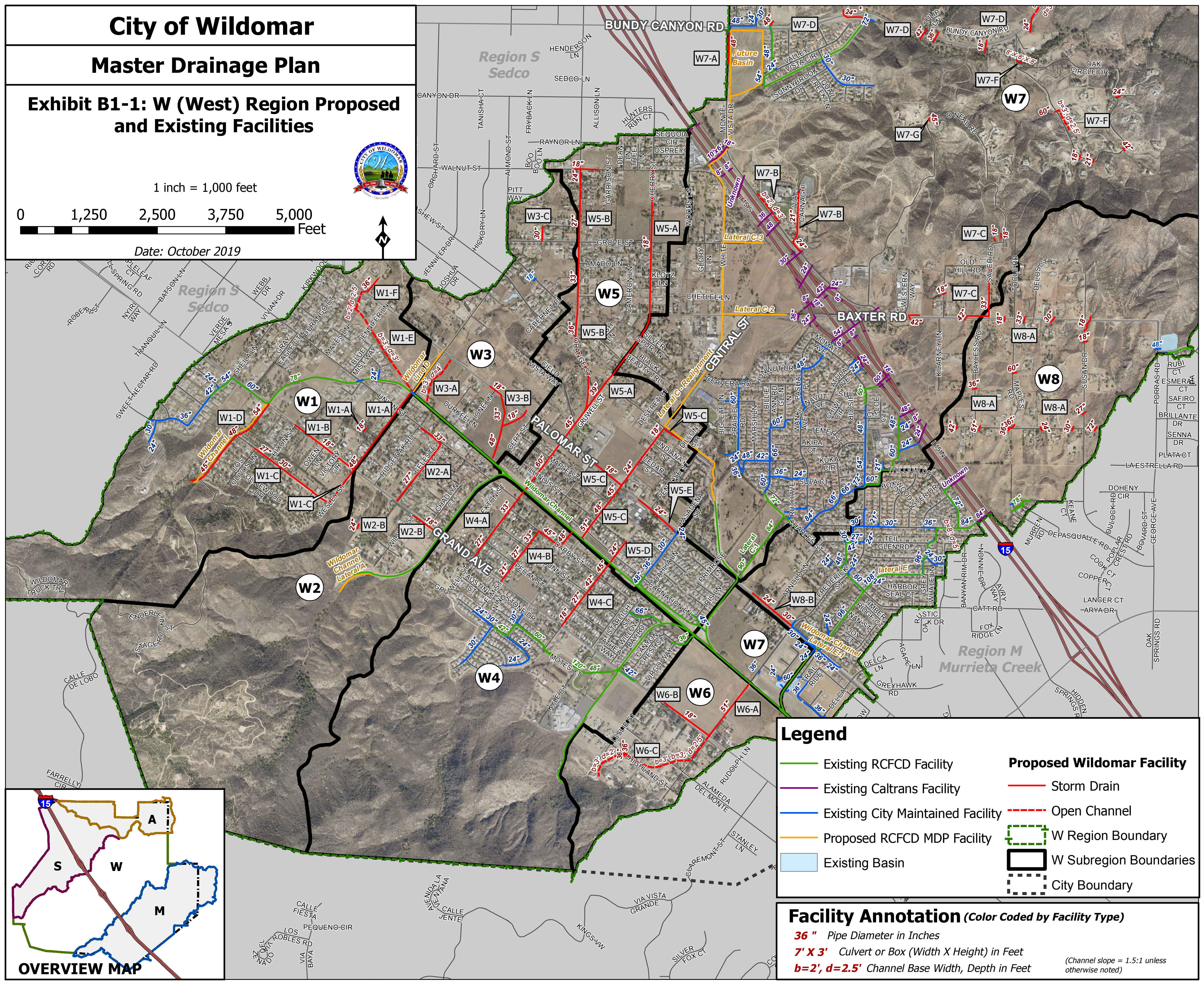
Master Drainage Plan

Exhibit B1-1: W (West) Region Proposed and Existing Facilities

1 inch = 1,000 feet



Date: October 2019



- | | | | |
|--|-----------------------------------|-----------------------------------|------------------------|
| | Existing RCFCDF Facility | Proposed Wildomar Facility | |
| | Existing Caltrans Facility | | Storm Drain |
| | Existing City Maintained Facility | | Open Channel |
| | Proposed RCFCDF MDP Facility | | W Region Boundary |
| | Existing Basin | | W Subregion Boundaries |
| | | | City Boundary |

Facility Annotation (Color Coded by Facility Type)

- 36"** Pipe Diameter in Inches
 - 7' X 3'** Culvert or Box (Width X Height) in Feet
 - b=2', d=2.5'** Channel Base Width, Depth in Feet
- (Channel slope = 1.5:1 unless otherwise noted)

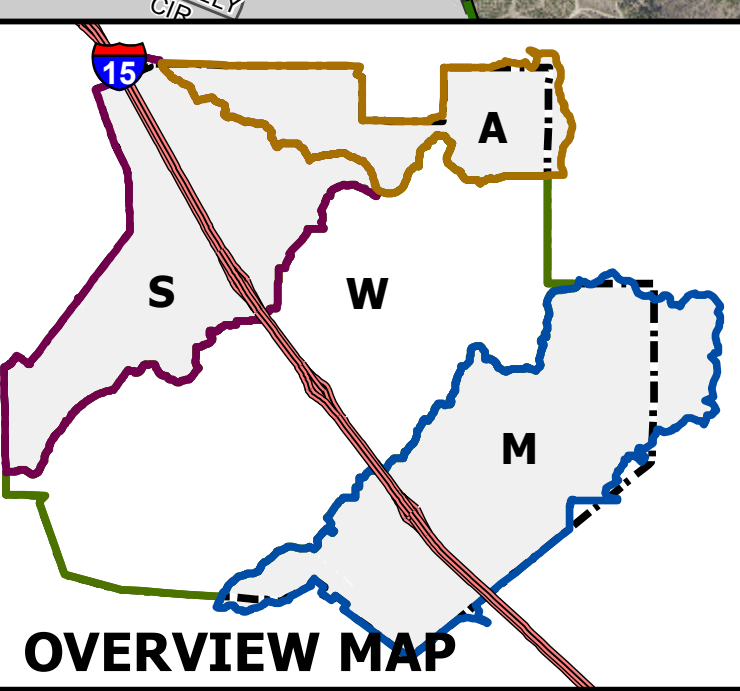


Exhibit B1-2

Region W (East) Proposed and Existing Facility Map

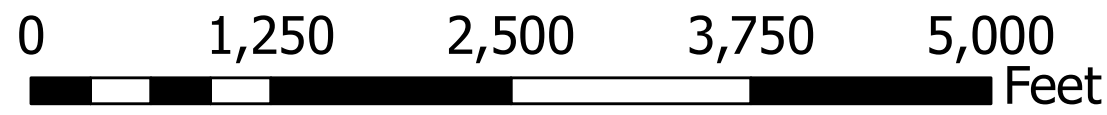
City of Wildomar

Master Drainage Plan

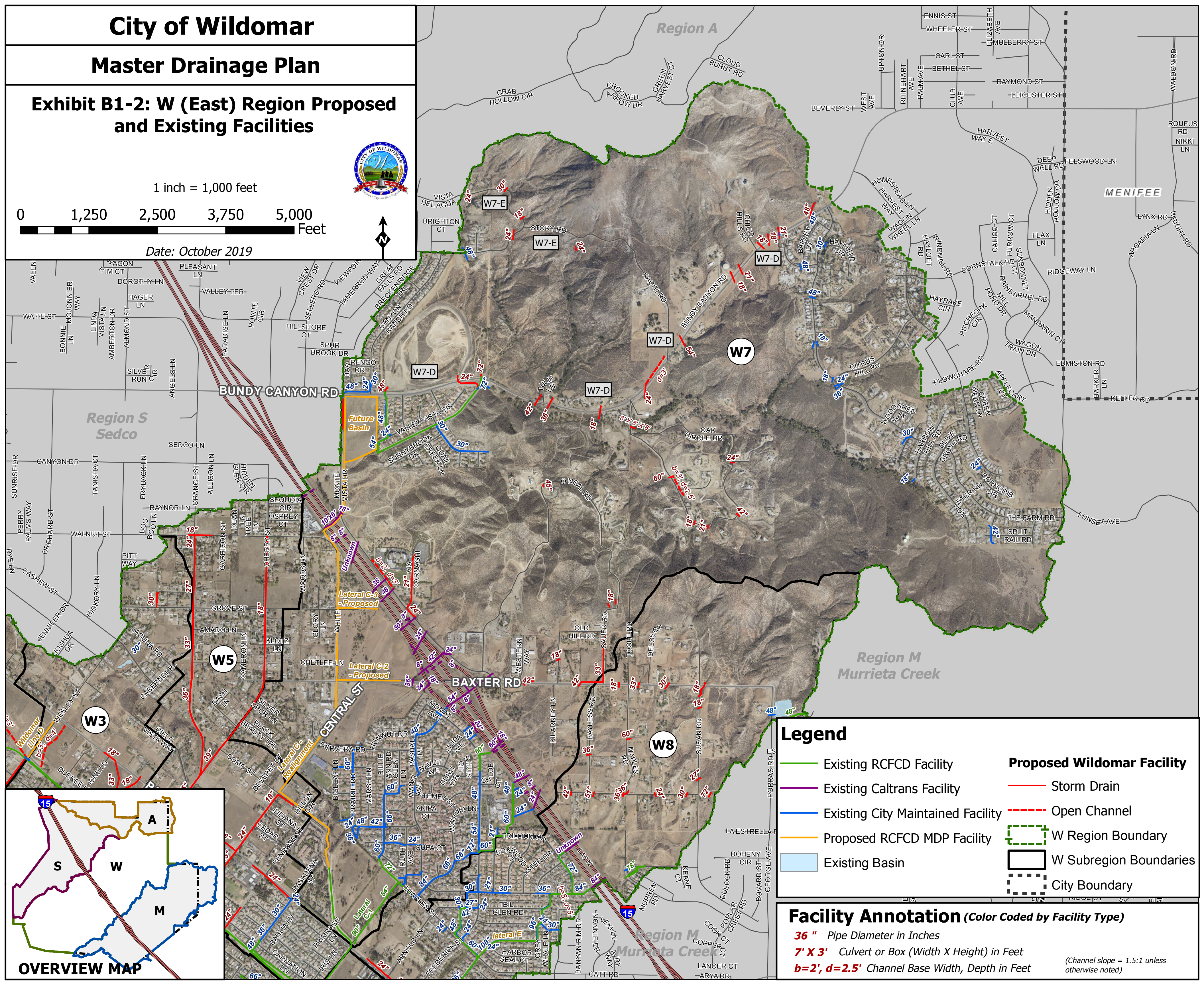
Exhibit B1-2: W (East) Region Proposed and Existing Facilities



1 inch = 1,000 feet



Date: October 2019



Legend

- | | | | |
|--|-----------------------------------|--|-----------------------------------|
| | Existing RCFCDF Facility | | Proposed Wildomar Facility |
| | Existing Caltrans Facility | | Storm Drain |
| | Existing City Maintained Facility | | Open Channel |
| | Proposed RCFCDF MDP Facility | | W Region Boundary |
| | Existing Basin | | W Subregion Boundaries |
| | | | City Boundary |

Facility Annotation (Color Coded by Facility Type)

- 36"** Pipe Diameter in Inches
 - 7' X 3'** Culvert or Box (Width X Height) in Feet
 - b=2', d=2.5'** Channel Base Width, Depth in Feet
- (Channel slope = 1.5:1 unless otherwise noted)



Exhibit B2

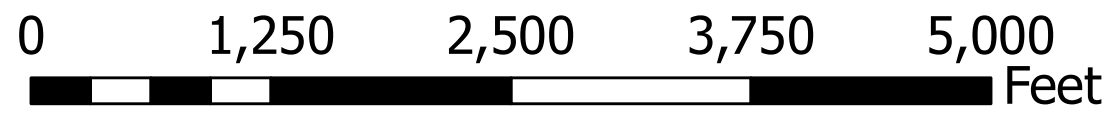
Region M Proposed and Existing Facility Map

City of Wildomar

Master Drainage Plan

Exhibit B2: M Region Proposed and Existing Facilities

1 inch = 1,000 feet

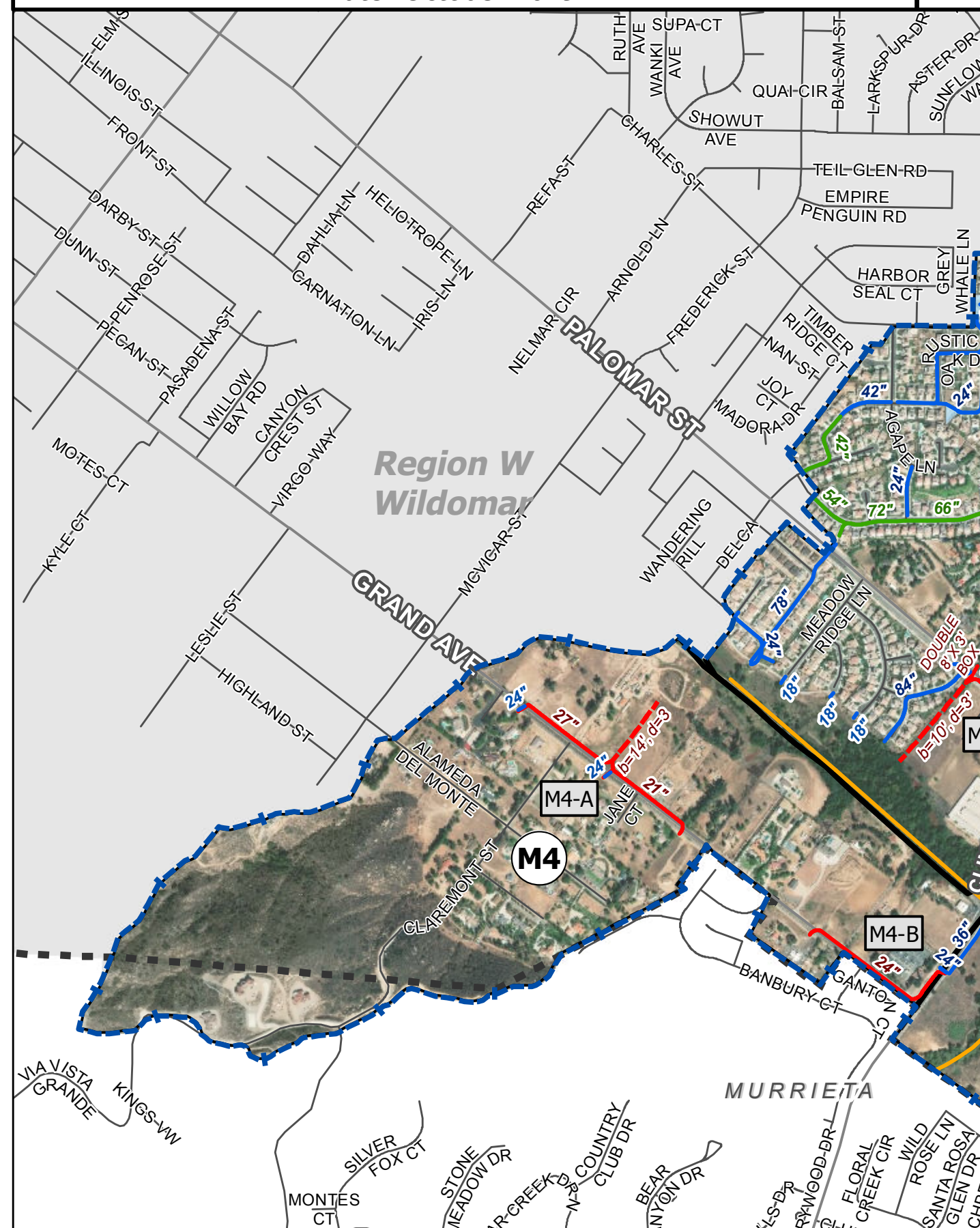
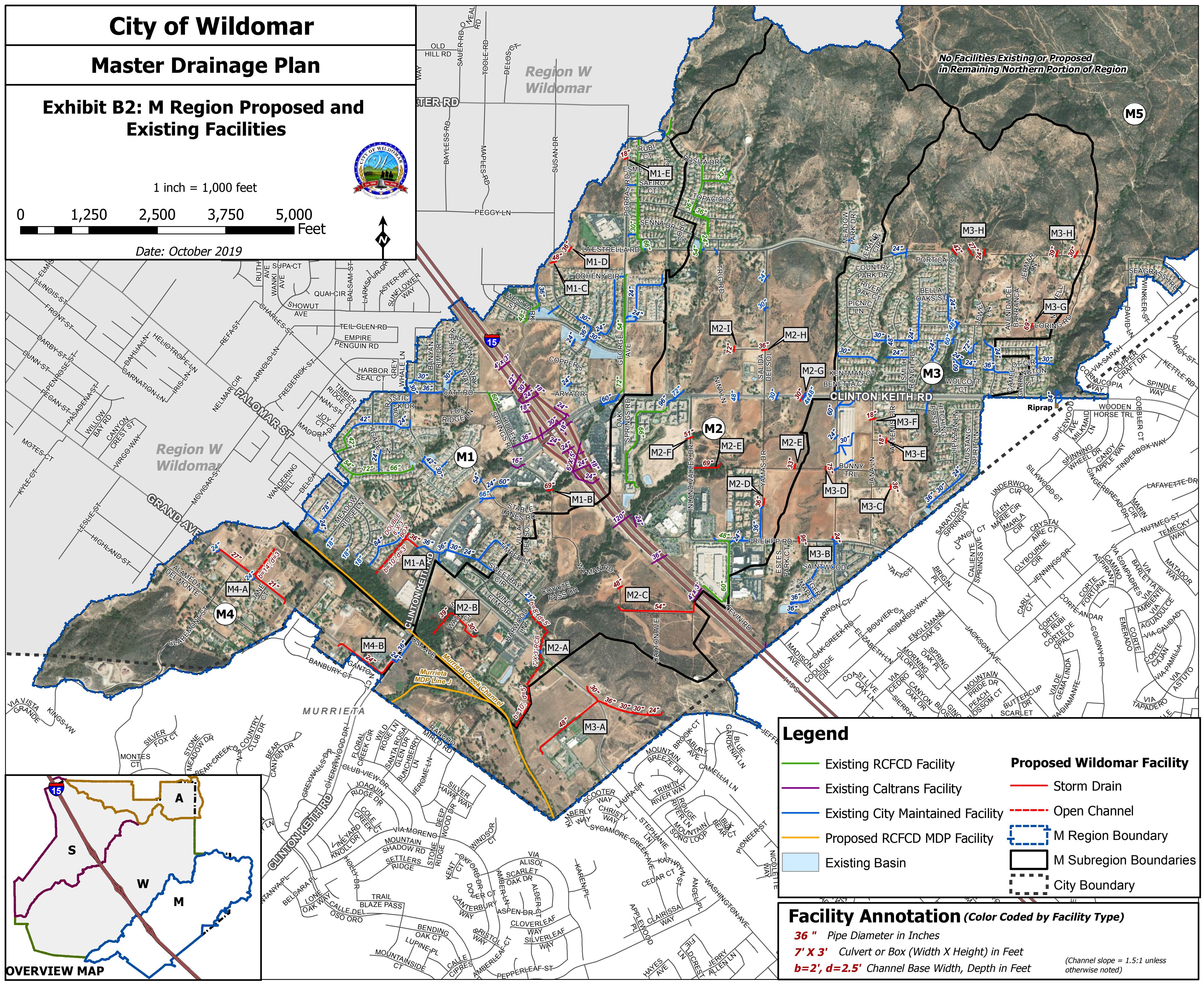


Date: October 2019



No Facilities Existing or Proposed in Remaining Northern Portion of Region

M5



Legend

	Existing RCFCDF Facility	Proposed Wildomar Facility	
	Existing Caltrans Facility		Storm Drain
	Existing City Maintained Facility		Open Channel
	Proposed RCFCDF MDP Facility		M Region Boundary
	Existing Basin		M Subregion Boundaries
			City Boundary

Facility Annotation (Color Coded by Facility Type)

36" Pipe Diameter in Inches

7' X 3' Culvert or Box (Width X Height) in Feet

b=2', d=2.5' Channel Base Width, Depth in Feet

(Channel slope = 1.5:1 unless otherwise noted)

Exhibit B3

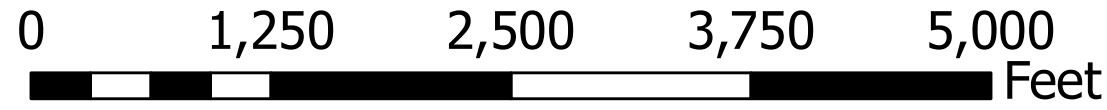
Region S Proposed and Existing Facility Map

City of Wildomar

Master Drainage Plan

Exhibit B3: S Region Proposed and Existing Facilities

1 inch = 1,000 feet



Date: October 2019



LAKE
ELSINORE

Region A

Region W
Wildomar

Region W
Wildomar

Legend

- | | | |
|--|-----------------------------------|-----------------------------------|
| | Existing RCFCDF Facility | Proposed Wildomar Facility |
| | Existing Caltrans Facility | Storm Drain |
| | Existing City Maintained Facility | Open Channel |
| | Proposed RCFCDF MDP Facility | S Region Boundary |
| | Existing Basin | S Subregion Boundaries |
| | | City Boundary |

Facility Annotation (Color Coded by Facility Type)

- 36"** Pipe Diameter in Inches
- 7' X 3'** Culvert or Box (Width X Height) in Feet
- b=2', d=2.5'** Channel Base Width, Depth in Feet

(Channel slope = 1.5:1 unless otherwise noted)
(Open Channels without base width are V ditches)

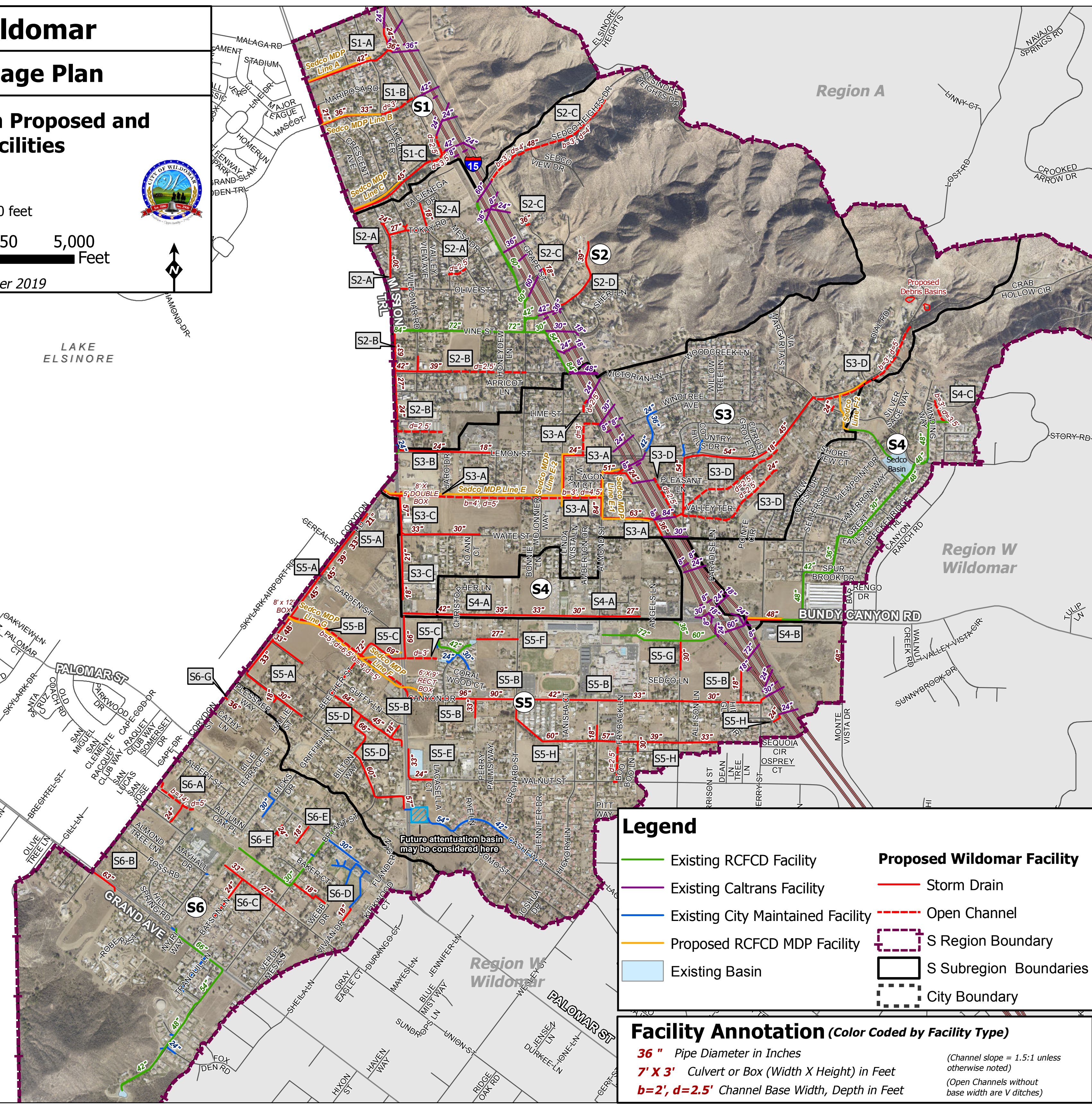
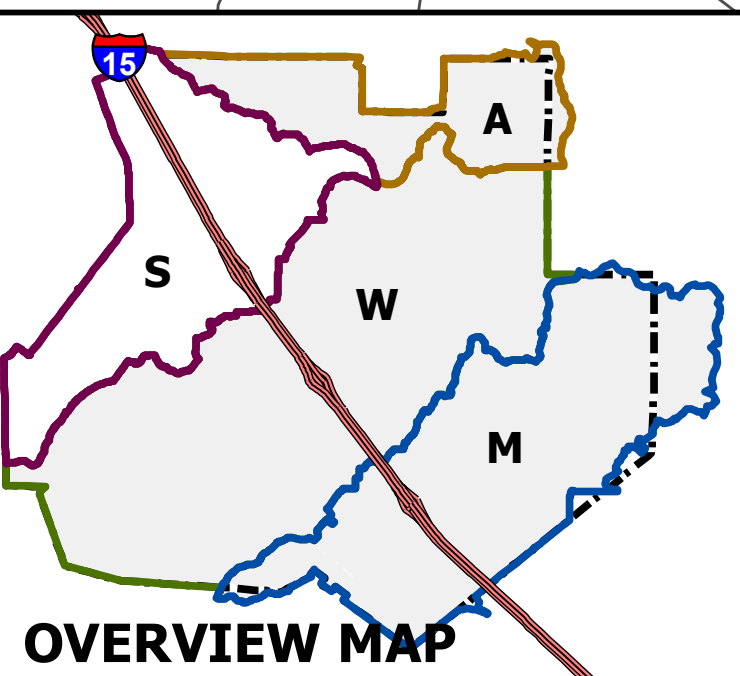


Exhibit B4

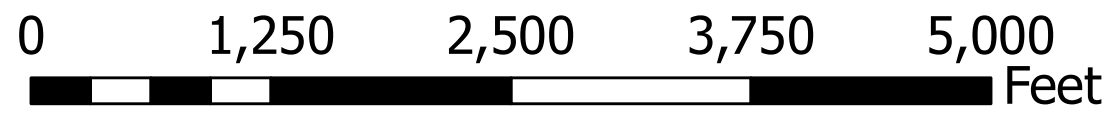
Region A Proposed and Existing Facility Map

City of Wildomar

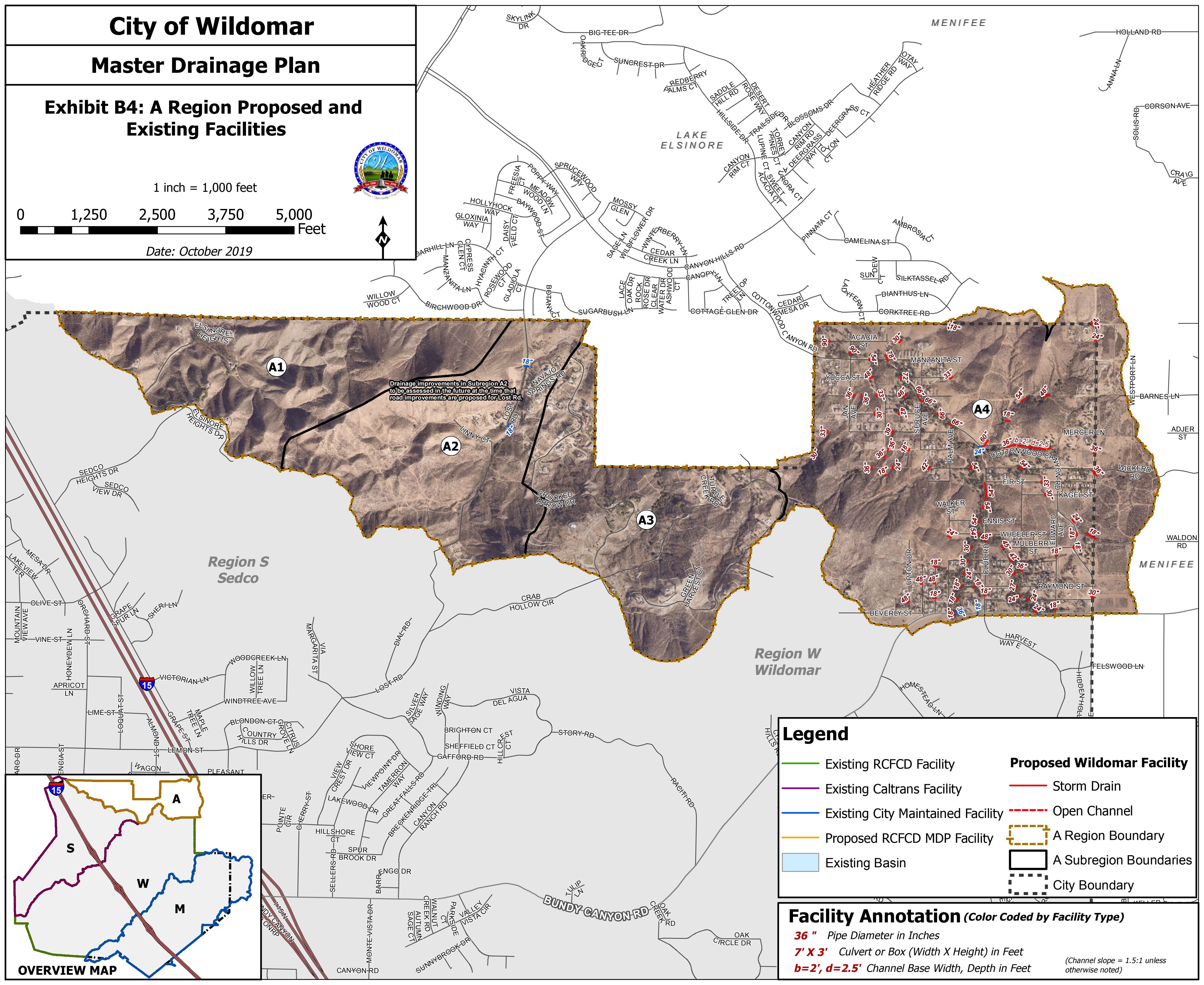
Master Drainage Plan

Exhibit B4: A Region Proposed and Existing Facilities

1 inch = 1,000 feet



Date: October 2019



Drainage improvements in Subregion A2 to be assessed in the future at the time that road improvements are proposed for Lost Rd.

Region S Sedco

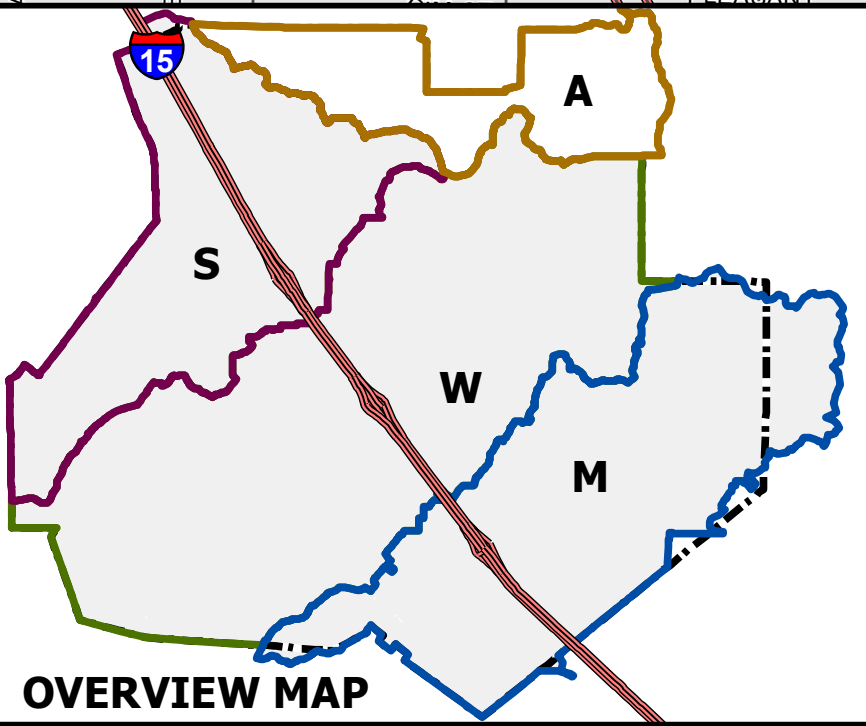
Region W Wildomar

Legend

- | | | | |
|--|-----------------------------------|--|-----------------------------------|
| | Existing RCFCF Facility | | Proposed Wildomar Facility |
| | Existing Caltrans Facility | | Storm Drain |
| | Existing City Maintained Facility | | Open Channel |
| | Proposed RCFCF MDP Facility | | A Region Boundary |
| | Existing Basin | | A Subregion Boundaries |
| | | | City Boundary |

Facility Annotation (Color Coded by Facility Type)

- 36"** Pipe Diameter in Inches
 - 7' X 3'** Culvert or Box (Width X Height) in Feet
 - b=2', d=2.5'** Channel Base Width, Depth in Feet
- (Channel slope = 1.5:1 unless otherwise noted)



Technical Data

(under separate cover)

