Development Design Manual

Coachella Valley Water District

May 2022

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Section 1

General Information and Development Project Review and Approval Process

1.1 Coachella Valley Water District

The Coachella Valley Water District (CVWD) provides domestic water, wastewater (sanitation), non-potable water (reclaimed wastewater and Colorado River water), irrigation/drainage, stormwater and groundwater management services to a population of 300,000 throughout the Coachella Valley, California.

CVWD was formed in 1918 under the state water code provisions of the County Water District Act (Water Code § 30000 et seq.). A governing board of five members is elected from five general divisions for terms of four years each.

CVWD boundaries encompass an area of nearly 1,000 square miles in the Coachella Valley, California. Most of this land is in Riverside County, but CVWD also extends into Imperial and San Diego Counties. Communities served include Cathedral City, Indian Wells, La Quinta, Mecca, North Shore, Palm Desert, Rancho Mirage, Thermal and Thousand Palms in Riverside County as well as the communities of Bombay Beach, Desert Shores, Hot Mineral Spa, Salton Sea Beach and Salton City in Imperial County. The CVWD Service Area Map is located in Appendix A.

This manual and additional information regarding CVWD can be found on the CVWD website at www.cvwd.org.

1.2 Development Design Manual-General Information

This Development Design Manual (DDM) provides comprehensive procedural and technical requirements for the planning, design and construction of CVWD service infrastructure required for new development.

Section 1 provides general information and the requirements for processing a new development and Sections 2 through 9 present drawing format, right-of-way (ROW) procedures, inspection requirements and CVWD service function technical design standards. The Appendices provide more detailed information including checklists, construction notes, specifications, etc.

1.3 General Project Design Requirements

1.3.1 Design

The developer shall employ, at its sole expense, a qualified professional engineering firm (engineer) to plan, design and prepare detailed construction plans and specifications (plans) for the CVWD service infrastructure in accordance with the DDM. All such planning and design work and plans performed and prepared by the developer's engineer shall be subject to review and written approval by CVWD prior to providing to contractors for bidding

purposes. The plans will conform to all applicable federal, state and local governmental rules, ordinances and regulations and all applicable environmental protection laws.

The project must also incorporate, if applicable, the elements of the current version of the Coachella Valley Water Management Plan (CVWMP) and the CVWD Urban Water Management Plan (UWMP). These documents are located on CVWD's website.

1.3.2 Water Supply Assessment and Water Supply Verification

Senate Bill 610 (SB610) was enacted in 2001 and became effective on January 1, 2002. SB610 requires cities and counties to request the preparation of a Water Supply Assessment (WSA) that includes specific information on water supplies from the public water supply agency that would serve any project that is subject to California Environmental Quality Act (CEQA) and is defined as a "Project" in Water Code Section 10912. This information is to be included into environmental review documents prepared pursuant to CEQA.

Senate Bill 221 (SB221) was enacted in 2001 and became effective as of January 1, 2002. SB221 establishes the relationship between the WSA prepared for a project and the project approval under the Subdivision Map Act. Pursuant to California Government Code Section 66473.7, the public water supply agency must prepare a written Water Supply Verification (WSV) that indicates sufficient water supply is available prior to the approval of a new subdivision.

The WSA and WSV apply to developments with 500 or more residential units and larger commercial and industrial projects. If the proposed project requires a WSA/WSV, please contact the Engineering Department for more information on the development of these document(s).

1.3.3 CEQA and NEPA (National Environmental Policy Act)

An action is subject to CEQA when it qualifies as a "project" as stated above in Section 1.3.2. Per the Council on Environmental Quality (CEQ), an action or project generally is also subject to NEPA when it; (1) has federal funding, (2) is located on or impacts federal lands, or (3) requires a federal permit.

The developer shall, at developer's sole cost and expense, be responsible for compliance with the CEQA, NEPA and all other applicable state and federal environmental laws and all requirements of the Federal Endangered Species Act, Clean Water Act and the California Endangered Species Act arising out of or in connection with the design and construction of the standard and/or special facilities (see Section 1.4.1 and 1.4.2) and for compliance with all conditions and mitigation measures which must be satisfied in connection with the same. The developer shall cause the appropriate public agency(s) of the State of California and/or United States of America to act as lead agency(s) for the purposes of complying with CEQA, and/or NEPA. CVWD may elect, but shall have no obligation, to act as lead agency. As part of its obligation to fund the CEQA and/or NEPA processes, the developer shall prepare or cause to be prepared all

instruments, documents, reports and other like or kind writings required to be prepared and/or filed by CEQA and/or NEPA.

Developer shall provide to CVWD copies of all CEQA and/or NEPA documents including the recorded Notice of Determination (NOD) or Notice of Exemption (NOE) with County of Riverside and local agency resolutions.

1.3.4 Right-of-Way

All new CVWD service infrastructure is required to be installed in appropriate right-of-way (ROW) as determined by CVWD, which can include:

- Land which CVWD has fee title
- Easement-dedicated to CVWD on the final map or by separate instrument
- Public ROW (public street requiring an encroachment permit issued to CVWD by the City/County or a public utility easement (PUE))

CVWD in its sole and absolute discretion shall determine whether a PUE dedication may be relied upon for installation of CVWD service infrastructure. PUEs within major thoroughfares and arterial streets are generally accepted. PUEs within private streets or private driveways may require separate dedication of ROW in favor of CVWD.

Section 3-Right-of-Way provides the detailed information related to the dedication of ROW and other related requirements.

1.4 Agreements, Fees and Annexations

1.4.1 Standard Installation Agreement

Standard infrastructure primarily includes onsite pipelines, well sites and/or when developer required infrastructure is not given a credit against the capacity fees (e.g., Water System Backup Facilities Charges and/or Sanitation Capacity Charges). A Standard Installation Agreement will be required prior to the first plan check. See Appendix B for an example of a Standard Installation Agreement. All standard infrastructure plans must be reviewed and approved by the Engineering Department. See Section 2 for drawing format and requirements and Sections 5 through 9 for design details.

1.4.2 Special Installation Agreement

Special infrastructure generally includes offsite pipelines, well sites and well pumping plants, reservoirs, booster stations, lift stations, stormwater facilities, irrigation/drainage facilities, and/or when the developer required infrastructure is given a credit against the capacity fees (e.g., Water System Backup Facilities Charges and/or Sanitation Capacity Charges). A Special Installation Agreement will be required prior to the release of the plans. See Appendix B for an example of a Special Installation Agreement. All special infrastructure plans must be reviewed and approved by the Engineering Department. See Section 2 for drawing format and requirements and Sections 5 through 9 for design details.

1.4.3 Fees and Credits

Developers are responsible for all infrastructure capital costs required to serve the proposed development.

Development fees for domestic water and wastewater fund the construction of regional facilities, specifically the construction of “backup” water and wastewater facilities. The fee structure is based on the developer’s ability to “buy-in” into the existing domestic water and/or wastewater system and gain the benefit of using current assets. These fees include the Sanitation Capacity Charge (SCC), Water Demand Offset Fee, and Water System Backup Facilities Charge (WSBFC) and its components including the Dwelling Unit Charge (DUC), Building Unit Charge (BUC), and Meter Surcharge (see Fees Section for current fees). The Dwelling Unit Charge is based on five (5) sub-components that include Production Facilities (wells/pumping plants), Treatment Facilities, Storage (reservoirs), Pressure Boosting/Reducing Facilities, and Transmission Pipelines. The Sanitation Capacity Charge is based on two sub-components that include Collection System (trunk sewers, regional lift stations, and force mains) and Treatment Facility. Development fees for all units are due for each approved phase after progress for service and prior to release of the first water meter.

CVWD will provide a development fee credit (for each applicable development fee) in consideration of the off-site infrastructure construction costs borne by the developer. For domestic water offsite infrastructure, the developer will receive credit for the specific Dwelling Unit Charge sub-component of the WSBFC that was constructed off-site. The credit shall not exceed the total specific sub-component of the Dwelling Unit Charge. For offsite sewer infrastructure, only the Collection System portion of the SCC is creditable. The Water Demand Offset Fee and the Treatment Portion of the SCC are not creditable.

The Water Demand Offset Fee and WSBFC may be reduced up to 60 percent if non-potable water is utilized within the Development.

Developer is responsible for payment and installation of infrastructure to serve its development (Required Facilities). If CVWD requires Developer’s Required Facilities to be Oversized, then Developer shall construct and install the Oversized Facilities. CVWD may contribute to pay the difference between the Required Facilities and the Oversized Facilities, if the Developer agrees to comply with California Labor Code and California Department of Industrial Relations such that the Developer pays the construction of the Oversized Water Facilities at prevailing wage rates. This difference in cost is not creditable.

1.4.4 Annexations

CVWD requires new development to annex into the Stormwater Unit if the land is not already included in the Stormwater Unit. The land so annexed shall be subject to all assessments, taxes and charges which may be levied within the Stormwater Unit. The Annexation Petition is provided by the Stormwater Division as part of the City/County approval process (see Appendix K).

1.5 Development Review Letter and Notice of Water/Sewer Service Availability

At the very early stages of a development project, CVWD will prepare a Development Review Letter at the request of the County or City. This letter provides the County or City and the developer/engineer with a basic description of the services that CVWD will provide, notice of water/sewer service availability subject to CVWD regulations concerning water supply, along with any service concerns and potential conflicts with existing CVWD infrastructure, policies or guidelines. An example of the Development Review Letter is shown in Appendix A.

If a Development Review Letter has not been provided for the project, CVWD will provide a Notice of Water and/or Sewer Service Availability at the request of the developer/owner.

1.6 Development Project Review and Approval Process

After the Development Review Letter and/or Notice of Water and/or Sewer Service Availability has been issued, the developer/engineer begins the Development Project Review and Approval Process. Figures 1 & 2 presents the CVWD Development Project Review and Approval Process in flow chart form. The flow chart presents the sequence of events throughout the life of a development project. The primary CVWD department responsible for each process function is depicted in a small box in the lower-right hand corner. The referenced DDM section for key flow chart items are shown in brackets. The Standard Installation Agreement and Special Installation Agreement include the detailed process requirements. The following sections describe the Development Project Review and Approval Process in general terms.

1.6.1 Initial Contact and CVWD Infrastructure Location

The primary contact throughout the life of the development project will be the Development Services Division of the Engineering Department. All plans or inquiries should be submitted to Development Services for routing to the appropriate CVWD departments for review.

The developer/engineer should contact the Utility Coordinator in the Engineering Department to obtain existing utility infrastructure locations.

1.6.2 Initial Meeting with CVWD Departments

When preliminary development project plans are available, the developer/engineer should set up the Initial Development Project Meeting with the Development Services Division to discuss CVWD's requirements. Representatives of all applicable CVWD Departments will attend. The developer/engineer should be familiar with the contents of this manual prior to the Initial Development Project Meeting.

After the Initial Development Project Meeting, the developer/engineer will begin the formal Development Project Review and Approval Process as outlined in the following subsections.

1.6.3 Plan Check Submittal Requirements

Prior to acceptance of the first set of plans for plan check, the developer/engineer must submit to Development Services the Plan Check Submittal Application and associated hydraulic modeling deposit/information, fire flow requirements, plan check deposit, forms/agreements and completed plan check checklist (see Appendix A). Upon acceptance of the Plan Check Submittal Application, the plans will be forwarded for plan check.

Developer is responsible for paying for all plan check costs incurred by CVWD. CVWD shall invoice Developers at regular intervals. If Developers are delinquent more than 60 days on plan checks invoices, the plan check process will stop until all delinquent invoices are paid.

Prior to accepting the plans for second plan check, the developer/engineer must submit to Development Services any recorded grant deeds, recorded easements, proposed tract map easements and landscape irrigation plans. CVWD's Water Management Division will review and approve the landscape plans and proposed irrigation water meter sizing. In addition, the ROW Division will review the landscape plans to determine any interference with existing CVWD infrastructure and ROW.

Once plan checks are complete and CVWD requests the final plans (mylars), the developer/engineer may submit the final plans electronically or provide mylars for CVWD's signature.

Prior to the release of any plans (mylars) by CVWD, the developer/engineer must submit to Development Services the CAD files for the approved plans in electronic format (no disk), execute any Special Installation Agreements, and pay the SCC for sewer-only projects, and pay all plan check fees. See Section 2.6 for digital submittal requirements of CAD files.

1.6.4 Construction Requirements

After approval of the plans and prior to the pre-construction meeting, the developer/engineer must submit to the Inspection Division the Material Submittal Form (See Section 4-Inspection) and provide Development Services an electronic version of the recorded tract map and a cash deposit in an amount equal to the greater of $5,000 or 5% of the estimated construction costs as a Performance Guarantee Deposit during the 18-month warranty. Release of the Performance Guarantee shall be in accordance with the Special and Standard Installation Agreements.

Next, the developer's contractor must schedule a preconstruction meeting with the Inspection Division prior to start of construction. The developer/contractor must provide certification that the contractor is properly licensed in California and that the developer has adequate insurance. Developer is responsible for all inspection services cost incurred on the project. The Developer shall pay an Inspection Services Deposit to CVWD at the time of the preconstruction meeting.

The work cannot begin until CVWD has installed all the connection points (primarily domestic water projects). All new CVWD service infrastructure will be constructed under direct CVWD inspection. See Section 4-Inspection for detail construction inspection requirements.

1.6.5 Progress for Fire Protection, Progress for Service and Project Completion and Acceptance

The water system can be progressed for fire protection after curb and gutter is constructed, prior to paving and after the water system has been disinfected and successfully passed CVWD's pressure test and bacteriological screen. This will allow the project to utilize the water system for fire protection during building construction.

When the base paving is complete, the Asset Register form is completed, and the approved As-Built Drawings have been submitted, then the CVWD service infrastructure can be progressed for service. The SCC, WSBFC and Water Demand Offset Fee for all units within the approved phase must be paid prior to the issuance of the first meter.

When final paving is complete, CVWD Inspection will develop a final punchlist. All punchlist items must be corrected and the developer must provide CVWD a copy of the CC&Rs for the project prior to final acceptance. Upon final acceptance by CVWD, the developer shall file a Certificate of Completion and Final Acceptance with the County and provide CVWD with the Bill of Sale conveying the facilities to CVWD along with the final construction costs. At this point, the eighteen (18) month warranty period begins.

1.6.6 Delayed Start of Construction

Construction must begin within one year of approved CVWD service infrastructure plans. If more than one year has elapsed since approved plans, the developer/engineer shall re-submit the plans for review and approval.

FIGURE 1
CVWD DEVELOPMENT PROJECT REVIEW & APPROVAL PROCESS

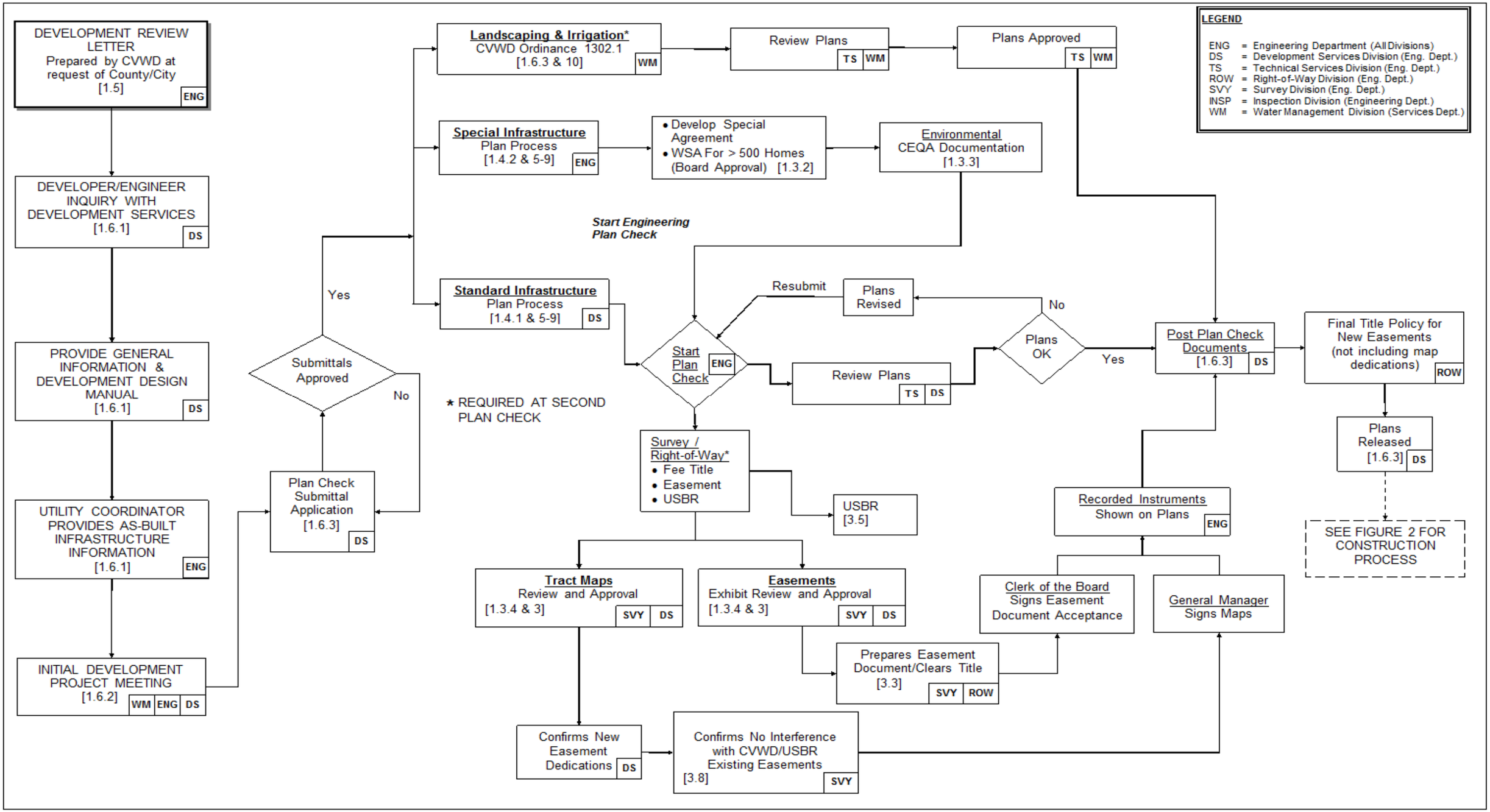
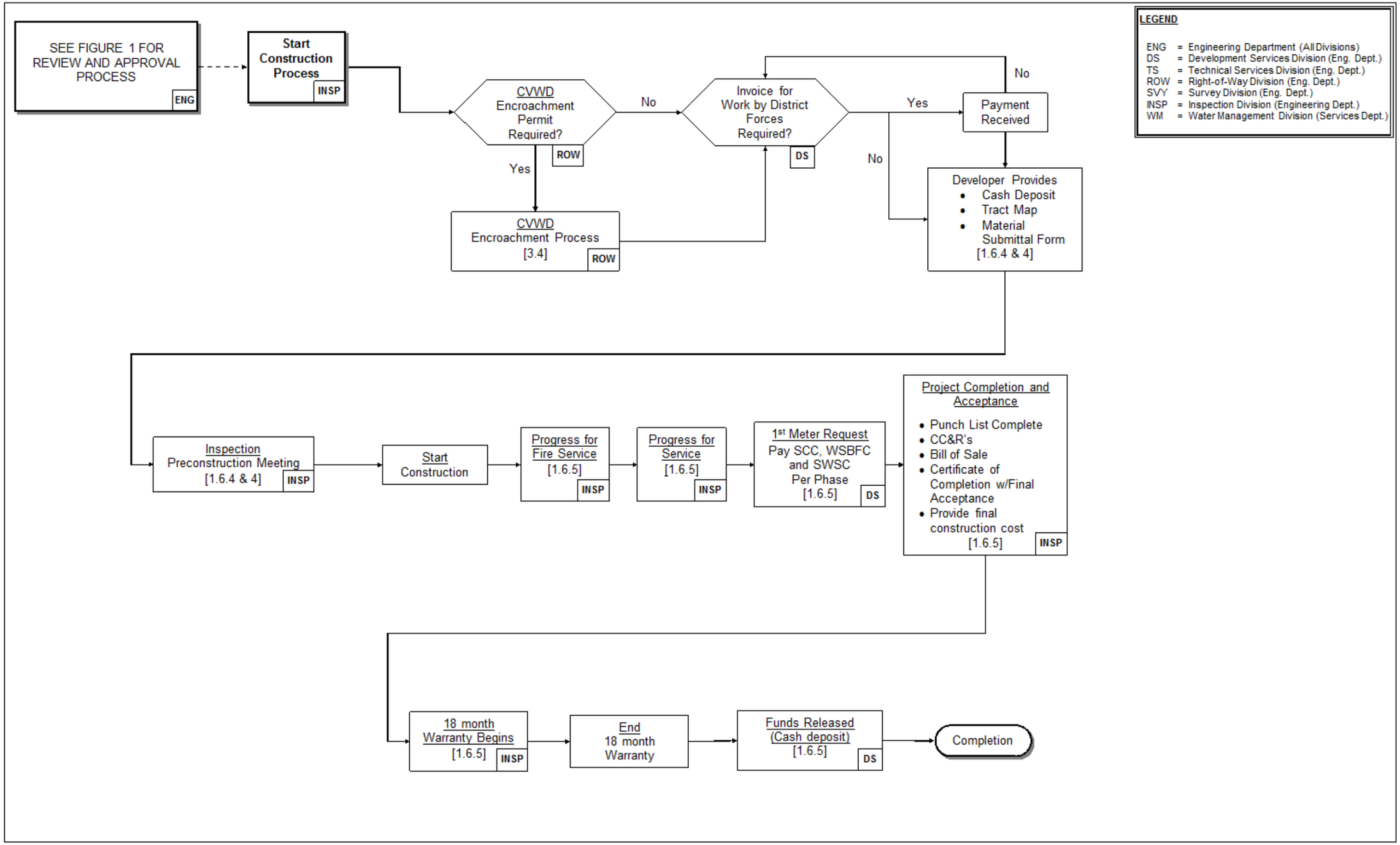


FIGURE 2
CVWD CONSTRUCTION PROCESS



Section 2
Drawing Format and Requirements

2.1 Drawings-General

The developer's engineer shall prepare CVWD service infrastructure drawings that are clear, concise, and meet CVWD drawing format and requirements. Drawings that are difficult to interpret and/or do not meet CVWD drawing standards are unacceptable and will be subject to rejection without review.

All drawings are submitted and returned through the Development Services Division within the Engineering Department. The Engineering Department will review all CVWD service infrastructure drawings except landscape irrigation drawings which are reviewed by the Water Management Division.

Construction must begin within one year of approved CVWD service infrastructure drawings. If more than one year has elapsed since approved drawings, the Development Project Review and Approval Process restarts and drawings must be re-submitted for plan check including new plan check fees.

Detailed plan checklists for domestic water, wastewater (sanitation), non-potable water, irrigation/drainage, stormwater, and groundwater management services are located in Appendix E along with drawing examples. The following serves to describe the general drawing format and requirements.

2.2 Sheet Format

2.2.1 General

CVWD service infrastructure drawings shall be of professional quality. Separate drawings must be submitted for each CVWD service function, i.e. domestic water, wastewater (sanitation), irrigation/drainage, stormwater, and landscape irrigation. Drawings shall be of standard engineering practice, well arranged, neat, legible and present the proposed construction in bold font to eliminate confusion. Drawings shall show both plan and profile (except domestic water mains less than 12" in diameter).

2.2.2 Sheet Layout

All drawings shall be 24" x 36" size. The horizontal scale shall be 1" = 40' (preferred) or 1" = 20' and the vertical scale shall be 1" = 4' (preferred) or 1" = 2'. Scale bars shall be provided.

Match lines and continuations from sheet to sheet shall be used and identified with applicable station points and cross reference. Stationing shall be provided along the centerline of pipe. New stationing shall start at 10+00.

As a minimum, the general sheet layout shall show the following:

- North Arrow shall point up or to the right
- Indicate the sheet number and total number of sheets on the drawing in large bold font at the bottom right corner of all sheets
- All sheets to include a geographic title block
- Engineers signature block
- Basis of bearing
- Benchmark
- Underground service alert (USA) statement
- City/County signature is added after CVWD has approved final drawings

Provide detail sections for special assemblies and complex connections (preferably on the same sheet). The detail shall be drawn to an appropriate scale showing pipe size and shall fully identify all the parts in the detail.

The engineer shall note on the drawings all connections to existing CVWD facilities and the party responsible for making the connections.

CVWD service infrastructure drawings shall not be used as construction drawings for streets, curbs, grading, electrical, gas, television, storm drains or any other non-CVWD improvements.

2.3 Cover Sheet

As a minimum, the Cover Sheet shall show the following:

- Project title, centered at top of sheet in large bold font
- Index Map with scale and north arrow
- Vicinity Map, upper left corner with north arrow
- Geographic title block (Township, Range, Section and Quadrant), and sheet numbering lower right corner
- Owner/developer
- APN
- USA information
- Basis of bearings and benchmark
- List of abbreviations and symbol legend
- Typical street section(s) called out as either public or private
- Utility contacts, static water pressure
- Manhole/cleanout legend (sewer)

- Easement and reference drawing information
- Engineers information block with current seal
- An 8-1/2” wide strip kept clear along entire right-hand side for CVWD notes and signature block to be supplied and affixed by CVWD
- Sheet Index

2.4 Plan and Profile Format

2.4.1 Plan View

The plan view sheets, shall be drawn at a horizontal scale of 1” = 40’ (preferred) or 1” = 20’. Drawings shall be arranged in a clear legible manner with all facilities clearly identified. Proposed facilities shall be called out in large bold font with type and size of facility. Leaders shall be utilized to offset facilities descriptions to improve drawing legibility. All existing CVWD and United States Bureau of Reclamation (USBR) facilities shall be called out with drawing numbers. All lines representing other utility infrastructure shall utilize a unique identifier.

Separation between all facilities and roadway centerline shall be shown. Stationing shall be readable, and shall follow pipeline centerline. All connection points, crossings, and appurtenances shall call out stationing (i.e. bends, manholes, laterals, services). Pipeline data shall be placed in a table format on each corresponding sheet.

No topographical or contour lines shall be added to domestic water drawings unless requested by CVWD. Contour lines will be required for stormwater, retention/detention basins and gravity sewer.

Gate valves and sewer manholes shall be labeled with Northing and Easting.

Restrained joints shall be called out in bold with stationing in accordance with the checklist requirements. The area of pipeline being restrained shall be shaded or hatched to distinguish the restraint joint areas. For projects in which the entire pipeline is restrained, only call out “ALL RESTRAINED JOINTS” in the plan view.

Easements shall be identified on all sheets including the Instrument Number. All CVWD and USBR easements shall be lightly shaded.

Street names or line references shall be called out in large bold font and identified as public or private. No cross-hatching shall be used to represent asphalt removal. Cross-hatching may be used for pipeline encasement.

An area 3”x 6” along the bottom right-hand side of the drawing shall be left clear for CVWD to affix the signature block.

Construction notes are to be included on each sheet numerically listing each described item with item number inscribed in a circle. The numerical callouts with leader lines shall point to the location of the described construction note.

2.4.2 Profile

Profile sheets shall be drawn at a vertical scale of 1" = 4' (preferred) or 1" = 2'. Profile shall show all existing and proposed surfaces and utility crossings over or under proposed facility. Stationing shall be shown along bottom of profile at 100 foot intervals. Profile stationing shall line up with plan view stationing. Elevations shall be clearly shown on both ends of profile sheet.

Sewer and drainage drawings shall show distances between manholes, top of manhole elevation, manhole number, stationing, depth and inverts in/out. All profile types shall show slope of pipeline, pipe invert elevation, restrained joints, grade breaks, crossings, and stationing of appurtenances and connection points with reference drawings called out. For pressurized pipelines, top of pipe elevations shall be shown.

For all profile sheets the vertical datum bench mark information shall be included in the title block along the bottom of each sheet.

2.5 Easements

CVWD requires easements to ensure the ability to properly operate and maintain its facilities. The detailed process for securing and dedicating easements to CVWD is described in Section 3-Right-Of-Way (ROW). The general physical requirements for CVWD easements are depicted in Table 2.1.

Table 2.1 CVWD Minimum Easement Width

Depth of Pipe Less Than 10'	**Easement Width**
Single Pipe	20 feet
Two Pipes[1]	32 feet (10' curbs/walls to pipe CL + 12' between pipe CL)
Depth of Pipe Greater Than 10'	
Single Pipe[2]	Minimum-Depth x 2.0
Two Pipes[1,2]	Minimum-Depth of Deepest Pipe x 2.0 + 10' curbs/walls to pipe CL + 12' between pipe CL)

[1]The 12" pipe centerline (CL) offset applies when the sum of the inside diameter of the two pipes is 24" or less. If the sum of the diameters is greater than 24", then the separating distance between the outside edge (including bells) of the pipes shall be 10'.

[2]CVWD may require additional easement width depending on field conditions

There shall be no unreasonable interference with the CVWD infrastructure within the easement area. Please see Section 3-Right-of-Way for more information on interference and encroachments.

2.6 Digital Drawings

Prior to the release of mylars (see Section 1.6.3), a digital copy of the drawings (on CD or DVD) shall be provided in AutoCAD (dwg) and Adobe Acrobat (pdf) format, including streets, units, cross reference drawings, section and midsection lines, and state plane coordinates. The Adobe Acrobat file must be an export of AutoCAD and not a scan of the plans.

CVWD uses Geographic Information System (GIS) as part of its asset management and facility maps. The ability to maintain an accurate record of assets requires CVWD to employ computer aided drafting (CAD) standards to optimize the import of asset data into GIS. See Appendix A for detailed information CAD requirements.

California state plane coordinates, zone 6 (NAD 83) are required to be shown at all street intersections, tract boundary points and two known section or ¼ section points. Development Services can supply known points for the area. Should any changes in the development project take place after this time, a revised digital drawing shall be provided immediately.

2.7 Revisions to Drawings

Drawings that are revised after approval by the CVWD shall be resubmitted for approval of the revision. Revisions to approved drawings need to be submitted by the original engineer or with the original engineer's written consent. The revisions will be labeled with a triangle (numbered with the appropriate sequential number) and a brief description of the revision in the CVWD signature block will be initialed by CVWD. The area to be revised should be identified by a cloud or other descriptive method.

Revisions can be made in two forms:

- By hand on the original mylar
- Resubmit replacement mylar showing the revisions and marking the drawing "REPLACEMENT MYLAR" in bold above the CVWD title block.

If any modifications to the CVWD service infrastructure are made after the drawings have been revised to "As-Built" by CVWD, the modifications shall be made by the Engineer on CVWD's copy (if not too extensive-to be determined by CVWD) and not on the Engineer's original or digital copy. If the revisions are extensive the drawings may be submitted as a regular revision as described above.

Section 3
Right-of-Way

3.1 General

For the purposes of this section, Right-of-Way (ROW) is considered fee-owned land and/or easement.

CVWD owns approximately 7,000 acres of land and has approximately 3,240 easements. CVWD ROW contains a host of facilities required to provide domestic water, wastewater (sanitation), non-potable water, irrigation/drainage, stormwater, and groundwater management services.

In addition, CVWD has unique ROW obligations related to the irrigation system.

The irrigation system is comprised of the Coachella Branch of the All-American Canal, Protective Works (Flood Protection Dikes and Channels), and Irrigation Distribution System. The United States Bureau of Reclamation (USBR) owns these facilities and CVWD operates and maintains (O&M) them in perpetuity. Accordingly, CVWD is responsible for administering and protecting USBR ROW. These facilities are located in the geographical area known as Improvement District No. 1 (ID 1). See Appendix J for a map of ID 1.

CVWD's ROW Division provides the following essential services in regards to the development design process:

- Dedication of real estate assets including land, buildings, and other facilities
- Dedication and quitclaim or release of ROW including those related to managed assets for USBR
- Processing of CVWD encroachment permits and Noninterference Review Letters (NIRL)
- Processing of USBR License (fee-owned land) and Consent (easements) Agreements
- Processing Irrigation and Drainage System Relocations and Abandonments

The following subsections provide the details for these essential services.

3.1 Costs

Certain owner/developer initiated activities require CVWD to charge fees and collect deposits against actual costs for CVWD to review and process. Please see "Special Charges for Miscellaneous Services" on the CVWD website. The fees are non-refundable. Hourly rates may vary. Deposits are refundable only to the extent the deposit exceeds expenses incurred by CVWD.

The deposits are the minimum required and the amount may be modified, in CVWD's sole discretion, based on the project's size, complexity, or impacts to CVWD. The time and material costs shall include all actual CVWD labor, administrative, and overhead costs, including expenses for engineering, management, and outside consulting provided to support CVWD staff. CVWD may elect to use a consultant to perform any of the services for specific projects based on either technical needs or staff availability.

3.2 Dedication of Real Estate Assets

The developer is required to dedicate to CVWD real estate assets for a variety of utility purposes as a condition of development. This may include raw land and/or improved land for well sites, pump stations, reservoirs, lift stations, treatment facilities, stormwater facilities, etc. There are two methods for dedicating real estate assets to CVWD; (1) dedication by final map or (2) dedication by separate instrument/document. In either case, the recorded instrument/document numbers and/or map book and page must be shown on the plans prior to release of the plans for construction (see Figure 1).

The dedication of real estate assets is defined in the Special Installation Agreement (see Section 1.4.2 and Appendix B). The Special Installation Agreement defines the basic requirements of the real estate asset(s), including size, type, general location, etc. and the timing of the dedication. Please note CEQA/NEPA compliance is the responsibility of the developer.

CVWD requires four items for each dedication by separate instrument/document; (1) Preliminary Title Report (PTR) and Title Insurance (TI), (2) Substitution of Trustee and Partial Reconveyance if applicable, (3) Proof of the signer's capacity to sign on the fee title owner's behalf (Corporate Resolution, Operating Agreement, etc.) and (4) Grant Deed. The PTR/TI ensures that the real estate asset(s) has no adverse encumbrances. The Partial Reconveyance ensures that the real estate asset is not subject to beneficiary foreclosure. The Grant Deed includes Exhibit "A" (legal description) and Exhibit "B" (plat depiction of the real estate asset(s), both Exhibits to be prepared by a CA Licensed Surveyor and are subject to the CVWD Standards for Legal Descriptions and Plats). CVWD will require a Record of Survey (including field survey and monument placement) and Certificate of Compliance to be filed if the parcel(s) are a part of a larger parcel. Examples of these documents are located in Appendix F.

3.3 Dedication of Easement

The developer is required to dedicate easements for a variety of utility purposes as a condition of development. Typically, easements are dedicated for pipelines and appurtenances but could be dedicated for other facilities.

There are two methods for dedicating easements to CVWD; (1) dedication by final map or (2) dedication by separate instrument/document. Typically, easements for pipelines and appurtenances located within the final map development area are dedicated on the final map and off-site easements are dedicated by separate instrument/document. In either case, the recorded easement instrument/document numbers and/or map book and page must be shown on the plans prior to release of the plans for construction (see Figure 1).

CVWD requires a PTR, Proforma, and TI for each easement dedication by separate instrument/document. The PTR/Proforma ensures that the real estate asset(s) has no adverse encumbrances. The developer is responsible for providing these items at no cost to CVWD. These are subject to CVWD's review and approval. Please refer to the Title Insurance Steps for easements in Appendix F.

In addition, CVWD requires three items for each dedication by separate instrument/document: (1) Grant of Easement, (2) Proof of the signer's capacity to sign on the fee title owner's behalf (Corporate Resolution, Operating Agreement, etc.) and (3) Lender Consent of Easement, if required. The Grant of Easement includes Exhibit "A" (legal description) and Exhibit "B" (plat depiction of the real estate asset(s), both Exhibits to be prepared by a CA Licensed Surveyor and are subject to the CVWD Standards for Legal Descriptions and Plats). Examples of these documents are located in Appendix F.

Dedication by final map is further elaborated in Section 3.8.

3.4 CVWD Noninterference Review Letter and Encroachment Permit Process

CVWD may allow limited access to its ROW holdings for temporary access or permanent construction. A Noninterference Review Letter (NIRL) and Encroachment Permit (EP) process has been established to formalize review and approval of proposed encroachments. The CVWD EP process is also utilized in conjunction with the USBR permitting process as further defined in Section 3.5. This process ensures the proposed activity will not unreasonably interfere with CVWD's or USBR's use of the ROW.

3.4.1 Interference

CVWD and the USBR have defined interference as follows:

- CVWD-anything that would unreasonably interfere with the easement rights, endanger the CVWD facility, or cause additional funds to be expended on O&M
- USBR-anything that would compromise the USBR facility, impede use or access, or cause additional funds to be expended on O&M

3.4.2 Noninterference Review Letter (NIRL)

CVWD requires the project proponent to submit a request for noninterference review for certain activities within CVWD and USBR easements. Examples of interference and noninterference include:

Interference Examples:

- Activities that cause interference include, but are not limited to, permanent structures including buildings, walls, gates, fences, trash enclosures, swimming pools, parallel underground wet and dry utilities, etc. Some parallel underground runs may be acceptable for a short distance.

- Potential interference may include driveway, sidewalk, parking lot, curb and gutter-depending on prior rights and extent of improvements. CVWD may suggest replacement/relocation of CVWD/USBR facility at applicant's cost to prevent future damage to surface improvements. If CVWD/USBR facility is not replaced/relocated, then any damage to surface improvements would not be CVWD's responsibility.
- Existing and/or proposed agricultural cultivation (crops) encroachments within a CVWD/USBR easement are considered interference, but may be authorized to remain through an Agricultural NIRL. USBR consent will also be required.

Noninterference Examples:

- Grass and plants less than 3 feet in height
- Trees outside 15 feet of CVWD/USBR infrastructure (e.g. pipelines)
- Landscape irrigation system
- Perpendicular underground wet and dry utilities (gas and electric may require additional review) with proper separating distance
- Other activities not listed will be considered on a case-by-case basis

CVWD will make a noninterference determination and issue a NIRL that requires acknowledgement by the project proponent. CVWD's NIRL application package and an example of a NIRL is located in Appendix F. The typical processing time for a CVWD NIRL is 30 days from receipt of a complete submittal. See latest version of Ordinance 1403.x for Special Charges for Miscellaneous Services.

3.4.3 Encroachment Permit (EP)

CVWD administers three types of EPs as defined below:

- EP-a recordable or non-recordable permit required for the long term use of CVWD fee-owned land or stormwater channel facility where CVWD holds an easement
- Construction EP-required for each entity/contractor installing:
    - Any improvement within USBR fee-owned land or easement
    - Any improvement within CVWD fee-owned land
    - Improvement involving CVWD facilities within CVWD easement if CVWD facilities are at risk
- Temporary EP-required for all temporary uses of CVWD/USBR ROW (potholing, temporary canal water use, filming and photo shoots, etc.)

Upon completion of the NIRL process, it may be determined that a Construction EP is required. Each EP is executed by CVWD and the applicant. Recordable EPs are recorded in the respective County. CVWD's EP application packages and examples of the EPs are located in Appendix F. The typical processing time

for a CVWD EP is 30 days from receipt of a complete submittal package. See Fee Section for CVWD's applicable fees and deposits.

3.5 USBR License Agreement and Consent Agreement Process

As outlined in Section 3.1, CVWD is responsible for administering and protecting USBR ROW. USBR may allow limited access to its ROW holdings for temporary access or permanent construction if CVWD approves the encroachment. The following subsections describe the USBR ROW permitting process in general and the process for abandoning and relocating irrigation laterals.

3.5.1 General

USBR utilizes two primary ROW permitting documents; (1) License Agreement and (2) Consent Agreement. USBR also issues Temporary Access and Temporary Construction Permits on a limited basis. The first step is to complete the USBR Right-Of-Use Application-Federal Form 299 (see Appendix F) which will be utilized by the USBR to determine which permitting document applies.

The License Agreement is required for all projects affecting USBR fee-owned land. Engineering review by CVWD and USBR is required. A CVWD Construction EP is issued after the License Agreement has been fully executed by all parties.

The Consent Agreement must be secured for any projects that may interfere [1] with USBR facilities within USBR easements over private lands. Engineering review by CVWD and USBR is required. A CVWD Construction EP is issued after the Consent Agreement has been fully executed by all parties.

CVWD NIRL (see 3.4.2) alone may be acceptable for minor perpendicular utility crossings and other minor activities that do not interfere with USBR facilities within USBR easements over private lands.

CVWD Temporary EP can be utilized for temporary noninterference activities (potholing, temporary canal water use, etc.) within USBR fee-owned land or USBR easements over private lands.

[1] *Interfere means anything that would compromise the USBR facility, impede use or access, or cause additional funds to be expended on O&M.*

3.5.2 USBR Irrigation Pipeline (Lateral) Abandonment and Relocation Process

Within the irrigation/drainage service area known as ID 1, USBR owns approximately 485 miles of irrigation piping (Laterals). The Laterals deliver Colorado River water from the Coachella Branch of the All-American Canal to the high point of each 40-acre parcel within the majority of the ID 1 boundary. As agricultural land transforms to urban uses, some Laterals will become obsolete and may be abandoned. However, many of these facilities will be needed in the future to service agriculture that remains and non-potable water uses in the lower

portion of the Coachella Valley. CVWD may condition a development to abandon, relocate, or replace a Lateral as a condition of development.

The Laterals are located within USBR ROW which was obtained in the 1940s, some of which were pursuant to the 1890 Act and may not be recorded. Therefore, many of these easements will not show up in a PTR and it is incumbent on the developer/engineer to contact the Utility Coordinator (CVWD Engineering) to obtain the as-built and ROW information for these facilities and show the facilities and associated ROW on the plans. The following describes the steps for the Lateral abandonment, abandonment and relocation, and replacement process. The USBR Abandonment and Abandonment and Relocation Application Packages are located in Appendix F.

3.5.2.1 Identify Affected Irrigation Laterals

- Contact the Utility Coordinator (CVWD Engineering) to obtain the as-built and ROW information.
- Plot the Laterals and USBR ROW on the proposed plans showing all proposed improvements.
- Schedule a meeting with Engineering Irrigation Division through Development Services to determine which facilities need to be abandoned, relocated, or replaced.

3.5.2.2 Irrigation Lateral Abandonment Only

- Coordinate abandonment plan with Engineering Irrigation Division.
- Existing Laterals may be abandoned by four methods; (1) physically remove, (2) crush in place, (3) fill with 2-sack slurry, or (4) abandon in place with an indemnity quitclaim. See Irrigation Standard Details in Appendix J.
- Lateral abandonment plans must be prepared in the same format as domestic water improvement plans.
- All USBR ROW must be identified on the plans by the recorded instrument/document numbers (e.g. Instrument No. 3619, Book 105, Page 250 recorded 9/30/1948, O.R.) or pursuant to the 1890 Act by Right-of-Way Notice and USBR Parcel (e.g. R/W Notice dated 11/23/1949 per Parcel C-7-46), as appropriate.
- Once the Lateral abandonment plans are approved by CVWD, submit USBR abandonment application package (located in Appendix F).
- After USBR approval, obtain CVWD Construction EP.
- USBR will issue a quitclaim deed to release easements acquired by a recorded instrument/document or an Affirmation of Abandonment for any ROW acquired by the 1890 Act. The appropriate release

document will be issued and recorded after final inspection and approval by CVWD.

- Fees assessed by USBR after receipt of the initial abandonment application package need to be paid directly to CVWD on USBR's behalf.
- See Fee Section for CVWD's applicable fees and deposits.
- Total process time after a complete application is received and accepted is typically 120 days.

3.5.2.3 Irrigation Lateral Abandonment and Relocation/Replacement

- Coordinate relocation plan with Engineering Irrigation Division
- CVWD will determine the size and location of the relocated facilities. New Laterals will be PVC pipe (see Irrigation Standard Details in Appendix J). Existing Laterals may be abandoned by four methods; (1) physically remove, (2) crush in place, (3) fill with 2-sack slurry, or (4) abandon in place with an indemnity quitclaim. See Irrigation Standard Details in Appendix J.
- Lateral abandonment and relocation/replacement plans must be prepared in the same format as domestic water improvement plans.
- All USBR ROW must be identified on the plans by the recorded instrument/document numbers (Instrument No. 3619, Book 105, Page 250 recorded 9/30/1948, O.R.) or pursuant to the 1890 Act by Right-of-Way Notice and USBR Parcel (R/W Notice dated 11/23/1949 per Parcel C-7-46), as appropriate.
- Once the Lateral abandonment and relocation/replacement plans are approved by CVWD, submit USBR abandonment and relocation application package if the relocation is outside of the existing easement. If relocation (replacement) is within the existing easement then apply for CVWD Construction EP only.
- Applicant executes a USBR Relocation Agreement/Grant of Easement. If the original ROW was acquired by Right-of-Way Notice pursuant to the 1890 Act, USBR may elect to proceed with recording a Right-of-Way Notice to acquire the new ROW for the relocated Lateral in lieu of the Relocation Agreement/Grant of Easement.
- After USBR approval, obtain CVWD Construction EP to relocate the Lateral.
- Apply for CVWD Construction EP to abandon Lateral line once the newly relocated Lateral is progressed for service.
- USBR will issue the quitclaim deed to release its interest in the easements acquired by a recorded instrument/document or an

Affirmation of Abandonment for any ROW acquired by the 1890 Act. The appropriate release document will be issued and recorded after final inspection and approval by CVWD.

- Fees assessed by USBR after receipt of the initial abandonment and relocation application package need to be paid directly to CVWD on USBR's behalf.
- See Fee Section for CVWD's applicable fees and deposits.
- Total process time after a complete application is received and accepted is typically 180 days.

3.6 CVWD Drainage Pipeline Abandonment and Relocation/Replacement Process

Within the irrigation/drainage service area known as ID 1, CVWD owns approximately 166 miles of underground drainage pipelines and 21 miles of open drains. The drainage system was installed for two purposes; (1) maintain the high groundwater table below the root zone and (2) act as a conduit for salinity leaching. As agricultural land transforms to urban uses, some drainage pipelines will become obsolete and may be abandoned. However, many of these facilities will be needed in the future to service agriculture in the lower portion of the Coachella Valley. CVWD may condition a development to abandon or relocate/replace a drainage pipeline as a condition of development.

The drainage pipelines are located in CVWD ROW and should appear in a PTR. However, it is incumbent on the developer/engineer to contact the Utility Coordinator (CVWD Engineering) to obtain the as-built and ROW information for these facilities and show the facilities and associated ROW on the plans. The following describes the steps for the drainage pipeline abandonment or relocation/replacement process.

3.6.1 Identify Affected Drainage Pipelines

- Contact the Utility Coordinator (CVWD Engineering) to obtain the as-built and ROW information.
- Plot the drainage pipelines and ROW on the proposed plans showing all proposed improvements.
- Schedule a meeting with Engineering Irrigation Division through Development Services to determine which facilities need to be abandoned or relocated/replaced.

3.6.2 Drainage Pipeline Abandonment Only

- Coordinate abandonment plan with Engineering Irrigation Division.
- Existing drainage pipelines may be abandoned by four methods; (1) physically remove, (2) crush in place, (3) fill with 2-sack slurry, or (4) abandon in place with indemnity quitclaim. See Irrigation Standard Details in Appendix J.

- Once mylars are approved by CVWD, submit formal request in writing to abandon and if applicable, obtain letter of authorization from any upstream users.
- Provide PTR and legal description and plat (Exhibits “A” and “B”, both Exhibits to be prepared by a CA Licensed Surveyor and are subject to the CVWD Standards for Legal Descriptions and Plats) for easement to be quitclaimed. Examples of these documents are located in Appendix F.
- Obtain CVWD Construction EP to physically abandon the drainage pipeline.
- See Fee Section for CVWD’s applicable fees and deposits.
- CVWD will issue and record the quitclaim deed after final inspection and approval by CVWD. See Section 3.7 for Compensation for CVWD ROW.

3.6.3 Drainage Pipeline Relocation/Replacement Requirements

- Coordinate abandonment and relocation/replacement plan with Engineering Irrigation Division.
- Existing drainage pipelines may be abandoned by four methods; (1) physically remove, (2) crush in place, (3) fill with 2-sack slurry, or (4) abandon in place with an indemnity quitclaim. See Irrigation Standard Details in Appendix J.
- Once plans are approved by CVWD, submit written request along with PTR and legal descriptions and plats (Exhibits “A” and “B”, both sets of Exhibits to be prepared by a CA Licensed Surveyor and are subject to the CVWD Standards for Legal Descriptions and Plats) for the new easement and easement to be quitclaimed. Examples of these documents are located in Appendix F. If the replacement is within existing easement, then apply for CVWD Construction EP only.
- Applicant executes a Grant of Easement and obtains a Lender Consent to Easement and Proforma/TI if applicable.
- After CVWD approval, obtain CVWD Construction EP to relocate the drainage pipeline.
- Apply for CVWD Construction EP to physically abandon the drainage pipeline once the newly relocated line is progressed for service.
- See Fee Section for CVWD’s applicable fees and deposits.
- CVWD will issue and record the quitclaim deed after final inspection and approval by CVWD. See Section 3.7 for Compensation for CVWD ROW.

3.7 Compensation for CVWD ROW

The majority of CVWD ROW is currently utilized for domestic water, wastewater (sanitation), non-potable water, irrigation/drainage, stormwater, groundwater management services, and conservation mitigation purposes. Some CVWD fee title

land and easements are held for future use. However, in some cases these property rights can be relinquished if they are deemed surplus.

There are four general property rights categories by which CVWD might receive compensation:

1. Sale of CVWD's Fee Title Land- Pursuant to Disposal of Surplus Real Property Policy, as amended from time to time, specific procedures are to be utilized for selling CVWD fee title land that has been deemed surplus or exempt surplus. CVWD fee-owned land will be sold at current market value or higher (see Appendix F).
2. Leasing of CVWD Fee Title Land- Pursuant to Disposal of Surplus Real Property Policy, as amended from time to time, CVWD fee owned land may be leased at current market value or higher. The lease value shall be based on appraised value.
3. Quitclaim of CVWD Easement Rights-CVWD easements (or portions of easements) may be quitclaimed to an applicant if there is no interference with existing or planned CVWD infrastructure or mitigation within the easement area to be quitclaimed.

   Private party applicants (developers, individuals, etc.) may be required to compensate CVWD for relinquishing this property right. The fee title market value may be established by appraisal or using CVWD's standard market values in effect. The fee title market value will then be discounted by an easement value factor (20% to 80%), as determined by CVWD, to obtain the value of the quitclaimed easement.

   This is consistent with CVWD Right of Way Encroachment Policy, approved by the Board of Directors on September 27, 2016 which calls for "full mitigation" of CVWD property rights (see Appendix F).
4. Overlying Easement within Existing CVWD Easement- An existing CVWD easement may be utilized by an applicant if there is no interference with existing or planned CVWD utility infrastructure or mitigation within the easement area. The applicant will be required to obtain the approval of the underlying fee owner. Private party applicants (developers, utilities, individuals, etc.) may be required to compensate CVWD for the use of this property right. The fee title market value may be established by appraisal or using CVWD's standard market values in effect. The fee title market value will then be discounted by an easement value factor (20% to 80%) as determined by CVWD to obtain the value of the easement. The applicant will be required to obtain all necessary CVWD EPs.

3.8 Final Map Review and Approval Process

Section 66436 of the Subdivision Map Act provides that a public entity or utility has the right to review and approve a tract or parcel map (final map). If the public entity or utility finds that the proposed activity as defined by the final map will unreasonably interfere with the full and complete exercise of its ROW, then the public entity or utility can object to the recording/filing of the final map. It is strongly suggested that the developer/engineer work with CVWD to ensure the final map is correct before filing. CVWD will not release plans until the final map or separate instrument/document easements are recorded.

Final map review and approval is performed by CVWD's Survey Division. CVWD reviews each final map in detail to ensure there will be no interference with CVWD/USBR existing and/or future ROW. A typical final map has three sections of interest to CVWD; (1) Proposed CVWD easements and fee title parcels/lots to be dedicated via the final map, (2) Signature Omissions-listing existing CVWD and USBR easements, and (3) Environmental Constraints. These are further elaborated below.

3.8.1 Proposed Easements

CVWD will cross check the approved plans to ensure the proposed easements match with the proposed infrastructure plans.

3.8.2 Signature Omissions

All existing CVWD and USBR easements must be shown on the final map. As outlined in Section 3.5.2, many USBR easements are not recorded and will not show up on a PTR. Therefore, it is incumbent on the developer/engineer to contact the Utility Coordinator (CVWD Engineering) to obtain the as-built and ROW information for these facilities and show the facilities and associated ROW on the plans and final map.

3.8.3 Environmental Constraints

As described in Section 8-Stormwater, CVWD is the major regional stormwater agency for the Coachella Valley. It is important that the Environmental Constraints portion of the final map contain the necessary language to call out stormwater requirements.

If interference is discovered during the review of the final map, then CVWD will issue an Interference Objection Letter to the City or County to ensure the final map is corrected.

Section 4
Inspection

4.1 General

CVWD provides on-site inspection of all approved CVWD service infrastructure including domestic water, wastewater (sanitation), non-potable water, irrigation/drainage and stormwater. The Inspection Division is part of the Engineering Department and all inspection is directed and coordinated by the Chief Inspector.

CVWD Inspectors ensure that construction of CVWD service infrastructure is in conformance with the drawings and specifications. The cost for inspection is borne by the developer. Figure 1 depicts the CVWD Development Project Review and Approval Process in flow chart form and includes the Inspection portion of the process.

During construction, any changes from the approved drawings and specifications must be approved first by the Engineer of Record and then by CVWD's Engineering Department prior to construction.

All pipelines, wells, pump stations, reservoirs, pressure reducing stations, fire hydrants, manholes, sewer laterals, or appurtenances shall be installed by a properly licensed contractor in accordance with CVWD approved Plans, Specifications, and standard drawings and shall be inspected during construction by CVWD personnel or CVWD representative. CVWD inspection shall also include bacteriological testing, pressure testing, air testing, closed circuit television (CCTV) of pipelines, and other specialized project-specific inspections, determined in the sole discretion of CVWD.

Construction work installed without required inspection is subject to removal at the sole cost of the developer/contractor.

4.1 Inspection Services Costs

Inspection services are provided on a time and material basis. The developer/contractor is responsible for all inspection costs and must provide an Inspection Services Deposit prior to start of construction. The deposits are the minimum required and the amount may be modified, in CVWD's sole discretion, based on the project's size, complexity, or impacts to CVWD. The time and material costs shall include all actual CVWD labor, administrative, and overhead costs, including expenses for engineering, management, and outside consulting provided to support CVWD staff. CVWD may elect to use a consultant to perform any of the inspection services for specific projects based on either technical needs or staff availability. Hourly rates may vary.

4.2 Submittals

All materials to be used during construction shall be submitted to the Inspection Division for review and approval utilizing CVWD Materials Submittal Form (ENG_INS-002) which is located in Appendix G. This submittal must be made prior to the Preconstruction Conference.

In addition, the developer/contractor must submit a Critical Path Method (CPM) construction schedule prior to the pre-construction meeting.

4.3 Performance Guarantee Deposit

The developer shall provide CVWD a Performance Guarantee Deposit in an amount of $5,000 or 5% of the estimated construction costs of CVWD facilities, whichever is greater. The Performance Guarantee Deposit must be received prior to the preconstruction meeting. The detailed requirements for the Performance Guarantee Deposit are located in both the executed Standard and Special Installation Agreements.

4.4 Preconstruction Conference

After the material submittals are approved, the Performance Guarantee Deposit is received and prior to starting any construction activities, the developer/contractor shall contact the Chief Inspector to schedule a mandatory pre-construction conference. At the preconstruction conference, the developer/contractor shall provide the following items:

1. City or County encroachment permit granted to CVWD for the installation, operation and maintenance of the proposed CVWD infrastructure
2. Inspection Services Deposit (See current CVWD Fee Schedule)
3. Proof of Insurance (See Standard Agreement in Appendix B)
4. Proof of Contractor's License
5. Proof of California Department of Industrial Relations (DIR) Registration for those projects where CVWD is sharing in costs. See Special Installation Agreements for specific requirements.

4.5 Field Inspection Procedures

After the pre-construction conference, contractors/developers are required to schedule inspection of all construction activities by calling before 2:00 PM one business days in advance of the work.

CVWD provides inspection between the hours of 6:00 AM to 2:30 PM. Developers/contractors requesting to perform work that requires inspection outside of the standard hours are subject to overtime and night work premiums. All requests for work outside of standard inspection hours must be in writing and made 48-hours in advance of the work for day work and a minimum of 72-hours for night time work (from 5 pm to 2 am) and weekends.

Example

- If overtime work is to be performed on Tuesday, the contractor/developer is required to call in to schedule inspection by 2:00 PM on the previous Friday.

- If weekend work is to be performed on Saturday, the contractor/developer is required to call in to schedule inspection by 2:00 PM on the previous Wednesday.

The request for inspection outside of standard working hours is not guaranteed and is subject to staff availability and approval.

4.6 If project has both sanitary and domestic water pipeline construction, CVWD requires that the developer/contractor construct the sewer pipeline before any domestic water pipeline. Project Completions Steps.

The following presents the process for bringing the project to various levels of completion.

4.6.1 Progress for Fire Service

The domestic water system may be progressed for fire service when the system has been disinfected and successfully passed CVWD's pressure test and bacteriological screen. At this stage all curb and gutter must be installed but paving is not required and all Progress for Fire Service Checklist items must be complete. No water meters will be issued but hydrants will be activated and the system will be placed into service to provide fire protection only. See Appendix G for the Progress For Fire Service Checklist Items.

4.6.2 Progress for Service

The domestic water system may be progressed for service when it has been disinfected, successfully passed CVWD's pressure test and bacteriological screen, and the Developer has sufficient funds in the Inspection Services Deposit for the project. Sanitation system and/or irrigation/drainage system may be progressed for service when the systems have successfully passed CVWD's pressure test and video inspection. At this stage, base course paving is required and all Progress for Service Checklist items (exclusive of valve covers, manhole covers and meter lids) must be complete. In addition, the Water System Backup Facility Charge, the Water Demand Offset Fee, and Sanitation Capacity Charge must be paid in full for all units in the approved phase upon the first meter request. Water meters and sewer lateral connections can be installed when the preceding items are satisfied. See Appendix G for the Progress For Service Checklist Items.

4.6.3 Project Completion and Acceptance

The Inspection Division will develop a punchlist within 90 days after the CVWD service infrastructure is Progressed for Service. These items typically include final asphalt, raising valve covers and manholes, etc. When all checklist items are complete, the as-built drawings and asset register (CVWD Form 956) received, CVWD Inspectors will final the project. In addition, the developer shall prepare and file the Certificate of Completion and Final Acceptance with County. Once the preceding is complete, the remaining portions of the Development Project Review & Approval Process can be completed (see Section 1).

The developer/contractor shall be responsible for any inspection costs above any deposits. CVWD shall refund any Inspection Services Deposit only to the extent the deposit exceeds the costs incurred by CVWD.

Section 5
Design Criteria Domestic Water Facilities

5.1 Background

The CVWD Domestic Water System is comprised of 30 pressure zones supplied by wells which withdraw water from the Whitewater River Subbasin and the Mission Creek Subbasin. The CVWD Domestic Water Service Area Map is located in Appendix H. Most pressure zones include reservoir storage. There are pressure booster pump stations and pressure regulating valve (PRV) stations that transfer water between zones. The only treatment for the majority of the wells is chlorination to ensure disinfection throughout the water distribution system. Ion exchange treatment facilities provide arsenic removal in the Mecca, Thermal and Oasis area. Domestic Water System statistics can be found in the most recent edition of CVWD's Annual Report.

The Domestic Water System design/construction standards and regulations for service are governed by the following documents:

- Regulations Governing Domestic Water Service-Appendix H
- Domestic Water Standard Specifications-Appendix H
- Domestic Water General Drawing Notes-Appendix H
- Green Book
- AWWA Standards
- Title 22, California Code of Regulations California Regulations Related to Drinking Water

CVWD has developed a Domestic Water System Hydraulic Model of the entire water supply and distribution system. This model will be utilized by CVWD staff and/or a CVWD consultant to verify the size of the domestic water system facilities required for each development at the developers cost.

5.2 Demand Criteria

CVWD requires new developments to install domestic water system infrastructure that satisfies CVWD's Domestic Water System design criteria. On-site and off-site domestic water infrastructure shall be sized to meet the Peak Daily Demand (PDD) of the proposed development in accordance with the following design criteria.

Table 5.1 Domestic Water Pipeline Design Criteria

Design Parameter	Criteria	
ADD	0.45 gpm/unit (648 gpd/unit)	
PDD	0.81 gpm/unit (1,166 gpd/unit)	
PHD	1.35 gpm/unit (1,944 gpd/unit)	
PDD/ADD	1.8	
PHD/ADD	3.0	
Storage Volume	V = [0.5 x PDD (Diurnal) + 0.5 x PDD (Emergency)] x no. of units x 1,440 min/day + Fire Flow PDD = 0.81 gpm/unit Fire Flow = _____ gpm x ____ hours x 60 min/hour (determined by Fire Marshall)	
Pipelines	Designed to transmit the greater of the following: 1. Peak Hourly Demand (PHD) 2. Peak Day Demand (PDD) + Fire Flow 12" and smaller: Max velocity = 5 ft/sec 18" and larger: Max HL = 1 psi /1,000 feet of pipeline	
Pump Stations	PDD w/ largest unit out of service Hydropneumatic systems include fire flow	
PRVs	PDD w/ largest unit out of service	
Treatment Facilities	PDD w/ largest unit out of service	
Well Capacity	No. of Wells = (0.81 gpm x no. of units x 1.2)/1,800 gpm/well • average well capacity = 1,800 gpm • 1.2 Factor of Safety = for maintenance or emergency • approximately one well for every 1,851 units	
Well Sites	Less than 140 acres	None
	Greater than 140 acres	1 per 140 acres or major portion thereof, major portion being 70 or more acres.

CVWD is located in a hot desert environment and peak demands are significant. CVWD utilizes a PDD allowance of 0.81 gpm per dwelling unit to ensure adequate service during the hot summer months. CVWD may adjust this factor depending on the location of the project, type of development and proposed landscaping.

5.2.1 Demand Criteria – Non-Potable Water

Where Non-Potable Water is available CVWD may allow a reduction of up to 60% in the domestic water demand for ADD, PDD and PHD as shown in Table 5.1 (See Section 9 for additional information on Non-Potable Water Facilities).

5.3 Pressure Zones

CVWD Domestic Water System includes approximately 30 operating pressure zones. These zones operate nominally within a static pressure range between 60 to 100 pounds per square inch (psi). Figure 5.1 schematically depicts a major pressure zone representing elevated storage. Individual single-family homes connecting to pressure below 60 psi will require a "Low Pressure Agreement" as shown in Appendix B. If static pressure exceeds 80 psi, an individual PRV is required (see Sect. 5.18). Water pressure zone information is available from the Engineering Department. The domestic water drawings must identify the existing or proposed pressure zone(s) serving the development and the static water pressure.

Proposed developments located outside of an existing pressure zone will need to create a new domestic water pressure zone and/or connect to an existing domestic water pressure zone(s) while mitigating impacts to the existing zone. As a result, the proposed development will need to provide facilities satisfactory to CVWD. These facilities may include wells sites, wells, treatment plants, booster stations, reservoirs, transmission mains, and pressure reducing stations. The required facilities to serve such developments will include redundant facilities within the new pressure zone and/or existing pressure zone(s) in order to ensure reliable and sustainable service. The degree of operation and maintenance, risk of failure of each facility, as well as demands to existing pressure zone(s) will also serve as a basis for the extent of the required facilities of the proposed development.

5.4 Pipeline Requirements

The CVWD Domestic Water System provides potable water for industrial, commercial and residential use and fire protection. For some projects, a detailed analysis of domestic and fire flow demands utilizing CVWD's Domestic Water System Hydraulic Model may be required to properly define requirements for system design.

Domestic Water System design requirements may include installing pipelines along the frontage(s) of a development for pipeline looping purposes (peak daily demands, fire flow and water quality requirements) and/or for future system expansion purposes. For example, when an area outside the development can logically be served by a future extension of a proposed domestic water pipeline, CVWD may require the pipeline be extended to the tract boundary or to the end of a paved street in a manner to facilitate the future extension. Oversizing may be required where such pipelines can logically serve an upstream area for future use (See Section 1.4.3 for additional information on Oversizing).

Developments desiring to connect to the CVWD's Domestic Water System may be required to provide a minimum of two connections in order to provide a redundant supply connection to the development. Redundant connections will enable CVWD to provide more reliable service, improved water circulation, and increased fire flow capacities to the development. In addition, on some occasions a development may be required to provide a pipeline extension to close a loop in the vicinity pipe network.

5.4.1 Pipeline Sizing Criteria

Table 5.2 provides the domestic water pipeline design criteria to be utilized for all hydraulic analyses.

Table 5.2 Domestic Water Pipeline Design Criteria

Design Criteria	**Standard**
Maximum Velocity	
12 inch and smaller	5 ft/sec
Cul-de-sac/dead end pipelines	10 ft/sec
Maximum Head loss	
18" and larger	1 psi /1,000 feet of pipeline
Minimum Pressure	
Static	60 psi
Fire	20 psi

Pipelines shall be 8, 12, 18, 24, 30, 36 or 42 inches in diameter. Pipelines larger than 30 inches in diameter may be required for projects with high demand requirements. No pipe smaller than 8 inches in diameter shall be permitted except for blow-off assemblies, meter manifolds, services and appurtenances.

A Hazen-Williams Coefficient (C) for new CML ductile iron shall be C = 110. For all older pipe, C shall be based on the age of the pipe for hydraulic analysis.

5.4.2 Pipeline Location and Horizontal Separation

Domestic water pipelines shall be located within public right-of-way (ROW), easements dedicated by tract map or specific easements or fee title land granted to CVWD. The design shall be adjusted to take into consideration utility conflicts, soils, groundwater and any other factors. Table 5.3 represents the minimum horizontal separation of domestic water pipelines from other infrastructure by pipeline size.

Table 5.3 Minimum Horizontal Separation – Domestic Water Pipeline

Horizontal Separation from Domestic Water Pipeline	Minimum Separation (Outside to Outside)
Sewer Pipeline[1]	10 feet
Sanitation landfill, wastewater disposal pond, hazardous waste disposal site.	100 feet
Cesspool, Septic Tank, sewage leach field, seepage pit, underground hazardous material storage tank, or groundwater recharge project site	25 feet
Non-Potable Pipeline[1]	10 feet
Storm Water Pipeline[1]	10 feet
Curb (Lip of gutter)/Edge of Pavement 12 inch and Smaller Domestic Water Pipelines	3 feet
Curb (Lip of gutter)/Edge of Pavement 18 inch and Larger Domestic Water Pipelines	6 feet
Horizontal Separation from Domestic Water Service Line	
Sewer Laterals	10 feet
Sewer Manhole	10 feet
Domestic Water Main Fittings and Bends	2 feet
Fire Hydrant Run	4 feet
Catch Basin	4 feet
Separation between Domestic Service Runs	2 feet

[1]The 10' separating distance is measured between the outside edge (including bells) of the pipes. If the sum of the inside diameters of the two pipes is 24" or less, then the centerline (CL) distance between the two pipes shall be 12'. This will aid in layout and plan checking. If the sum of the diameters is greater than 24", then the separating distance between the outside edge (including bells) shall be 10'.

Note: This is not an all-inclusive list, see Title 22 Code of Regulation, Section §64572 Water Main Separation.

No deflection shall be allowed off any flanges. Table 5.4 shows the Maximum Deflection of full length pipe by pipe joint type and size.

Table 5.4 CVWD Maximum Deflection DIP*

Type of Pipe Joint	Pipe Size- Inches									
	8	10	12	14	16	18	20	24	30	36
Push-On	2.5°	2.5°	2.5°	1.5°	1.5°	1.5°	1.5°	1.5°	1.5°	1.5°
Mechanical Joint	2.5°	2.5°	2.5°	1.75°	1.75°	1.5°	1.5°	1°	- -	- -
Restrained Joint	2°	2°	2°	1.5°	1.5°	1.5°	1.5°	1.5°	1°	1°

* The "Design" deflections shown are 50 percent of the maximum value allowed by the Ductile Iron Pipe Research Association (DIPRA).

5.4.3 Pipeline Cover and Vertical Separation

Table 5.5 shows the minimum cover for various pipeline sizes.

Table 5.5 Pipeline Cover

Pipe Size or Development Type	Minimum Cover
12 inch and smaller	36 inches
18 inch and larger	48 inches
18 inch (in residential development w/curb and Gutter)	36 inches
Unimproved areas or parking lots	48 inches

The cover for pipelines in shopping centers and commercial complexes shall be 48 inches and all pipelines shall be located in driving aisles. No pipelines or appurtenances shall be located under parking spaces or islands. Streets shall be brought to subgrade, sewer installed and curb and gutter installed before the pipeline is installed.

Water and sewer crossings and associated separations shall be in accordance with CVWD Standard Drawing Nos. W-1/S-3 and W-2/S-4 (see Domestic Water Standard Drawings in Appendix H).

5.5 Connection to CVWD Domestic Water System

All connections to the existing CVWD domestic water system will be made by CVWD at the Developer's expense. The Contractor may connect to an existing valve when approved by CVWD under CVWD inspection.

5.6 Well Site and Well Pumping Plant Criteria

There are two well criteria---well sites and sites with installed pumping plant. The number of well sites is based on the acreage of the development. The number of these well sites to include an active pumping plant is based on the water demands of the development.

5.6.1 Well Sites

The number of well sites is based on the following in accordance with Table 5.6.

Table 5.6 Well Sites

Development Size (Acreage)	Number of Well Sites
Less than 140 acres	None
Greater than 140 acres	1 per 140 acres or major portion thereof, major portion being 50 or more acres.

Well sites shall be a minimum of 150 feet by 150 feet in dimension (0.50 acres) in cases where the blow-off water is discharged to an approved off-site location. For situations where the blow-off water is discharged to an on-site detention basin system, the well site shall be a minimum of 0.75 acres. The Detention Basin System shall be designed to accept 1 hour of well discharge at 2,000gpm. CVWD reserves the right to require larger sites in special cases.

The Developer will be required to design and construct well site improvements including; (1) grading, (2) block walls, (3) water pipeline stubs, (4) power, (5) driveway and gates, (6) blow-off structure and piping and (7) detention basin (See Appendix E, CVWD Well Site Check List).

5.6.2 Well Sites with Pumping Plant

The number of well sites (as determined in 5.6.1) to be outfitted with a well and a pumping plant is generally one well for every 1,851 units and based on the following formula:

> No. of Wells W/Pumping Plant = (PDD x no. of units x 1.2 FS)/1,800 gpm/well1.2 Factor of Safety = for maintenance or emergency (one well for every 1,851 units).

5.6.3 Well Site Separation

Well sites can be located within a development or at an approved off-site location within the same water pressure zone as the development. Wells shall be sited according to the minimum separating distances depicted in Table 5.7.

Table 5.7 Well Site Separation

Horizontal Separation from Well Site	Minimum Separation
Base of Mountain	4,000 feet
Existing Well Site	1,000 feet
Seepage pit, Cesspool, Leach Line or Tank	150 feet
Sewer Pipeline or Sewer Lateral	50 feet
Sewer Manhole or Sewer Lift Station	100 feet

Note: This is not an all-inclusive list; see CDPH Requirements for New Well dated November 1981, Guidelines for the Protection of Public Domestic Water Supply Wells from Sources of Contamination or Pollution dated March 1986, Table 1 Minimum Horizontal Distance and California Well Standards Bulletin 74-90.

5.7 Reservoir Storage

Generally, construction of reservoir storage is required for large developments and if there is limited or no existing storage in the pressure zone or a new pressure zone is being created due to the development. Alternatively, CVWD may require payment of a reservoir fee in lieu of construction of reservoir storage. Figure 5.1 schematically shows a major pressure zone representing elevated storage.

5.7.1 Storage Calculations

Reservoir storage includes three components—Peak Daily Demand (PDD) (Diurnal), Fire Flow and Emergency Storage. The specific requirements include:

V = [0.50 x PDD (Diurnal) + 0.5 x PDD (Emergency)] x no. of units x 1,440 min/day + Fire Flow

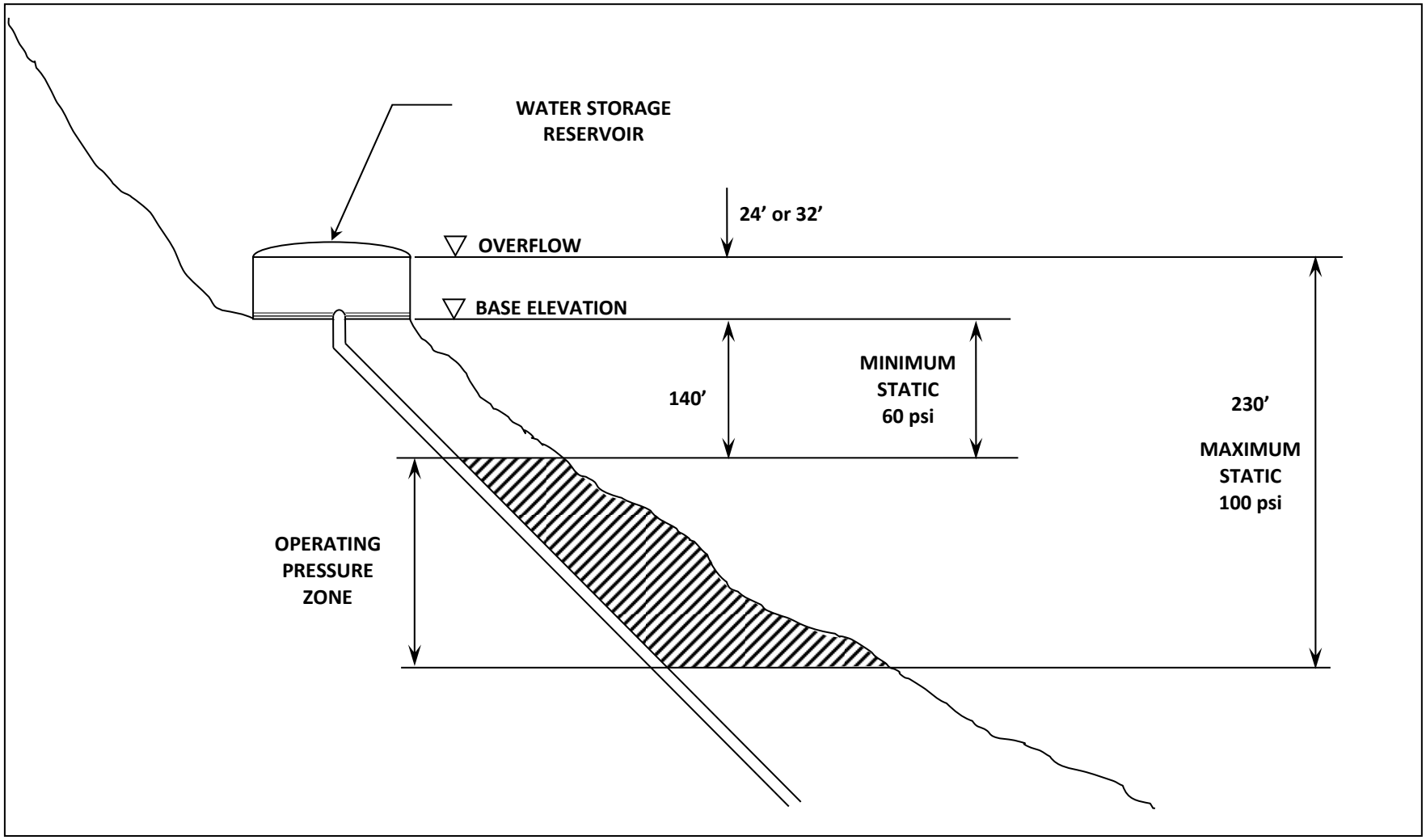
PDD = 0.81 gpm/unit

Fire Flow = _____gpm x ____hours x 60 min/hr (determined by Fire Marshall)

5.7.2 Location (Base Elevation)

The location of a reservoir is dictated by the hydraulic gradeline (feet above MSL) of the pressure zone when the reservoir is empty (base elevation). CVWD requires a minimum static pressure of 60 psi at all points within the development based on the base elevation of the reservoir. Reservoir heights are generally 24 or 32 feet, plus freeboard.

Figure 5.1 Typical Pressure Zone/Reservoir Configuration (Pressures have been rounded)



5.8 Booster Pump Stations and Pressure Reducing Valve (PRV) Stations

5.8.1 Booster Pump Station Types

In general, booster pump station types shall be defined as ***open systems*** or ***closed systems.*** It is the responsibility of the Engineer of Record to select the appropriate booster pump station design, consideration shall be given as to location, service area, pressure zone, flow rate required, operation, power supply backup and such other criteria to provide reliability to the system. The Engineer of Record is required to meet and confer with CVWD Engineering staff on preliminary design requirements prior to plan submission.

A booster pump station (BPS) is required if a development is located at an elevation that does not allow a minimum pressure of 60 psi or at the boundary of two pressure zones whereby the BPS pumps from the lower pressure zone to the higher pressure zone. The booster pump station also provides a backup source of water during high demands or in the case of an emergency.

5.8.2 Booster Pump Stations – Open System

An open system booster pump station is one which transfers water to a higher pressure zone that is governed by an atmospheric storage reservoir (water surface open to atmosphere - See Figure 5.2a). A typical example of this type of booster pump station pumping operation is:

The booster pump station pumps out of an atmospheric storage reservoir or from a lower distribution system into a separate distribution system with higher atmospheric reservoir storage. Typical pump operation is controlled by water surface elevation in the higher storage reservoir.

5.8.3 Booster Pump Stations – Closed Systems

A closed system booster pump station is one which transfers water to a higher pressure zone closed to the atmosphere (See Figure 5.2b). A closed system (or hydropneumatic system) may be allowed in areas where it is not feasible to install a gravity storage reservoir and there is less than 100 units within the pressure zone. This system generally consists of a ground storage tank, booster pump station with at least two domestic water pumps and a high demand pump. A typical example of this type of booster pump station pumping operation is:

Pump operation is typically controlled by pre-set discharge pressure settings. Normally, at least one pump is continuously in service. System over-pressurization and/or pump damage is avoided with the installation of a pressure relief valve/control valve. The pressure relief valve/control valve maintains a constant pressure and can return a portion of the pump discharge to a lower “open” pressure zone system.

5.8.4 Booster Pump Station General Design Criteria

The total capacity of the booster pumping station (or stations) must be sized to provide the water demand for the service area planned. Total capacity shall include:

- Open System - PDD with the largest pump unit out of service
- Closed System - PHD with the largest pump unit out of service

All piping within the pumping station shall be sized for total water demand at planned build-out for the water service area. Space shall be reserved along the manifold and ground at the pumping station site, with blind flanged lateral(s) provided, for future pump additions anticipated to meet total water demand at planned build-out of the area.

In general, booster pump stations are located adjacent to storage reservoirs. In special cases, approved by CVWD, offsite booster pump station sites shall be a minimum of 150 feet by 150 feet. CVWD reserves the right to require larger sites in special cases.

The typical type of pump shall be vertical turbine can pump or horizontal centrifugal pump.

A minimum of two (2) domestic booster pumps and one (1) high demand pump shall be provided to meet the design capacity.

The booster pumps shall be designed to insure that total dynamic head and flow for the system curve can be obtained by all combinations and VFD's.

Pump sizing shall not exceed capacity of the suction line or the NPSH requirements of the pumps.

On site pipelines for the pumping station shall be sized at five (5) feet per second maximum velocity for discharge piping, three (3) feet per second maximum for suction piping, based upon total station capacity.

Since the service area of booster pump station is dependent upon the continuous operation of the booster pump station for its source of water supply and pressure, emergency standby power facilities must be provided. Back-up power in these cases shall be operated to start the moment that the utility power is interrupted. See Section 5.9 for more details on emergency standby power requirements.

5.8.5 Pressure Reducing Valve (PRV) Stations

A pressure reducing valve station (PRV) is required if a project is located at the boundary between two pressure zones whereby the PRV provides water from the higher pressure zone to the lower pressure zone. The PRV provides a backup source of water during high demands or in the case of an emergency.

CVWD shall make the determination of the water demand data to be used, which may include the development project's demands, existing and future, as the basis for sizing of the PRV and associated piping.

Velocity shall not exceed five (5) feet per second in the supply and discharge piping. Reducers and increasers shall be used to connect the typically large onsite supply and discharge piping to meet pipeline velocity requirements before and after the pressure reducing valve. PRV's may be downsized from the inlet and outlet pipeline sizes to which they are connected, provided the velocity across the valve does not exceed the valve manufacture's specifications.

PRV's shall be Cla-Val or approved equal and shall be in compliance with CVWD's Standard Specifications and Materials List.

All PRV stations shall be so equipped with pressure controls that allow the adjusting of pressure settings.

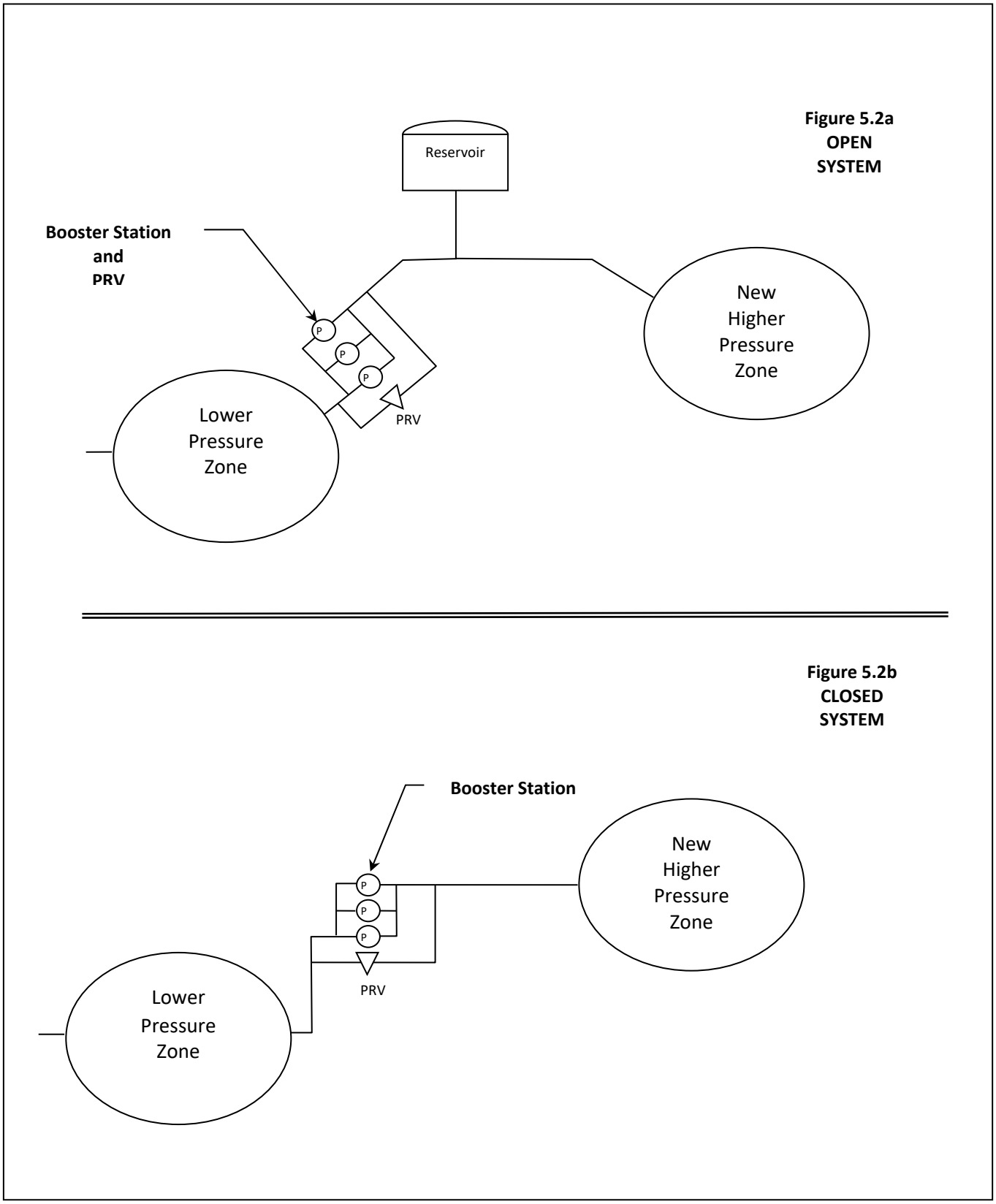
PRV stations that serve as the supplement or back up source of water supply for meeting peaking or fire flow demand shall be set slightly below the high-pressure setting (i.e. 10 ± psi below normal operating pressure).

A PRV station shall have two pressure regulating valves installed in parallel, to provide reliability during maintenance periods or failure of components.

Each PRV and lateral piping shall be sized to independently accommodate the full flow of the pressure reducing station.

PRV station sites shall be a minimum of 100 feet by 100 feet. CVWD reserves the right to require larger sites in special cases.

Figure 5.2 Typical Booster/PRV System Configurations



5.9 Emergency Standby Power Facilities

The project site shall provide adequate space for a diesel fueled standby generator in a recessed concrete structure. The generator shall be sized to operate at connected load (full site load) of the designed station. The standby power project fees shall include applicable Air Quality Management application fees, one-full fuel tank, sound attenuation enclosure testing and installation of CVWD's specified equipment.

The concrete recessed structure (approximately 32 feet x 18 feet) shall include but is not limited to exterior lighting, receptacles, safety rails, stairs, drain sump pumps, automatic sump pump controls and drain filtration system (manufactured to control infiltration of oils and other contaminates from entering the ground water system). The recessed structure shall provide reduced viewable generator height from the public. Vehicle access (20-feet) shall be available on the longer side of the recessed structure.

In order for the internal combustion engine to operate the electric generator, a permit to construct and operate must be obtained from the Air Quality Management District having jurisdiction. Permitting fees and engine procurement are greater if the project site is within 1,000-feet of an existing school.

The internal combustion engine operated generator shall be enclosed in a weather resistant sound attenuated metal enclosure. The metal enclosure shall reduce the engine noise to 75-dBA at 23-feet from the generator when operating at full load in all directions from the generator. When a block building is constructed to house the booster pumps and other equipment, the generator shall be incorporated inside the block building.

The generator shall be equipped with a fuel tank mounted on the same base rails as the generator and its metal enclosure. The fuel tank shall be sized to allow full load operating condition for a period not less than 12-hours minimum.

5.10 Fire Systems/Backflow Requirements

All developer plans showing fire system connections shall provide information on the type of fire system that is being installed for the development (e.g. wet-pipe fire sprinkler systems, deluge fire sprinkler systems and dry pipe and preaction fire systems). The developer's engineer shall fill out and check the appropriate fire system box on the CVWD Plan Check checklist for domestic water. Upon request for additional information on the fire system, the fire system plans shall be submitted to CVWD to review the complexity and type of proposed fire system so the degree of hazard can be assessed. The level of protection given to each fire system connection shall be in accordance with criteria listed below and the ***Manual of Cross-Connection Control*, tenth edition, Chapter 7 Fire Systems, as published by the University of Southern California and *AWWA Manual M14*, third edition, Chapter 5 "Typical Hazards."**

Since a fire system design can vary, the level of backflow protection will be based on the type of potential cross-connection and the degree of hazard. The three types of backflow protection that will be considered are: (1) Single (lead free) Detector Check, below ground installation. (2) Double Check Detector Assembly (DCDA), above ground installation. (3) Reduced Pressure Detector Assembly (RPDA), above ground installation.

5.10.1 Wet-Pipe Fire Sprinkler Systems

Wet-pipe systems are the most common type of fire sprinkler systems. A wet-pipe system is one in which the fire sprinkler piping is constantly charged by a direct connection to the public water supply. When a fire sprinkler activates, water is immediately discharged. A Single (lead free) Detector Check shall be installed unless a hazard such as those mentioned in section 5.10.5 “Other Fire System Hazards Requiring Backflow Protection” are present.

5.10.2 Deluge Fire Sprinkler Systems

Deluge fire sprinkler system (system) is a dry-pipe non-pressurized fire suppression system. These systems are open to atmosphere and a Single (lead free) Detector Check shall be installed. Additional backflow protection is not required unless chemicals will be added when water flows, in which case, a RPDA will be installed.

5.10.3 Dry Pipe and Preaction Fire Sprinkler Systems

Dry pipe and preaction fire sprinkler systems are similar in design. A dry-pipe pressurized system is typically pressurized with air or nitrogen, whereas a preaction system may or may not be pressurized. In either case, a DCDA shall be installed unless there is a risk of a high hazard (e.g. chemicals), in which a RPDA will be installed.

5.10.4 Residential Fire Systems

See Section 5.13.

5.10.5 Other Fire System Hazards Requiring Backflow Protection

- DCDA shall be installed if the private fire system has a looped system (multiple connections), a private fire main with multiple (3 or more) on-site private hydrants, elevated storage tanks, pumps pumping from above-ground covered reservoirs or tanks, an auxiliary water supply on or available to the premises, or an auxiliary water supply located within 1,700 feet of the pumper connection.

- RPDA shall be installed if the fire system has an interconnection with auxiliary supplies, such as pumps pumping from reservoirs exposed to contamination, rivers, ponds, wells or industrial water systems, or where antifreeze or other additives are used.

5.11 Fire Flow Calculations + Hydraulic Modeling

CVWD has a hydraulic model of the existing domestic water system. The domestic water daily demands and fire flow requirements must be verified by the hydraulic model by coordinating with the CVWD Engineering Department. Please refer to Appendix A, Plan Check Submittal Application, Hydraulic Modeling checklist.

5.12 Fire Hydrants

5.12.1 Fire Hydrant Location

Fire hydrants shall be placed per Fire Department requirements or, approximately every 330 feet in locations that minimize damage by traffic. Fire hydrant runs or valves shall be installed outside decorative paving areas wherever possible. The minimum distance between a block wall and a fire hydrant shall be 6 feet. Bends and water service connections are prohibited on hydrant runs. All hydrant runs shall use restrained joint piping and a thrust block at the hydrant.

5.12.2 Fire Hydrant Type

All fire hydrants shall be of wet barrel type.

Fire hydrants in shopping centers and commercial complexes shall be of the three nozzle (two 2-1/2-inch and one 4-inch) wet barrel type.

5.13 Services and Meters

Effective January 1, 2011, Residential Fire Sprinkler Systems are required by California Residential Code, Title 24, Part 2.5. A single permanent service connection shall provide water service for both the domestic water and residential fire sprinkler portions of the customer service line. The Developer's Engineer of Record (EOR) is responsible for calculating and designing the required service line and meter size based on the critical pressure and fire sprinkler and/or domestic water demands needed at each lot. The required table (See Appendix E) must be placed on the Domestic Water plans for first plan check. At the time of application for service, the customer will provide CVWD with the required domestic water and residential fire sprinkler water demands and minimum pressures for the proposed dwelling. The customer's demands will be compared against the EOR's plans for meter sizing approval.

For individual lots that are not part of a development, CVWD will check the size of the single permanent service connection and meter to meet the customer's demands and pressure requirements.

A single service connection to each individually owned premise is required. Mobile home developments are included in this requirement. CVWD owns, operates and maintains the portion of the service connection from the pipeline to the downstream side of the shut-off valve on the property owner's side of the meter-with the customer owning the remaining portion of the service line to the building.

A backflow prevention device will be required on all services that represent a potential or real hazard to the CVWD domestic water system. See Appendix H, Regulations Governing Domestic Water Service for a partial listing of the type of services requiring protection and the level of protection required.

The developer's contractor shall install the service and meter box and shall maintain both until meter installation. CVWD will install the meter and backflow prevention device.

5.13.1 Service Lines

- Service connections to single-family residences shall be a minimum of 1 inch in diameter and in accordance with the Domestic Water Standard Specifications.
- A single service connection may be installed to each suite within a commercial/industrial building.
- A single service connection may be installed to each building within a commercial/industrial complex.
- Services or service lines shall be installed outside decorative paving areas whenever possible.
- Service connections shall be installed perpendicular to the pipelines unless prior approval is obtained from CVWD.
- **Service saddles shall be used for all service connections.**

5.13.2 Meters

The normal maximum meter size is 2-inch. Multiple 2-inch meters may be used if the demand exceeds the allowable flow rate. Meters larger than 2 inches will be permitted in special cases.

Table 5.8 Meter Sizing

Meter (Inches)	Maximum Velocity	Maximum Flow Rate
¾	10fps	30
1	10fps	50
1-1/2	10fps	100
2	10fps	150
4, 6 and 8	10fps	Case by case

*Meters shall be sized to allow the above flow rates.

There are circumstances where residential accounts are required to install a meter larger than ¾-inch to meet residential fire sprinkler requirements. Under these circumstances, CVWD may issue a meter surcharge waiver if applicant is

unable to revise the design of the fire sprinkler system to enable the design of a ¾-inch meter. The meter surcharge waiver only applies to single-family residential units and does not apply to developments or projects with master water meters.

All irrigation meters are sized by CVWD's Water Management Division in accordance with CVWD's Landscape Ordinance.

5.14 Pipe Material

Piping and appurtenances used in the domestic water system shall comply with the following general material requirements:

- Pipelines shall be cement-mortar lined (CML) ductile iron pipe.
- Fittings shall be CML ductile iron.
- Fire hydrant runs and detector check runs shall be CML ductile iron pipe.
- All pipelines, fire hydrant runs, detector check runs, service line runs, fittings, valves shall have restrained joints and have V-Bio enhanced or approved equal polyethylene encasement.

Under certain circumstances, the construction of the domestic water system shall comply with the following special requirements in addition to the general requirements listed above:

- In locations where the surrounding soil is determined to be corrosive or where the pipeline will be within shallow groundwater, CML ductile iron pipe shall also be zinc coated with restrained joints.
- In locations where the pipeline will be located under decorative paving, the valves, hydrants and fittings shall be located outside of this area, wherever possible (CVWD is not responsible for the repair or replacement of decorative pavement).
- In locations where the water pressure is or will be 110 psi or greater, the class of the pipe will be determined by CVWD.
- In locations where the pipeline will not be located under a paved street, the pipeline shall be CML ductile iron pipe with restrained joints with 48 inches of cover at final grade. Final grade shall be established prior to installation of pipeline.

Please see documents in Appendix N for reference (Pipe Materials for Non-Pressurized Pipeline Projects and Pipe Materials for Pressurized Pipeline Projects).

5.14.1 Pipe Backfill and Bedding

Backfill and bedding zones shall be as shown on Domestic Water Standard Drawing No. W-3 in Appendix H unless special consideration is required.

Special consideration shall be applied to the design of pipe bedding and backfill where soil conditions, or a high groundwater table or other factors warrant additional analysis. The developer and its engineer shall be solely responsible for determining the appropriateness of CVWD Standard Drawing W-3 for the project and for determining whether special consideration is required, and shall provide supporting calculations upon request.

5.15 Valves

Three valves are required on tees or wyes and four valves are required on crosses, excluding fire hydrant, detector check or meter manifold runs. Tees and valves at new points of connection shall match the pipe size of the new connection.

Valve size shall equal fitting diameter. If a reducer is required, the reducer shall be installed after the valve for change of pipe size.

Marker posts are required if valves or blow-offs are to be installed outside of paved areas.

Valves shall be installed outside decorative paving areas, whenever possible.

All valves shall be installed perpendicular to final grade.

No run of pipe shall exceed 1,320 feet in length without an in-line valve installed of the same diameter as the pipe for diameters less than 24 inches. For pipeline diameters 24 inches and larger the valve spacing shall be at CVWD's recommendation.

5.16 Combination Air-Release and Air/Vacuum Valves

Combination air-release and air/vacuum valves shall be installed at all high points in the pipeline where air is isolated and as specified by CVWD. The size of the combination air-release and air/vacuum valve to be installed shall conform to the chart below unless otherwise approved by CVWD.

Table 5.9 Combination Air-Release and Air/Vacuum Valves

Size of Pipeline (Inches)	Size of Combination Valve (Inches)
8	1
12	2
18	2
24	2
30 and larger	4 or as required

5.17 Blow-Off Assembly

A blow-off assembly shall be provided to facilitate draining and flushing of the pipeline where it dead-ends. A fire hydrant assembly can be utilized as a blow-off for pipelines 8 inches in diameter or larger. The blow-off shall be located in a paved street a minimum of 3 feet from the curb within a minimum of 6 feet between the gate valve and the bend. The size of the blow-off to be installed shall conform to the chart below unless otherwise approved by CVWD.

Table 5.10 Blow-Off Assembly Sizing

Size of Pipeline (Inches)	Size of Vacuum Relief Valve (Inches)
8	4
12	6
18	6
24	CVWD to determine
30	CVWD to determine

Marker posts are required if blow-offs are to be installed outside of paving areas.

5.18 Customer Pressure Reducing Valves

Pressure reducing valves shall be installed on the customer side of the meter and are the responsibility of the customer to maintain. Pressure reducing valves shall comply with the Uniform Plumbing Code, Section 608 “Water Pressure, Pressure Regulators, Pressure Relief Valves and Vacuum Relief Valves.”

Section 6
Design Criteria
Sanitation Facilities

6.1 Background

CVWD provides sanitation (wastewater) service for a large portion of the Coachella Valley including the communities of Bombay Beach, Cathedral City, Indian Wells, La Quinta, Mecca, North Shore, Palm Desert, Rancho Mirage, Thermal, Thousand Palms and other unincorporated areas. CVWD has an agreement to accept flows from a portion of Desert Water Agency's service area in Palm Springs. CVWD's Sanitation boundary map is located in Appendix I.

CVWD operates five (5) Water Reclamation Plants (WRPs) as shown in Table 6.1. WRP 1 and WRP 2 are smaller lagoon facilities providing service to the communities of Bombay Beach and North Shore, respectively. WRP-4 is located in Thermal and provides service to the lower portion of the sanitation system. WRP-4 discharges secondary effluent under a National Pollution Discharge Elimination System (NPDES) permit to the Coachella Valley Stormwater Channel. WRP-7 and WRP-10 provide service to the northern portions of the system and are located in Indio and Palm Desert, respectively. These facilities provide tertiary treatment and recycled water is distributed to area golf courses and other large landscape customers.

Table 6.1 Water Reclamation Plants (WRPs) & Non-Potable Water

Facility	Plant Capacity (mgd)	Tertiary Treatment Capacity (mgd)	Number of Non-potable Water Customers
WRP-1	0.15	0.0	0
WRP-2	0.033	0.0	0
WRP-4	9.9	0.0	0
WRP-7	5.0	2.5	2
WRP-10	18.0	15.0	18
Total	33.083	17.5	20

The collection system includes over 1,000 miles of buried pipelines and over 17,000 manholes. The majority of gravity sewers are vitrified clay pipe (VCP). There are over 150 miles of pressurized force mains receiving sewage from the 34 lift stations. The majority of the force mains are polyvinylchloride (PVC) pipe.

Sanitation System statistics can be found in the most recent edition of CVWD's Annual Report.

The Sanitation System design/construction standards and regulations for service are governed by the following documents:

- Regulations Governing Sanitation Service -Appendix I
- Sanitation Standard Specifications-Appendix I
- Sanitation General Drawing Notes-Appendix I
- Green Book
- WEF Standards
- AWWA Standards
- 2003 edition of the California Plumbing Code

6.2 Sanitation Sewer Design Capacity

In general, the sanitation sewer capacity should be designed for the estimated ultimate tributary area. Likewise, consideration should be given to the maximum anticipated capacity of different types of development.

Several factors shall be considered in determining the required capacity of sanitation/sanitary sewers (sewers). The following are examples of factors to be considered:

- Maximum peak hourly domestic sewage flow
- Additional maximum sewage or waste flow from developments
- Inflow and ground water infiltration
- Topography
- Water Reclamation Plant locations
- Pipeline excavation depth
- Lift Station requirements (Pumping)

When an area outside the development can be logically served by future extension of a proposed gravity sewer, the sewer shall extend to the tract boundary or to the end of a paved street in a manner to facilitate the future extension. Over sizing and extra depth of sewers will be required where such sewers can logically serve an upstream tributary area and extra size and/or depth are required for such future use. (See Section 1.4.3 for additional information on Oversizing).

CVWD has developed a Sanitation Collection System Hydraulic Model of the entire wastewater collection system. This model will be utilized by CVWD staff and/or a CVWD consultant to size the sanitation system facilities required for each development at the developers cost. Please refer to in Appendix A. Plan Check Submittal Application, Hydraulic Modeling checklist.

6.3 Design Flow Criteria

Sewage flow shall be based on the criteria in Table 6.2. The basis for flow is the equivalent dwelling unit (EDU) or the flow from a typical residential home.

Table 6.2 Sewage Flow Criteria

Design Item	Flow Criteria	Flow
Average Flow per EDU	Average Flow	200 gpd/EDU
Treatment Facility	Average Day Peak Month	250 gpd/EDU (200 x 1.25)
Sewer (Gravity)	Peak Hour Dry Weather Flow (d/D)	400 gpd/EDU (200 x 2.0)
Sewer and Lift Station	Peak Hour Wet Weather Flow – WRP 4	540 gpd/EDU (200 x 2.7)
Sewer and Lift Station	Peak Hour Wet Weather Flow – WRP 7	600 gpd/EDU (200 x 3.0)
Sewer and Lift Station	Peak Hour Wet Weather Flow – WRP 10	480 gpd/EDU (200 x 2.4)

Commercial/industrial flow shall be based on average wastewater flow for existing comparable uses provided by CVWD. EDUs will then be established by dividing the flow by the average flow/EDU from Table 6.2. If similar facilities are not available, CVWD will establish flow and EDUs utilizing Table A-1 which is located in Appendix I.

6.3.1 Peak Hour Design Flow

Peak hourly dry weather flows and peak hourly wet weather flows, as indicated in Table 6.2, are used for sizing gravity pipelines, force mains, and sewer lift stations, and in accordance with the criteria set forth in subsequent sections.

6.4 Sewer Pipeline Design

The criteria for the design of sewer pipeline include the design period, slope, design depth of flow and velocity. In no case shall gravity sewer pipelines be less than 8 inches in diameter.

Gravity sewers shall be stationed from the downstream connection point with stationing increasing upstream. Negative stationing referred to as "back stationing" should be avoided.

Table 6.3 represents the minimum slope for various gravity sewer pipeline sizes.

6.4.1 Slope and Velocity

Subsequent to the determination of the design flow the engineer shall use Manning’s formula to calculate the required pipe size. The engineer shall quantify the relation of slope, design flow, velocity, diameter, and “n” value utilizing the criteria’s set forth in Table 6.3 “Minimum Pipe Slope” and Table 6.4 “Pipe

Velocities." The minimum "n" value shall not be less than 0.013 for all pipe materials.

Table 6.3 Minimum Pipe Slope

Sewer Diameter (Inches)	Slope (Foot per Foot)
4 (house lateral)	0.021
6 (house/commercial lateral)	0.021
8	0.0033
10	0.0024
12	0.0019
15	0.0014
18 and up	0.0014

Table 6.4 Pipe Velocity

Velocities	Design	Minimum	Maximum
Sewer Pipelines	3 fps	2 fps	10 fps
Force Mains	4 to 7 fps	3 fps	7 to 10 fps
Inverted Siphons	4 fps	3 fps	5 fps

6.4.2 Gravity Sewer Pipeline Sizing Criteria

Gravity sewer pipelines shall be sized such that the peak hourly dry weather flows established in Table 6.2 do not exceed the d/D ratios depicted in Table 6.5.

The designer shall also check for adequacy of gravity sewer pipelines during peak hourly wet weather flows. Surcharged conditions for the gravity sewer pipelines are acceptable during peak hourly wet weather flows, provided that the hydraulic grade line (HGL) is at least 3 feet lower than the manhole rim elevation. If the HGL is within, or higher, than 3 feet below the manhole rim elevation, the gravity sewer pipeline is considered undersized.

Table 6.5 Depth to Diameter Ratios (d/D)

Gravity Sewer Pipeline Diameter (Inches)	Maximum d/D[1]
8	d/D = 0.50, (1/2 D)
10 – 27	d/D = 0.67, (2/3 D)
≥ 30	d/D = 0.75, (3/4 D)

[1] d = depth of flow & D = diameter of sewer pipe

6.4.3 Change in Pipe Size

When a smaller sewer pipeline joins a larger sewer pipeline, the invert of the larger sewer pipeline should be lowered sufficiently to maintain the same energy gradient. See Section 6.6.1.3 “Manhole Invert Elevations” for the minimum change in grade across the manhole.

6.5 Sewer Pipeline Location

Sewer pipelines shall be located within public right-of-way (ROW), easements dedicated by tract map or specific easements or fee title land granted to CVWD. The design shall be adjusted to take into consideration utility conflicts, soils and any other factors.

6.5.1 Horizontal Alignment and Separation

The horizontal alignment in general for major, primary and secondary roadways shall be located in the center of the driving lane nearest to the centerline of the street. Considering other design limitations and construction factors, a minimum separation between sewer pipeline and other infrastructures shall be maintained. Table 6.6 represents the minimum horizontal separation from other infrastructure facilities.

Table 6.6 Minimum Horizontal Separation – Sewer Pipelines

Horizontal Separation from Sewer Pipeline	Minimum Separation
Domestic Water Pipeline[1]	10 feet
Non-Potable Pipeline[1]	10 feet
Stormwater Pipeline[1]	10 feet
Well	50 feet
Curb (Lip of gutter)/Edge of Pavement	7 feet
Horizontal Separation from Sewer Manhole or Lift Station	
Sewer Laterals	6 feet
Domestic Service Pipeline	10 feet
Well	100 feet

[1]The 10 foot separation distance is measured between the outside edges (including bells) of the pipes. If the sum of the inside diameters of the two pipes is 24-inches or less, then the centerline (CL) distance between the two pipes shall be 12 feet. This will aid in layout and plan checking. If the sum of the diameters is greater than 24-inches, then the separating distance between the outside edge (including bells) shall be 10 feet.

Table 6.4 (Continued)	
Horizontal Separation from Sewer Lateral	
Water Pipeline	10 feet
Water Service Line	10 feet
Well	50 feet
Sewer Manhole	6 feet
Sewer Lateral (Opposite Direction)	2 feet
Sewer Lateral (Same Direction)	4 feet
Catch Basin	4 feet

Sewer pipeline and domestic water pipeline crossings and separations shall be in accordance with CVWD Standard Drawings W-1/S-3 and W-2/S-4 in Appendix I.

Horizontal curves are allowed by CVWD; however, not encouraged except when necessary to maintain the required separation from other infrastructure.

Table 6.7 represents the minimum pipeline radius by pipeline size.

Table 6.7 Minimum Pipeline Radius

Sewer Diameter (Inches)	Radius* (Feet)
8-10	100
12-24	145
27-36	190
39-42	290

* Standard pipe lengths. Shorter pipe lengths may be used under certain circumstances.

Shopping centers and commercial complexes shall comply with the following special requirements:

- All sewer pipelines shall be located in drive aisles
- No sewer pipelines or sewer laterals shall be located under parking spaces or islands
- All sewer laterals shall be equipped with a cleanout
- All sewer lateral cleanouts shall be located in a planter area or clear area of drive aisle.

6.5.2 Pipeline Cover and Vertical Separation

The typical minimum depth of a sewer pipeline is 7.0 feet. CVWD may allow shallower depths in special cases when approved by the Engineering Department. Depths greater than 25.0 are not allowed without approval of the Engineering Department.

Concrete encasement is required in the following cases:

- When the clearance between the outside pipe wall of the sewer pipeline and the outside pipe wall of any other structure is less than 36-inches above the sewer pipeline or 12-inches below the sewer pipeline.
- When separation between sewer pipelines, domestic water pipelines, irrigation pipelines or storm drain pipelines cannot be maintained as described in Section 64572, California Waterworks Standards, Title 22 of the California Administrative Code and shown on CVWD Standard Drawings W-1/S-3 and W-2/S-4. Any exceptions to the separation requirements described in Section 64572 shall require California Department of Public Health approval.
- When the depth of cover to the top of the sewer pipeline is less than four feet.

No vertical curves shall be permitted in the sewer.

6.6 Construction

6.6.1 Manholes

Manholes shall be installed at the intersection of sewer pipelines; at all changes in grade, size or alignment; and at the end of any sewer pipeline more than 200 feet in length.

6.6.1.1 Manhole Spacing

Manholes shall be installed on spacing not to exceed 400 feet. Sewer pipelines with a radius greater than 400 feet shall be considered as straight with manhole spacing not to exceed 400 feet. Manhole spacing on curved sewer pipelines less than a 200 foot radius shall be 200 feet. Manhole spacing on curves between 200 and 400 feet shall be adjusted proportionately and approved by CVWD. Sewer pipelines with reverse curves are required to have a manhole at the point of tangency of the curve. Standard manhole details are shown on CVWD Standard Drawings S-5 in Appendix I.

6.6.1.2 Manhole Depth and Size

The minimum manhole depth is to be 7 feet unless approved by the Engineering Department. The manhole depth is to be calculated from the proposed finished grade to the lowest pipe invert. The minimum manhole

diameter size shall be as indicated in Table 6.8 “Manhole Minimum Diameter.”

Table 6.8 Manhole Minimum Diameter

Sewer Diameter	Depth	MH Dia	Depth	MH Dia
8 to 24-inch	$<$ 12 feet	48-inch	$\geq$ 12 feet	60-inch
24-inch & larger	-	60-inch	$\geq$ 16 feet	72-inch

6.6.1.3 Manhole Invert Elevation

For straight flow through the manhole the sewer pipeline invert elevation for pipe of the same diameter shall have a minimum of 0.10-foot drop from the entering and exiting pipe. For flows with a change in direction through the manhole of 90-degrees the sewer pipeline invert elevation for pipe of the same diameter shall have a minimum of 0.20-foot drop from the entering and exiting pipe. Junction manholes with sewers of the same diameter shall match all inlet inverts and have a minimum of 0.1-foot drop from the entering and exiting pipe.

The invert elevation for pipe of different diameters through a manhole or junction structure shall match the crown of the outlet pipe. The crown of the inlet pipe shall be at the same elevation or higher than the outlet pipe and shall have a minimum of 0.1-foot drop from the inlet and outlet pipe.

6.6.1.4 Drop Manhole

Drop manholes shall be provided for sewers entering a manhole at an elevation of 3 feet or more above the manhole invert. Where the difference in elevation between the incoming sewer pipeline and the manhole invert is less than 3 feet, the slope of the incoming sewer pipeline shall be increased to eliminate the need for the drop. All manholes shall be constructed with an outside drop connection per CVWD Standard Drawing S-8A. Inside drop connections may be permitted when the manhole is a minimum 5 feet in diameter, and when the manhole is of excessive depth and is constructed per CVWD Standard Drawing S-8B.

6.6.1.5 Special Manhole Construction Requirements

Any manhole determined to have a high potential of generating excessive sulfide gases shall be epoxy coated. Manholes identified shall include, but are not limited to, the first manhole originating from a sewer trunk main 15-inches in diameter or larger, force main transition manholes, drop manholes, or as determined by CVWD.

Residential properties with services located at the end of cul-de-sacs or when the sewer is greater than 10 feet deep may connect to manholes providing that no more than four (4) 4-inch house lateral are installed. The

maximum angle between the residential 4-inch lateral and the manhole is 45-degrees.

Manholes located in any nonresidential area shall have a sealed manhole frame and cover, bolted-down type, in accordance with CVWD Standard Drawing S-10A and S-10B and shall also be noted on the drawings.

6.6.2 Cleanouts

Cleanouts shall be installed at the end of a sewer if the distance from a manhole is less than 200 feet.

Six-inch diameter house laterals shall be equipped with a cleanout at the property line or curb. If the City or County requires a cleanout at the curb or property line, it may be substituted for the required cleanout by the CVWD. The drawings shall be so noted.

6.6.3 Gravity Sewer Pipe Material

Generally available pipe materials commonly used for gravity sewer pipe installations are suitable for use in CVWD's system. Each pipe material, lining, and coating should be evaluated for the given site and soil conditions, installation challenges, and conditions of service of the project. Materials for consideration for both flexible and rigid pipe systems include:

- Flexible Pipes:
  - Thermoplastic-based materials including polyvinyl chloride (PVC), high-density polyethylene (HDPE), and polypropylene (PP)
  - Thermoset plastic pipe or fiberglass composite-based materials
- Rigid Pipes:
  - Vitrified Clay Pipe (VCP)
  - Reinforced Concrete Pipe (RCP) with a corrosion resistant liner

Selection between flexible and rigid pipe and the different types of materials within these categories depends on many factors. Flexible pipe may provide certain advantages when the pipe is subjected to ground movement due to soft soil conditions or due to potential seismic hazards such as liquefaction. Certain rigid pipes may provide advantage in terms of resistance to corrosive environments or other factors. The proposed pipe material should also be evaluated based on exterior and interior protective coatings that are best suited for the project's specific site conditions.

Please see documents in Appendix N for reference (Pipe Materials for Non-Pressurized Pipeline Projects and Pipe Materials for Pressurized Pipeline Projects).

6.6.4 Pipe Backfill and Bedding

Backfill and bedding zones shall be as shown on CVWD Standard Drawing S-2 and S-7 in Appendix I unless special consideration is required.

Special consideration shall be applied to the design of pipe bedding and backfill where soil conditions, high groundwater table or other factors warrant additional analysis. The developer and its engineer shall be solely responsible for determining the appropriateness of CVWD Standard Drawing S-2 and S-7 for the project and for determining whether special consideration is required, and shall provide supporting calculations upon request. Table 6.9 provides a comparison of pipe material with pipe size, native soil class, and proposed depth of bury. Alternative trench designs can extend the range of applicability, but the design should consider soil-structure interaction in order to develop the proper trench configuration.

Table 6.9 Pipe Selection – Maximum Cover Depth versus Soil Stiffness Class

Pipe Material	Size Range (inches)	Maximum Depth (feet)	Native Soil Conditions			
			Class II	Class III	Class IV	Class V
VCP	8 - 36	30	30	20	Alt Design	Alt Design
RCP	39 - 96	30	30	20	Alt Design	Alt Design
PVC – SDR 35	8 - 24	20	20	15	Alt Design	Alt Design
PVC – SDR 26	8 - 15	25	25	20	Alt Design	Alt Design
PVC – Profile Wall	18 - 36	35	35	20	Alt Design	Alt Design
HDPE – Solid Wall	18 - 36	20	20	15	Alt Design	Alt Design
HDPE – Profile Wall	72 - 96	35	35	20	Alt Design	Alt Design
CFFRM (HOBAS®)	18 - 96	50	50	20	Alt Design	Alt Design
GRP (Flowtite®)	12 - 96	50	50	20	Alt Design	Alt Design

6.6.5 Sewer Laterals

The sewer lateral is comprised of two components—the house lateral (from wye at the sewer to the property line) and the building sewer (from the property line to the building). The customer is responsible for the operation and maintenance of both components of the sewer lateral. CVWD does not allow the installation of sewer laterals in driveway areas except in certain cases in cul-de-sacs. In this special case, an offset cleanout must be installed with the cleanout located adjacent to the driveway.

Sewer laterals shall be installed to each dwelling unit or commercial unit except for multistory structures and apartments. Four-inch diameter sewer laterals shall be installed for single dwelling units and 6-inch diameter or greater sewer laterals shall be installed for other customers depending on sewage flow.

Depth of house laterals shall be sufficient to provide service to the lowest or most distant point to be served on each lot at a minimum grade of two percent with not less than one foot of cover over the top of the pipe. The minimum depth of the house lateral at the curb or edge of pavement shall be 4.0 feet.

In areas where CVWD has approved the depth of the sewer to be less than 7 feet, the invert of the lateral at the wye of the street sewer shall be indicated at the curb or edge of pavement and include the finish surface elevation of the lot to be served and shall be so noted on the drawings.

6.6.6 Facility Location Markers and Detectable Tracer Tape

Marker posts shall be installed at manholes, force mains and cleanouts located outside of paved areas in accordance with CVWD Standard DrawingsW-27/S-38.

Detectable Locating/Warning tape shall be installed over the pipeline at a depth of two feet and shall be 5 mils thick and feature a print style which cannot be scraped off or erased. Detectable warning tape shall be six (6) inches in width and shall read: “CAUTION – Buried Sewer Pipeline Below” and follow American Public Works Association color code (Green for Sewer). Detectable warning tape shall be woven reinforced for non-stretch, non-distorting, high-strength for plowing requirements. Acceptable manufacturers shall be Reef Industries, Terra Tape, Sentry Line Reinforced Detectable or Approved Equal.

6.6.7 Source Control and Wastewater Pretreatment

CVWD shall evaluate all non-residential sewer lateral installations to determine the need for wastewater pretreatment and sampling equipment based on information provided in the sanitation service application. CVWD may require the installation and maintenance of such equipment to conform to CVWD Regulations Governing Sanitation Service.

6.6.7.1 Grease Interceptors

A grease interceptor shall be required for any business having the potential of discharging grease into a public sewer. Prior to service

connection, an applicant shall submit to the Source Control Department, stamped plans for Plumbing, Equipment, Fixtures and Drainage of building. CVWD will review for approval, the grease interceptor's attached appurtenances, location, sizing and installation requirements. CVWD will consider minimum requirements contained in the 2003 edition of the California Plumbing Code when approving interceptors. The minimum size of grease interceptor shall be 750 gallons.

6.6.7.2 Oil/Sand Interceptors

Any type of business where oil/sand may be discharged into a public sewer shall have an interceptor. Prior to service connection, an applicant shall submit to the Source Control Department stamped plans for Plumbing, Equipment, Fixtures and Drainage of building. CVWD will review for approval, the oil/sand interceptor's attached appurtenances, location, sizing and installation requirements. CVWD will consider minimum requirements contained in the 2003 edition of the California Plumbing Code when approving interceptors. The minimum size of oil/sand interceptor shall be 750 gallons.

6.6.7.3 Interceptors

Any type of business where lint may be discharged into a public sewer shall have an interceptor. Prior to service connection, an applicant shall submit to the Source Control Department, stamped plans for Plumbing, Equipment, Fixtures and Drainage of building. CVWD will review for approval, the lint interceptor's attached appurtenances, location, sizing and installation requirements. CVWD will consider minimum requirements contained in the 2003 edition of the California Plumbing Code when approving interceptors. The minimum size of Lint Interceptor shall be 500 Gallons.

6.6.8 Business Sewer Lateral for Grease, Lint, Oil or Sand Interceptors

The Business sewer lateral is comprised of two components—the lateral (from the wye at the sewer main in the street to the property line) and the building sewer (from the property line to the building). The customer is responsible for the operation and maintenance of both components of the sewer lateral. CVWD does not allow the installation of sewer laterals in driveway areas except in certain cases in cul-de-sacs. In this special case, an offset cleanout must be installed with the cleanout located adjacent to the driveway.

A single lateral may be utilized for both the buildings regular sewer and interceptor sewer discharge pipeline provided the following criteria exists: 1) the regular sewer pipeline (on-site sewer pipeline conveying only raw sewage) is connected between the interceptor and the end of lateral at the property line, 2) the regular sewer does not exceed the flow rate approved, and 3) the building sewer lateral is for the purpose of one place of business. Any business

discharging non-residential wastewater to the sewer may be required to install a sampling station downstream of all service connections to the sewer lateral.

6.7 Lift Stations

Lift stations will only be allowed under unusual conditions in locations that cannot be served by a gravity sewer. It is the responsibility of the developer's engineer to demonstrate that a sewer lift station is the most practical means for conveying sewage into the existing CVWD sanitation system.

The following represents the general design criteria for a sewage lift station facility. It is essential that the developer's engineer meet and confer with CVWD prior to any analysis or preliminary lift station design. Each phase shall be reviewed and approved by CVWD from capacity analysis to preliminary and final design. CVWD reserves the right to modify, change and/or supplement the following in an effort to accommodate changing regulatory requirements, location restrictions, and/or provide for lift station expansion.

6.7.1 Lift Station Location

The lift station should be located at least 100 feet from any buildings or houses and a buffer zone of at least 25 feet should be established between the lift station fence and its surrounding environment.

No portion of the site shall be located within the floodway zone. All parts of the station and the access roadway shall be located a minimum of 2 feet above the 100 year floodplain elevation as shown on FEMA FIRM maps.

Rural lift stations shall have an access road of a minimum of 20 feet wide with a 6-inch layer of class II aggregate base. Urban lift stations shall have the same access width and the access road shall be paved with asphalt concrete. The lift station property shall be adequately sized to provide sufficient space for future bio filter beds and odor control equipment. All lift stations shall have a minimum vehicle turning radius of 42 feet. At stations requiring the use of a crane to pull pumps and other equipment, the turn-around provisions and access points shall be revised accordingly.

The lift station site, including all slabs, equipment, and utilities shall be enclosed within the minimum height block wall of 6 feet. All items located within the lift station shall be at least five feet from the wall.

The station shall include one high pressure sodium type security light mounted on a pole at least 15 feet above the ground, or as directed by CVWD.

At locations where water is available, a ¾-inch hose bib shall be provided for washing down the wet well. All water services shall include a backflow prevention device in an above-ground enclosure.

The lift station site plans shall clearly identify the proposed lift station equipment, future lift station equipment and existing topo features as called out in this section.

Provide complete topographic and control surveying and record of survey as required for design and construction. Identify and locate all existing above ground facilities and utilities. Pothole, locate and identify underground facilities and utilities impacted by the project including all connection points to existing facilities and utilities. All survey information must utilize benchmarks recognized by CVWD, and all elevations are per 1929 datum. All survey control points used for the project must be listed and shown on the drawings with coordinates.

A geotechnical investigation shall be conducted to consider the impacts to design and construction of the lift station, especially when high ground water levels are anticipated at the site. Based on the investigation results, the report shall provide design parameters for the project and include design details for buried pipes. In addition, recommended means for site dewatering and shoring during construction shall be provided if necessary. The report shall be prepared and sealed by an engineer or geologist registered in the state of California.

6.7.2 Lift Station Capacity

Lift stations shall be designed for the peak hour wet weather flow with the largest pump unit out of service. During the design phase, the future flow capacity shall be compared to the initial project design flows capacities, special consideration shall be given to wet well retention time and pumping equipment operational parameters so that they are not exceeded.

The engineer shall provide to CVWD the complete hydraulic analysis and calculations for the above criteria. Included with the submitted calculations shall be the system and pump curves and the required capacities for initial and ultimate flows.

6.7.3 Lift Station Design

Pumps shall be capable of passing 4-inch diameter solids. All pump equipment will be manufactured and supplied by the same company.

All pumps and motors shall comply with the applicable provisions of the Hydraulic Institute, ASTM, and ANSI. All electrical equipment shall comply with the National Electrical Code and be Underwriters' Laboratories (UL) labeled.

Each submersible pump shall utilize a base elbow connection and stainless steel dual tubular sliding guide rail system. The guide rail system shall be designed to permit the installation and removal of the pump from the base elbow discharge connection without having personnel enter the wet well. Each pump shall be fitted with a stainless steel cable or chain of sufficient strength and length to permit the installation or removal of the pump for maintenance and or inspection.

Table 6.10 Lift Stations

Lift Station	
Capacity	Peak Hourly Wet Weather Flow
Emergency Storage	Minimum 6 feet from high water alarm to influent sewer pipe invert. Depth to be determined by CVWD.
Operation	Lead/lag
Maximum Pump Cycles	6 cycles/hour
Pump Discharge Piping	4 to 10 fps

6.7.4 Wet Well Design

The wet well for dual and three pumps shall be a minimum diameter of 10 feet or a concrete rectangular vault, cast-in-place concrete constructed watertight, with concrete base and cover. The rectangular vault structures and sizes will be reviewed on a project specific basis. All metal appurtenances inside the wet well shall be stainless steel unless otherwise directed by CVWD.

The wet well design and detention time shall be such that the deposition of solids is minimized and the sewage does not become septic. An interior protective coating shall be required for the prevention of hydrogen sulfide corrosion of the structure.

A grout fillet shall be properly designed and constructed around the full circumference of the wet well's bottom to direct grit and other solids to the pumps. The slope of this fillet shall be at least 1:1. The inner diameter of this "grout circle" shall be as recommended by the pump manufacturer for the specified pump and approved by CVWD, but in general should be as small as possible without creating a vortex condition around the pumps. The inner "grout circle" shall be centered around the pumps.

The wet well shall also incorporate an emergency storage design at peak hour design flow from the high water alarm to the invert of the influent sewer. In no case shall this distance be less than six feet. CVWD shall determine the required storage volume.

No more than one influent sewer shall enter the wet well, and it shall be located opposite the pumps.

Located adjacent to the wet well shall be a concrete pump wash down pad. The wash down pad shall be provided with a drain and P-trap that drains directly back into the wet well. The pump wash down pad and the discharge manifold slab can be designed together (see 6.7.5) as long as there is sufficient space.

6.7.5 Discharge Piping and Valves

Discharge piping from each pump shall exit the wet well to a valve vault or if specifically approved by CVWD to an above ground discharge manifold for easy access to the valves, piping and flow meter. The above ground piping and valves shall be painted gray to indicate it as a sewage (wastewater) pipeline. A by-pass shall also be furnished with a valved connection to the force main beyond the pump isolation valves for emergency pumping. The manifold shall have a concrete slab that slopes to a 6-inch drain with a stainless steel drain cover. The slab drain shall connect directly to the wet well with an inline P-trap. The slab shall be designed to insure that any liquid from seepage, routine piping and valve maintenance will be drained back to the wet well.

Each lift station shall be provided with a magnetic flow metering device to monitor the discharge flow from the lift station. The discharge piping shall be configured with a straight run of piping (no valves, tees, or reducers) equal to 10 diameters upstream and at least six diameters downstream of the flowmeter or as directed by the flowmeter manufacturer to achieve an acceptable flow pattern through the flowmeter.

6.7.6 Odor Control

The engineer shall consider the need for odor control facilities in the design of the lift station (i.e. bio filter bed, air scrubbers, chemical additives, aeration). Additionally, the engineer shall provide odor analysis considering the average and maximum detention time in the wet well. Each odor control analysis shall include CVWD's preferred bio filter beds odor control system as one of its alternatives. The odor control analysis shall be provided to the CVWD with CVWD selecting the final odor control system. A permit to construct and operate odor control facilities must be obtained from the Air Quality Management District. If odor control is determined not to be required, the lift station shall be designed for the addition of future odor control facilities (i.e. ventilation pipe stubbed out from the wet well).

6.7.7 Control and Telemetry

The sewer lift station pump operation will automatically alternate the pump sequencing (lead/lag operation) to balance pump wear during operation. Pumps set points are to be actuated at predetermined wet well levels as defined in the engineers design report for the lift station. The wet well levels and alarms shall be controlled by a redundant control system.

The lift station shall incorporate a radio telemetry system that is to be capable of automatically contacting the CVWD in cases of emergency (i.e. power failure or pump failure).

6.7.8 Emergency Standby Power Facilities

The project site shall provide adequate space for a diesel fueled standby generator in a recessed concrete structure. The generator shall be sized to

operate at connected load (full site load) of the designed station. The standby power project fees shall include applicable Air Quality Management District application fees, one-full fuel tank, sound attenuation enclosure testing and installation of CVWD's specified equipment.

The concrete recessed structure (approximately 32 feet x 18 feet) shall include but is not limited to exterior lighting, receptacles, safety rails, stairs, drain sump pumps, automatic sump pump controls and drain filtration system (manufactured to control infiltration of oils and other contaminates from entering the ground water system). The recessed structure shall provide reduced viewable generator height from the public. Vehicle access (20-feet) shall be available on the longer side of the recessed structure.

In order for the internal combustion engine to operate the electric generator, a permit to construct and operate must be obtained from the Air Quality Management District having jurisdiction. Permitting fees and engine procurement are greater if the project site is within 1,000-feet of an existing school.

The internal combustion engine operated generator shall be enclosed in a weather resistant sound attenuated metal enclosure. The metal enclosure shall reduce the engine noise to 75-dBA at 23-feet from the generator when operating at full load in all directions from the generator.

The generator shall be equipped with a fuel tank mounted on the same base rails as the generator and its metal enclosure. The fuel tank shall be sized to allow full load operating condition for a period not less than 12-hours minimum.

6.7.9 Electrical and Power Equipment Building

Depending on the lift station site, CVWD may require a block building to house electrical equipment, the emergency generator or other equipment. If a building is required, the design should reflect the architectural character and features of buildings in the vicinity of the lift station. For example, a building with a southwestern style incorporating a Mansard roof with clay tiles would be considered.

6.8 Force Mains

The size of the sewer force main shall be determined during the design phase of the lift station. Force mains shall be designed for peak hour wet weather flow, as indicated in Table 6.2. If the initial capacity of the lift station is considerably less than ultimate, consideration should be given to the undesirable effect of prolonged detention times within the force main. The engineer shall evaluate in these situations the feasibility of installing dual force mains to accommodate initial and ultimate flows. In no case shall a force main be less than 6-inches in diameter. The discharge from the lift station shall be into another force main, lift station receiving wet well, a receiving gravity sewer manhole or into the wastewater treatment plant. Force mains that discharge directly to a receiving manhole shall be epoxy coated on the interior or PVC lined for corrosion protection.

The force main and lift station design shall also consider and include facilities to eliminate or sufficiently dampen transient forces and/or surging in the event of power failure or an immediate station shutdown. Lift stations designed with a total dynamic head above 100 feet or force main velocity above 4 feet per second shall be evaluated to determine the need for hydraulic cushion check valves. If indicated, check valves shall be equipped with a hydraulic cushion to dampen the valve closing action. The hydraulic-cushion check valve shall be fully adjustable to control the valve closing speed. Details shall be included in the improvement plans.

The developer's engineer shall evaluate the need for odor control facilities for all forces mains.

6.8.1 Force Main Pipeline Sizing Criteria

Force main velocity criteria is used in order to provide velocities that re-suspend solids when the duty pump or pumps are in operation. The maximum velocity for force mains are used to prevent scour, excessive water hammer, and minimize electrical usage. Force main velocities design criteria and limits are listed in Table 6.11.

Table 6.11 Sewer Force Main Design Criteria

Design Criteria	**Standard**		
Velocity	Minimum (fps)	Recommended (fps)	Maximum (fps)
Any Size	3	4 to 7	7 to 10
Maximum Head loss			
18-inch & larger	1 psi /1,000 feet of pipeline		
Pressure			
Operating	40 to 80 psi		

The Hazen-Williams Coefficient (C) values to be used for calculating force main friction losses shall be C=130 for old pipes and C=150 for clean new pipes. The pumping plant and force main must be designed to accommodate variations expected during the life of the system (as in flows, service area, age of pipe etc.). The roughness constant (C) shall be determined on a case by case basis by CVWD.

6.8.2 Force Main Cover and Alignment

Force mains shall have a minimum cover of 4.0 feet and a maximum cover of 12.0 feet from the proposed finish grade to the top of pipe. High points in the force main should be minimized along the alignment. A wastewater air release and air/vacuum valve shall be installed in a vault and shall be located at each high point on the force main. At major low-points a manually controlled drain

valve shall be installed in a manhole to allow for cleaning or draining. The force main shall discharge at an elevation not more than 2 feet above the invert of a separate receiving manhole having no upstream gravity sewer connections.

The design of the force main alignment shall use 45-degree elbow fittings to reduce the potential for stoppages where a 90-degree change of direction in the force main is required. The engineer shall show and specify two 45-degree elbows on the improvement plans. Thrust blocks are to be used at all bends on the force main and they shall be constructed against undisturbed soil.

All PVC force mains shall utilize an Electronic Marker System (EMS) manufactured by 3M or an approved equal. Mid-range pipe locators shall be placed on the force main at 500 foot intervals, at horizontal changes in alignment and as directed by the CVWD.

6.8.3 Force Main Pipe Material

All sewer force mains shall be polyvinyl chloride pipe (PVC) pipe meeting AWWA C-900 or C-905. Force mains shall be water pressure tested in accordance with Section 306-1.4.5 of the Green Book. In locations where the sewer system is to be installed in non-corrosive soils and in unimproved areas or in parking lots, construction shall comply with the following special requirements:

a) Pipelines smaller than 12-inches shall be a minimum of C900-Class 150-DR 18 PVC pipe in accordance with AWWA C900

b) Pipelines 18-inch through 42-inch diameter shall be a minimum of C905-CL165-DR25 PVC pipe in accordance with AWWA C905.

6.8.4 Force Main Valves

Force main valves smaller than 36-inch shall be ball-centric plug valves by Dezurik. Any valves required for pipelines larger than 36 inch will be as directed by CVWD.

Marker posts are required if valves are to be installed outside of paved areas.

No valves shall be installed in decorative paving areas.

All valves shall be installed perpendicular to final grade.

6.8.5 Force Main Fittings

Fittings for force main pipelines shall be made to fit appropriate size and corrugation patterns and shall comply with section 207-9.2.3 of the Sanitation Standard Specification (see Appendix I).

Fittings include in-line joint fittings such as couplers, bends, tees or reducers. Fittings shall not reduce or impair the overall integrity or function of the pipeline.

Drawings shall depict all fittings, including all stationing and types.

6.8.6 Combination Air and Vacuum Relief Valves

Air vacuum valve assemblies shall be installed at all high points along the pipeline as shown on CVWD Standard Drawings S-40 and S-40B in Appendix I. At the high point of all vertical deflections, an air/vacuum valve will be required on the high side of the siphon.

Two-inch combination air and vacuum relief valve assemblies shall be installed on all sewer force mains greater than 8-inches in diameter. Larger sized combination air and vacuum relief valves will be required as directed by CVWD.

6.8.7 Thrust Restraint – Force Mains

Thrust restraint shall be designed in accordance with CVWD Restrained Joint Guidelines (Appendix H). The type of restrained joint shall be per CVWD Standard Specifications for Sanitation Systems.

6.9 Inverted Siphons

Inverted siphons are considered special structures and are designed to convey sewage flows (liquid and gas) across obstructions. These obstructions can be flood control channels, streams, depressed highways, irrigation channels and other obstructions. Every effort during design should be made to avoid sewer siphons due to high maintenance requirements and odor problems. Inverted siphons are known to have difficulty passing floating material and grease. These materials become easily trapped in the upstream manhole structure. When feasible, inverted siphons shall include airlines (sometimes referred to as “air jumpers”) between the upstream and downstream manholes. The air jumper is used to convey sewer gases across the siphon and can also serve as an overflow if the siphon becomes plugged. The design of inverted siphons and airlines are to ensure proper function during the design period of the system, to be fail-safe and to minimize maintenance and odors.

Inverted siphons shall be approved by CVWD in concept prior to preparation of drawings.

6.9.1 Inverted Siphon Location

Inverted siphons and airlines should be located completely within public right-of-way. If unavailable, an easement or other limited right-of-entry location may be adequate. In all cases, the right-of-way shall provide adequate clearances to not only contain the physical structures, but also allow vehicles, workers and equipment to enter and perform any construction, inspection, flushing, repair, maintenance and operational activity.

6.9.2 Inverted Siphon Design

Inverted siphons shall not have less than two barrels, with a minimum conduit size of 8 inches. A conduit less than 8 inches will be difficult to maintain, clean and operate, and will in turn result in clogging, higher maintenance costs and failure. One redundant barrel shall always be provided for bypass capacity, for

emergencies, and for use when another barrel is taken out of service for maintenance or repairs. Dual barrels installed, shall be the same size, each one capable of conveying the full design flow rate.

The hydraulic capacity of an inverted siphon shall not be less than the capacity of the sewer system upstream of the inverted siphon. Hydraulically, inverted siphons shall be designed for the average daily flow with a preferred minimum velocity not less than 4 fps, and an absolute minimum velocity of 3 fps. Velocities less than these are non-self-cleaning velocities which may allow material to deposit in the conduit, which in turn will result in blockages, higher maintenance costs and a shorter life. The daily peak hour flow shall provide a minimum velocity of 4 fps at least once a day.

6.9.3 Invert Siphon Structures

Inverted siphon inlet and outlet structures shall be designed so that the peak daily design flow can be diverted from one barrel to the other, and so either barrel may be taken out of service for cleaning or maintenance.

Section 7
Design Criteria
Irrigation and Drainage Facilities

7.1 Background

The Irrigation and Drainage system is comprised of the Coachella Branch of the All-American Canal (Coachella Canal), Protective Works (Flood Protection Dikes and Channels), Irrigation Distribution System and the Agricultural Drainage System (Drainage System). The United States Bureau of Reclamation (USBR) owns the Coachella Canal, Protective Works, and Irrigation Distribution System. CVWD owns the Drainage System and operates and maintains the Coachella Canal, Protective Works, Irrigation Distribution System and Drainage System.

The Coachella Canal conveys Colorado River water to the Coachella Valley from the All-American Canal near Yuma, AZ. It begins at Drop No. 1 on the All-American Canal and extends north 123 miles to the Coachella Valley and terminates at Lake Cahuilla in La Quinta. At the All-American Canal turnout, the Coachella Canal has a capacity of 1,500 cubic feet per second (cfs) or 2,975 acre-feet/day. The design capacity of the Coachella Canal decreases in proportion to lower deliveries as it traverses towards the terminus of the canal at Lake Cahuilla in La Quinta.

The Irrigation Distribution System includes a system of 485 miles of irrigation pipelines (laterals) which distribute water to 40-acre blocks of land within Improvement District No. 1 (ID1). ID1 was formed for the purpose of funding the contract repayment obligations and the operation and maintenance costs for the Coachella Canal, Protective Works, Irrigation Distribution System and Drainage System. A map of ID 1 and the Irrigation Distribution System is located in Appendix J.

The Drainage System includes a system of 21 miles of open drains and 166 miles of drain piping which transport agricultural drainage water from private tile drain systems to the Coachella Valley Stormwater Channel and the Salton Sea. A map of the Drainage System is located in Appendix J.

Irrigation and Drainage System statistics can be found in the most recent edition of CVWD's Annual Review.

The Irrigation and Drainage System design/construction standards and regulations for service are governed by the following documents:

- Regulations Governing Irrigation and Drainage – Appendix J(under construction)
- Irrigation Standard Specifications-Appendix J
- Drainage Standard Specifications - Appendix J
- Irrigation and Drainage General Drawing Notes-Appendix J
- Standard Specifications for Public Works Construction (Latest Edition)

- AWWA Standards

7.2 Flow Criteria

The following sections describe the development of flow and hydraulics for the original Irrigation and Drainage Systems.

7.2.1 Irrigation Distribution System

The Irrigation Distribution System was originally designed to provide a delivery point at the high point of each 40-acre parcel. The irrigation laterals supplying the 40 acre parcels were sized assuming a flow per acre as depicted in Table 7.1.

Table 7.1 USBR Irrigation Distribution System-Flow/Acre

Acres	Flow (Q) (cfs)[3]
0-120	3.0 [1]
120-240	6.0 [2]
240-1,000	Acres/50 + 3.0 cfs
1,000 – 1,150	23 cfs
1,150 and greater	Acres/50

[1] Use 6.0 cfs if serving more than 3 deliveries

[2] Use $\frac{\#\ of\ ACRES}{50} + 3.0\ cfs$ if serving more than 6 deliveries

[3] Where $\frac{\#\ of\ Acres}{50}$ for incoming pipe is greater than the sum of capacities of outlet pipes at a division point, use sum of outlet capacities for incoming pipe.

Baffle stands are located every 1,320 feet to create the head required for each delivery point. The head at the delivery point is determined by using the Factors For Pipeline Design Table (see Appendix J) that provides for a range of 2.0-6.0 feet of head at the high point depending on elevations throughout the 40 acre parcel.

Irrigation pipelines can be designed using the Darcy-Weisbach, Scobey or Hazen Williams formulae. Velocities shall not be greater than 4.0 feet per second. Pipe and fitting friction losses must be minimized to ensure adequate head at the point of delivery. Typically this ranges from 0.1 to 5.0 feet of headloss per 1,000 feet of pipe. The USBR now utilizes a hydraulic model to size irrigation laterals to ensure proper hydraulics and economics.

7.2.2 Drainage System

The CVWD drainage system was originally designed to provide a connection to the private tile drain system at the low point of each 80 acre parcel. The private tile drain system is owned, operated and maintained by the property owner. An empirical drainage flow equation was developed using on-field data which

automatically compensates for the soil conditions in the lower Coachella Valley. The drainage flow equation is:

$q = 50 \times L^{-0.25}$ (up to 960 acres) + 0.1 cfs/acre (beyond 960 acres)

q = drainage flow in gallons per minute (gpm) per 1,000 feet of farm tile
L = length of tile/1,000 feet

This equation was further expanded to provide drainage flow from various parcel sizes in order to design the CVWD drainage system. It was assumed there are 162.5 feet of private tile drain per acre. The Farm Drain Tile Discharge Table provides the drainage flow for a variety of acreages and is located in Appendix J. Examples of drainage flows are shown below:

40 acres = 0.4 cfs
80 acres = 0.7 cfs
1,000 acres = 5.0 cfs
5,000 acres = 14 cfs

In 1981, the National Resource Conservation Service (NRCS) of the United States Department of Agriculture (USDA) developed Guidelines For On-Farm Subsurface Artificial Drainage Systems. These guidelines provided a more enhanced approach to designing private tile drain systems. The sizing and spacing of private tile drains is based on the Coachella Valley Field Soil Survey which includes subsurface soil information every 660 feet or about 9 borings per 40 acre parcel. The Guidelines For On-Farm Subsurface Artificial Drainage Systems are located in Appendix J.

The CVWD drainage system piping is sized using the Manning equation assuming full pipe. The minimum slope allowed is 0.0014 ft/ft

The minimum depth to the top of the CVWD drainage system piping is 7.0 feet. The drain must be installed in a gravel filter envelope (minimum of 3-inches around the pipe) designed according to USDA-NRCS specifications. Developers that connect to the CVWD drainage system shall comply with the requirements of the State irrigated lands regulatory program as implemented by the Colorado River Basin Regional Water Quality Control Board.

7.3 Distribution Zones

7.3.1 Irrigation Distribution Zones

There are six distinct service zones within the ID1 distribution system. These zones were determined based on the locations of the parcels served and the ability to schedule water deliveries.

The canal conveyance system is designed as a gravity system dropping approximately one foot per mile for its entire 123 mile length. For example, Service Zone 1 is from Milepost 88.6 to Milepost 97.0 and therefore, the hydraulic grade line of the canal drops 8.4 feet within that zone. The hydraulic grade line of the canal is used to convey the water via gravity through the closed

piping irrigation lateral system. Table 7.2 provides the irrigation laterals by zone along with the design flow capacity. Please refer to the Irrigation System map in Appendix J.

Table 7.2 Water Service Distribution Zones

Service Zone	Canal Milepost (MP)	Canal turnouts	Design Q (cfs)
Zone 1	MP 88.6 - MP 97.0	Lateral 88.6 Lateral 91.4 Lateral 92.0 Lateral 93.0 Lateral 94.2 Lateral 95.2 Lateral 95.6 Lateral 96.1 Lateral 97.0	Q = 17.3 Q = 29.2 Q = 9.0 Q = 65.1 Q = 85.6 Q = 6.0 Q = 6.0 Q = 6.0 Q = 80.6
Zone 2	MP 98.0 - MP 105.0	Lateral 98.0 Lateral 99.4 Lateral 99.8 Lateral 100.9 Lateral 101.3 Lateral 102.3 Lateral 102.7 Lateral 103.0 Lateral 103.7 Lateral 104.4 Lateral 105.0	Q = 60.6 Q = 14.6 Q = 86.3 Q = 16.5 Q = 23.0 Q = 23.0 Q = 3.0 Q = 11.0 Q = 13.8 Q = 9.0 Q = 9.4
Zone 3	MP 105.7 - MP 118.1	Lateral 105.7 Lateral 106.3 Lateral 106.9 Lateral 107.3 Lateral 108.2 Lateral 108.3 Lateral 109.2 Lateral 109.8 Lateral 110.2 Lateral 111.2 Lateral 111.7 Lateral 111.9	Q = 23.0 Q = 17.0 Q = 6.0 Q = 17.9 Q = 37.1 Q = 3.0 Q = 13.4 Q = 9.8 Q = 6.0 Q = 3.0 Q = 12.4 Q = 3.0
Zone 3	MP 105.7 – MP 118.1	Lateral 112.2 Lateral 112.5 Lateral 112.7 Lateral 112.7A Lateral 113.7 Lateral 113.9	Q = 9.7 Q = 3.0 Q = 11.8 Q = 3.0 Q = 3.0 Q = 3.0

Service Zone	Canal Milepost (MP)	Canal turnouts	Design Q (cfs)
		Lateral 114.3	Q = 6.0
		Lateral 114.8	Q = 3.0
		Lateral 115.3	Q = 3.0
		Lateral 115.6	Q = 24.8
		Lateral 115.9	Q = 14.0
		Lateral 116.1	Q = 16.6
		Lateral 116.6A	Q = 12.9
		Lateral 117.1	Q = 36.6
		Lateral 117.6	Q = 30.0
		Lateral 117.8	Q = 8.6
		Lateral 118.0	Q = 50.4
		Lateral 118.0A	Q = 3.0
Zone 4	MP 118.3 - MP 120.8	Lateral 118.7	Q = 23.0
		Lateral 118.9	Q = 3.0
		Lateral 119.2	Q = 30.2
		Lateral 119.6	Q = 3.0
		Lateral 119.64	Q = 182.6
		Lateral 119.65	Q = 20.6
		Lateral 119.7	Q = 6.0
		Lateral 120.8	Q = 58.4
Zone 5	MP 121.3 - MP 123.45	Lateral 120.0	Q = 6.0
		Lateral 120.3	Q = 3.0
		Lateral 120.6	Q = 3.0
		Lateral 121.3	Q = 3.0
		Lateral 121.6	Q = 37.8
		Lateral 122.7	Q = 21.2
		Lateral 123.45	Q = 230.6
Zone 6	MP 97.1 (Oasis System)	Lateral 97.1	Q = 270.0

7.3.2 Irrigation Distribution Pumping Plants

Certain portions of the Irrigation Distribution System cannot be served by gravity and required booster pump stations. Table 7.3 lists the booster pump stations by Service Zone.

Table 7.3 Irrigation System Booster Pumps Stations

Service Zone	Distribution Pumping Plants	Design Capacity (cfs)
Zone 1	NONE	
Zone 2	NONE	
Zone 3	L-1 L-2 L-3 PS113.2 PS114.3 (Out of Service) PS115.3	Q = 16.6 Q = 50.4 Q = 31.8 Q = 9.0 Q = 7.8 Q = 3.0
Zone 4	L-4 PS119.2A	Q = 58.4 Q = 3.0
Zone 5	E-3 E-5	Q = 6.0 Q = 15.8
Zone 6	O-1 O-2 O-3 O-4 O-5 O-6 O-7	Q = 20.4 Q = 6.0 Q = 10.2 Q = 15.4 Q = 3.0 Q = 7.4 Q = 6.0

7.3.3 Drainage System Distribution System

The Drainage System has 32 closed pipe drains and 5 open channel drains that discharge into the Coachella Valley Stormwater Channel. In addition, there are 21 open drains that discharge directly into the Salton Sea. Please refer to the Drainage System map in Appendix J.

7.4 Irrigation and Drainage Pipeline Requirements

7.4.1 Irrigation Pipeline Requirements

Irrigation pipelines shall be polyvinylchloride (PVC) in the sizes of 10, 12, 18, 24, 30, 36 or 42-inches in diameter. Irrigation pipelines shall be Ductile Iron Pipe (DIP) in sizes greater than 42-inch. A Hazen-Williams Coefficients (C) of 110 shall be used for hydraulic analysis.

A hydraulic analysis must be provided that demonstrates that the new pipeline capacity is consistent with the original system design capacity.

7.4.2 Drainage Pipeline Requirements

Drainage pipelines shall be perforated High Density Polyethylene (HDPE) in the sizes of 8, 12, 18, 24, 30 and 36-inches in diameter. Drainage pipelines shall have a full circular cross section with an outer corrugated pipe wall and smooth inner wall and perforated side wall. HDPE pipelines shall have integral bell and

spigot water tight joints with elastomeric gaskets and shall be as manufactured by Advanced Drainage Systems (ADS) Model N-12 or approved equal.

Table 7.4 represents the minimum slope for various drainage pipeline sizes.

Table 7.4 Minimum Pipe Slope

Diameter (Inches)	Slope (Foot per Foot)
8	0.0033
10 and up	0.0020

7.4.3 Pipeline Location and Horizontal Separation

Irrigation pipelines shall be located within existing or new easements dedicated to the USBR. Drainage pipelines shall be located within existing or new easements dedicated to CVWD (or USBR in some cases). The design shall be adjusted to take into consideration utility conflicts, soils, groundwater, and any other factors.

Table 7.5 presents the minimum horizontal separation from other infrastructure by pipeline size.

Table 7.5 Minimum Horizontal Pipeline Separation

Horizontal Separation by Type	Minimum Separation
Domestic Water pipelines[1]	10 feet
Sewers	10 feet
Recycled Water	10 feet
Dry Utilities	5 feet
Storm Drain	10 feet

[1]The 10 foot separating distance is measured between the outside edge (including bells) of the pipes. If the sum of the inside diameters of the two pipes is 24-inches or less, then the centerline (CL) distance between the two pipes shall be 12 feet. This will aid in layout and plan checking. If the sum of the diameters is greater than 24-inches, then the separating distance between the outside edge (including bells) shall be 10 feet.

7.4.4 Pipeline Cover and Vertical Separation

Table 7.5 shows the minimum cover for various pipeline sizes.

7.4.5 Detectable Locating/Warning Tape

Copper tracer wire shall be installed and secured to the top of all irrigation pipeline as it is being laid. The tracing wire shall be stubbed up at each valve (brought into valve box), to each service, to all appurtenances and to all blowoffs and air vacs (coiled around the barrel just below the top flange with 16 inches excess). Tracer wire shall be secured to the top of the pipe, at minimum of 10-

foot intervals, with plastic adhesive tape. The copper wire shall be #10CCS High Strength 300# Break Load with Locking Tracer Wire Connectors per CVWD's approved material list or approved equal.

The wire shall be electrically continuous throughout the entire piping system. All splices of the wire shall be made securely and covered thoroughly with a Direct Bury Splice Kit, 3M DBY/DBR or approved equal. The Contractor shall schedule a conductivity test (conducted by CVWD) on completion of the water main installation and prior to the final pavement. If the conductivity test fails, the Contractor shall be responsible for making the necessary repairs, until passing results are achieved. Additional compensation will not be allowed therefore.

Table 7.6 Pipeline Cover

Pipe Size or Development Type	Minimum Cover
12 inch and smaller (Irrigation)	36 inches
18 inch and larger (Irrigation)	48 inches
12 inch to 36 inch (Drain)	7 feet

Water and sewer crossings and associated separations shall be in accordance with CVWD Standard Drawing Nos. W-1/S-3 and W-2/S-4 (see Appendix H).

7.5 Canal Water for Construction and Dust Control Purposes

Developers/contractors are encouraged to use non-potable water for construction and dust control. Coachella Canal water may be available for construction and dust control purposes with the proper construction meter connection. Flow in the Coachella Canal varies during the irrigation season depending on water deliveries to irrigators.

7.6 Connection to CVWD Irrigation/Drainage Distribution System

All connections to the existing irrigation and drainage facilities will be made by developer or the developer's contractor under the direction of CVWD and connections will be limited to a maximum 3 day shutdown of the existing irrigation pipeline. All associated costs of the replacements and connections to existing CVWD facilities shall be at the sole expense of the developer.

7.6.1 Drainage Discharge Monitoring

A drainage manhole as described in section 7.15 shall be installed where any developer drainage system connects to the CVWD drainage system. This drainage manhole will be made available to CVWD staff for monitoring drain flows entering the CVWD drainage system.

7.7 Booster Pump Stations

If a booster pump station is required, it will be designed in accordance with the standards identified in Section 5-Domestic Water Design Criteria. The developer may be required to construct a booster pump station to lift canal water to higher elevations in order to provide service to the elevated lands.

7.8 Meters

Irrigation meters for large canal water delivery shall be in-line flow meters within a concrete vault with a two-piece traffic rated spring assisted lid. The flow meter shall be a flanged type with straightening vanes, reading in cfs, with a totalizer in acre-feet. Installation of irrigation meters shall be per CVWD Standard Drawing I-47. Vertical meters shall be warranted in certain applications and shall be at the direction of CVWD. New irrigation meters shall be accessible and installed away from traffic within an existing easement. All irrigation meters requested to be abandoned by the developer shall be at the developer's expense and shall be returned to CVWD.

Refer to Sections 5.13 and 9.8, for residential/commercial irrigation meter requirements.

7.9 Baffle Stands

Baffle stands shall remain in place unless directed by CVWD. Connections to baffle stands shall be constructed using a Fernco adaptor or approved equal per CVWD Standard Drawing I-48 at a minimum distance of 3 feet from the baffle stand.

7.10 Pipe Material

In locations where the irrigation system is to be installed in unimproved areas or in parking lots, construction shall comply with the following special requirements:

1) Pipelines 12-inches and smaller shall be a minimum of C900-Class 165-DR 25 PVC pipe in accordance with AWWA C900
2) Pipelines 18-inch through 42-inch diameter shall be a minimum of C905-CL165-DR25 PVC pipe in accordance with AWWA C905.
3) Pipelines larger than 42-inch shall be Ductile Iron Pipe (DIP) in standard sizes of 48, 54, 60 and 64-inch and shall be in accordance with AWWA C151. Pressure class will be determined by the CVWD.
4) Connections between existing concrete pipe and PVC shall be constructed using a Fernco-type fitting, with a maximum of 6-inch size differential per CVWD Standard Drawing I-48.
5) Fittings for PVC or DIP shall be ductile iron with cement mortar lining in accordance with AWWA C110 and C153.
6) Ductile iron fittings shall be polyethylene wrapped per AWWA C-105. Deflection from flanges is not allowed. Pipe deflection shall comply with Section 5, Table 5.4.

Please see documents in Appendix N for reference (Pipe Materials for Non-Pressurized Pipeline Projects and Pipe Materials for Pressurized Pipeline Projects).

7.10.1 Pipe Backfill and Bedding

Backfill and bedding zones shall be as shown on CVWD Standard Drawing I-7 in Appendix J unless special consideration is required.

Special consideration shall be applied to the design of pipe bedding and backfill where soil conditions, or a high groundwater table or other factors warrant additional analysis. The developer and its engineer shall be solely responsible for determining the appropriateness of CVWD Standard Drawing I-7 for the project and for determining whether special consideration is required, and shall provide supporting calculations upon request. See Section 6, Table 6.9 that provides a comparison of pipe material with pipe size, native soil class, and proposed depth of bury. Alternative trench designs can extend the range of applicability, but the design should consider soil-structure interaction in order to develop the proper trench configuration.

7.11 Thrust Restraint

Thrust restraint shall be designed in accordance with CVWD Restrained Joint Guidelines (Appendix H). The type of restrained joint shall be per CVWD Standard Specifications for Irrigation and Drainage Systems.

7.12 Irrigation/Drainage Pipeline Replacement and/or Abandonment

The expansion of urban development into agricultural areas often requires the replacement and/or abandonment of irrigation/drainage pipelines. Please refer to Section 3-Right-of-Way for the detailed replacement and/or abandonment procedures.

Irrigation/drainage pipelines to be abandoned must be completed utilizing one of the following methods:

1. Crushed in place
2. Removed completely
3. Slurry filled with 2-sack slurry

All of the above methods of abandonment must also be followed by backfill and compaction to 95 percent relative density. All irrigation pipeline abandonments must be completed up to the adjacent property line and/or section line. If a pipeline continues onto another property, the end of the pipeline must be completely plugged with concrete to a minimum depth of 3 feet.

7.13 Valves and Fittings

7.13.1 Irrigation Valves

Irrigation pipeline valves smaller than 36-inch shall be ball-centric plug valves by Milliken or approved equal. Any valves required for pipelines larger than 36-inch will be as directed by CVWD.

Marker posts are required if valves are to be installed outside of paved areas.

No valves shall be installed in decorative paving areas.

All valves shall be installed perpendicular to final grade.

7.13.2 Fittings

Fittings for drainage pipelines shall be made to fit appropriate size and corrugation patterns.

Fittings include in-line joint fittings such as couplers, bends, tees or reducers. Fittings shall not reduce or impair the overall integrity or function of the pipeline.

Drawings shall depict all fittings, including all stationing and types.

CVWD requires that 3M EMS Mini-Marker water (1257) be installed 3 feet below grade above every bend or every 500 feet.

7.14 Combination Air and Vacuum Relief Valves

Air vacuum valve assemblies shall be installed at all high points along the pipeline as shown on CVWD Standard Drawings I-21, I-22A and I-22B. At the high point of all vertical deflections, an air/vacuum valve will be required.

Two-inch or as determined by CVWD combination air and vacuum relief valve assemblies shall be installed on all irrigation mains.

7.15 Drainage Manholes

New manholes to be constructed on an existing or proposed drain line shall be constructed in accordance with CVWD Standard Drawings S-5 & S-10B with lid stamped “Drain.” All existing manholes shown on plans shall call out stationing, manhole number, rim elevation and CVWD drawing number. Connections to existing manholes are to be made under District inspection. Manholes shall be installed at the intersection of drainage pipelines; at all changes in grade, size or alignment; and at the end of any drain line more than 200 feet in length.

7.15.1 Manhole Spacing

Manholes shall be installed on spacing not to exceed 400 feet. Drainage pipelines with a radius greater than 400 feet shall be considered as straight with manhole spacing not to exceed 400 feet. Manhole spacing on curved drainage pipelines less than a 200 foot radius shall be 200 feet. Manhole spacing on curves between 200 and 400 feet shall be adjusted proportionately and approved

by CVWD. Drainage pipelines with reverse curves are required to have a manhole at the point of tangency of the curve. Standard manhole details are shown on CVWD Standard Drawing S-5 in Appendix I.

7.15.2 Manhole Depth and Size

The minimum manhole diameter size shall be as indicated in Table 7.7 “Manhole Minimum Diameter.”

Table 7.7 Manhole Minimum Diameter

Drain Diameter	Depth	MH Dia	Depth	MH Dia
8 to 24-inch	$<$ 12 feet	48-inch	$\geq$ 12 feet	60-inch
24-inch & larger	-	60-inch	$\geq$ 16 feet	72-inch

7.15.3 Manhole Invert Elevation

The District requires that the manhole inlet and outlet invert elevations to be at the same elevation.

Section 8
Design Criteria
Stormwater Facilities

8.1 Introduction

CVWD provides regional flood protection within its Stormwater Unit Boundary (see Appendix K) by collecting, detaining and conveying regional flood flows through the Coachella Valley to the Salton Sea. CVWD owns, operates and maintains the 50-mile Whitewater River/Coachella Valley Stormwater Channel (WWRSC/CVSC) and other tributary facilities. In addition, CVWD operates and maintains facilities owned by the United States Bureau of Reclamation (USBR).

CVWD is the National Flood Insurance Program (NFIP) Administrator for unincorporated areas in Riverside County that lie within the Stormwater Unit Boundary. It also provides floodplain management services to most of the cities in the Stormwater Unit Boundary.

As a result of these responsibilities, CVWD reviews and approves submissions for the following types of projects:

- Projects that will be adjacent to or within the existing regional stormwater facilities and potentially affect their performance. Typical examples are bridges and utility crossings
- New developments within the Stormwater Unit Boundary that are potentially exposed to flood hazards. These projects may or may not construct stormwater facilities for mitigation of existing regional flood hazards

CVWD does not review or approve on-site drainage for new developments within the Stormwater Unit Boundary. This aspect of development is reviewed by Riverside County (unincorporated areas) or the Cities (incorporated areas).

CVWD has adopted standards and guidelines for the design and construction of regional stormwater facilities and for evaluation of new developments. The following sections describe these standards and provide guidance to proponents and their engineers on requirements for approval of the above project types. Section 8 is organized so that general discussion is provided in the main report; technical details, procedures to meet the standards, report outlines, and checklists are included in Appendix K.

8.2 Proviso

CVWD will review and approve studies and reports related to its stormwater system or for development within flood-prone areas for conformance with its regulations and with County, State and Federal regulations, where appropriate. This notwithstanding, CVWD assumes no liability for inadequate design or improper construction. Review and approval does not absolve the owner, developer, design engineer, or contractor of

liability. Compliance with this document or with regulatory standards does not guarantee that properties will be free from flooding or flood damage.

The project engineer retains the responsibility for design of storm water or drainage facilities that meet industry standards of practice and provide public safety. CVWD, its officials, and its employees assume no liability for information, data or conclusions reached by developers or engineers and make no warranty, expressed or implied, when they review or approve projects or studies.

8.3 The Regional Stormwater System

The Whitewater River originates on the southern slopes of the San Bernardino Mountains and flows southeast through the Coachella Valley to the Salton Sea. The drainage area is approximately 1,500 square miles at the Salton Sea. Downstream of Palm Springs, its course is now channelized. From Point Happy (near Washington Street) upstream to Palm Springs the channelized section is referred to as the WWRSC; downstream to the Salton Sea, the channelized extension is referred to as the CVSC. The WWRSC/CVSC is about 50 miles long.

Table 8.1 describes the stormwater facilities which are also shown on a map in Appendix K. Tributary stormwater facilities convey flood flows from the Santa Rosa Mountains on the southwest or from the Little San Bernardino Mountains on the northeast to the WWRSC/CVSC. These facilities include the West Magnesia Channel, Palm Valley Channel, Thousand Palms Channel, Wasteways 2 and 3, La Quinta Evacuation Channel, Deep Canyon Channel, and Avenue 64 Evacuation Channel. CVWD also operates stormwater systems that intercept regional floods and convey them to the tributary stormwater facilities. Examples of these projects include the East Side Dike, Dike No. 4, and the Bear Creek Detention System. CVWD also operates stormwater facilities or systems that discharge directly to the Salton Sea, such as Wasteway No. 1.

CVWD works to re-evaluate, upgrade and certify its existing stormwater facilities to applicable FEMA standards and regulations. In addition, CVWD has developed stormwater plans within its Stormwater Unit Boundary. On-going design and planning projects, in various stages of development, include:

- Thousand Palms Flood Control Project. CVWD is in the process of completing the design and environmental study following the transfer of the project from USACE to CVWD.
- Eastern Coachella Valley Stormwater Master Plan
- North Indio Flood Control Channels North Cathedral City Storm water Master Plan Improvements
- Whitewater River Levee Improvements Upstream of Ramon Road
- East Side Dike North of I-10 Levee Certification
- East Side Dike I-10 to Dos Palmas
- Avenue 54 to Thermal Drop Structure Channel Improvements

- Western Shore of Salton Sea Stormwater Master Plan

Table 8.1: CVWD Stormwater Facilities

Facility	Type	Bed/Banks	Length (mi)
Whitewater River/CVSC	Channel/Levee	Earth/Concrete Slope Lining	50.0
Bear Creek System & La Quinta Evacuation Channel	Levee/Basin/Channel	Earth/Concrete/Soil Cement	5.8
Dead Indian System & Deep Canyon System	Levees/Channel	Earthen/Concrete	7.8
Palm Valley Channel & Cat Creek	Basins/Channels	Earthen/Concrete	7.0
East Magnesia Canyon Channel	Channel	Earthen/Concrete	1.8
West Magnesia Canyon Channel	Basin/Channel	Earthen/Concrete	1.3
Thousand Palms Connecting Channel	Channel	Earthen	0.5
Thunderbird Channel	Channel	Concrete/Concrete	1.0
Thunderbird Villas Stormwater Channel	Channel/Storm Drain	Concrete/Concrete	0.8
Peterson Stormwater Channel	Channel/Storm Drain	Concrete/Concrete	0.5
Sky Mountain Channel	Channel/Storm Drain	Concrete/Earthen	1.8
Eastside Dike	Levee	Earthen	25.5
Wasteway 1	Channel	Concrete	3.3
Wasteway 2	Channel	Concrete	2.3
Wasteway 3	Channel	Concrete	1.3
Dike #2	Levee	Earthen	1.0
Dike #4	Levee	Earthen Dike	3.5
Avenue 64 Evacuation Channel/Fillmore Street Irrigation Ditch	Channel	Concrete/ or Pipes/Concrete	6.8
Guadalupe Dike System	Levee	Earthen/ Riprap Dike	1.0

8.4 Guiding Regulations

CVWD relies on four regulations in their review of submissions for projects within the Stormwater Unit Boundary; (1) California Drainage Law, (2) Riverside County Ordinance 458 (latest version), (3) CVWD Ordinance 1234.2, and (4) Municipal Separate Stormwater Sewer System (MS4) Permit. The following sub-sections describe the basic principles behind these regulations.

8.4.1 California Drainage Law

California Drainage Law states that property owners have the right to protect themselves from flooding as long as they do not unreasonably increase flood risk for adjacent property owners. Flows must be reasonably received and released in the historical flow paths at the historical flow depths and velocities.

8.4.2 Riverside County Ordinance 458

This ordinance was adopted by Riverside County as a requirement of its participation in the National Flood Insurance Program (NFIP) of FEMA as stipulated in Title 44, Section 65 of the Code of Federal Regulations (44CFR65). Ordinance 458 specifically regulates development in Special Flood Hazard Areas identified on maps prepared by FEMA, the State of California or the County that result from the one-percent annual chance flood, also referred to as the “Base Flood” and the “100-Year Flood”.

8.4.3 CVWD Ordinance 1234.2

Ordinance 1234.2 provides standards for design and ownership of stormwater facilities within the Stormwater Unit Boundary (please refer to Guideline K-7 for details). The Ordinance provides a common standard (CWD 100-Year Plus) for design and evaluation of all existing and proposed stormwater channels, whether owned by CVWD or a private entity.

8.4.4 Municipal Separate Storm Sewer System (MS4) Permit

The Colorado River Basin Regional Water Quality Control Board has issued a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System Permit (MS4 Permit) under Order No. R7-2008-0001. In cooperation with the County of Riverside and incorporated cities within the Whitewater River Watershed, CVWD is responsible for “*implementing that portion of the urban runoff management program for any discharges to and from* (its) *MS4 facilities*”. As such, any discharge into the Whitewater River/Coachella Valley Stormwater Channel (WWRSC/CVSC) or other stormwater facilities within CVWD’s jurisdiction must comply with the MS4 permit.

To accomplish this, CVWD requires the local Land Use Authority to provide a letter supporting their regulatory authority to control the discharge of pollutants from the proposed outlet in compliance with the MS4 Permit. Typically, an approved Water Quality Management Plan (WQMP) prepared by the developer gives the city the level of comfort they need to provide CVWD this letter; however

specific requirements should be solicited from the respective city or Riverside County. CVWD will provide a Development Review Letter noting this requirement during the entitlement phase of any proposed project with plans to discharge into any CVWD stormwater facility.

8.5 Design Standards for Regional Stormwater Channels

The following subsections describe CVWD standards for the design of regional stormwater channels. Reference is provided to appropriate guidelines in Appendix K for further details on analytic procedures.

8.5.1 Hydrologic Design

The 100-Year flood, also referred to as the one-percent annual chance flood by FEMA, is the standard for design and analysis of regional stormwater channels. CVWD has calculated or adopted 100-Year design floods for the facilities in Table 8-1 and these flows will be used for analysis of existing facilities or design of projects within or near the channels, unless specifically directed otherwise by CVWD.

For design of new facilities or re-evaluation of the hydrology of existing facilities, the 100-Year flood will be estimated from records of annual peak flows (where a sufficient length of record is available near the development site). If no suitable records are available, it is then estimated from rainfall-runoff modeling. Guideline K-6 provides procedures to calculate 100-Year peak flows and hydrographs.

8.5.2 Hydraulic Design

CVWD recognizes two types of stormwater channels: incised and leveed (Ordinance 1234.2; Appendix K-7). Incised channels are those where the 100-Year water surface elevation, calculated from the 100-Year flood, lies below the adjacent ground or bank top elevation. Leveed channels are those where the 100-Year water surface elevation is higher than that of adjacent ground and a levee is required for flood protection.

For existing facilities, incised channels are distinguished from leveed channels through comparison of the 100-Year water surface profile to one of adjacent ground or levee crests, as prepared from surveys or topography. New facilities shall generally be designed as incised channels meeting the 100-Year Plus freeboard standards.

Ordinance 1234.2 provides design minimum freeboard standards for the two channel types:

1) Incised Channels: Incised stormwater channels shall be designed to convey the 100-Year Flood with a minimum of 3 feet of freeboard as measured from the lowest adjacent ground to the design water surface. CVWD may require additional freeboard based on the size and location of the watershed and the associated flood hazard potential.

2) Leveed Channels: Levees shall be designed with a minimum of 4 feet of freeboard from the levee crest elevation to the 100-Year Flood water surface elevation. CVWD may require additional freeboard based on the size and location of the watershed and the associated flood hazard potential.

Where superelevation of the water surface is expected along a stormwater channel during the 100-Year flood, the above freeboard standards are applied above the super-elevated water surface elevation.

8.5.2.1 Hydraulic Models for Existing Facilities

Analysis of existing facilities or analysis of impacts on adjacent lands will require 100-Year existing and proposed water surface profiles and, potentially, other hydraulic characteristics, such as depths, velocities, and shear stresses.

For the analysis of existing facilities or analysis of lands adjacent to existing facilities, the proponent will obtain CVWD's most recent HEC-RAS hydraulic model of the facilities and update the geometry and channel characteristics to reflect existing conditions. Updating the model may require new surveys, field inspection, and model revision and calibration. Once existing conditions are established and confirmed by CVWD, the model can be modified as required to calculate post-project hydraulic conditions.

Where an adequate hydraulic model is not available for an existing channel the proponent will develop a hydraulic model for the site based on recent surveys or topography that meets FEMA map standards. CVWD requires that proponents use HEC-RAS for hydraulic modeling. An unsteady model may be required where significant volumes of water leave the channel or return from the floodplain. For these circumstances, CVWD recommends HEC-RAS 2D, which defines lateral weirs that allow floodwaters to pass onto and back from the floodplain. Two-dimensional models may be required in areas of complex topography, such as on fans, or where flows are complex, such as at the confluences of major tributaries or confluences with the WWRSC/CVSC.

8.5.2.2 Hydraulic Models for New Channels

The proponent will develop a hydraulic model for existing and project conditions based on recent surveys or topography that meets FEMA map standards. CVWD requires that proponents use HEC-RAS for hydraulic modeling, as described above.

8.5.3 Erosion Design

CVWD requires analysis of erosion for the evaluation of existing channels and for design of new channels. Erosion consists of both lateral erosion of banks (bank retreat) and vertical erosion of the bed, including channel incision (scour).

Where existing bank materials are expected to erode during passage of the 100-Year flood, CVWD requires that bank protection is designed and constructed along the stormwater facility to protect adjacent developments. Guideline K-2 describes acceptable types of bank protection and their design procedures. In some circumstances, a lateral erosion setback for developments may be acceptable rather than construction of bank protection.

For earthen or natural bottom stormwater channels, CVWD requires an analysis of scour, including channel incision (profile degradation), both for existing and new channels. Guideline K-3 describes CVWD's procedures for calculating scour for different engineering applications.

8.5.4 Sediment Transport Design

Where projects have the potential to alter existing sediment transport conditions by modifying channel dimensions, adding or removing flows, or trapping sediment CVWD requires a comparison of existing and project conditions. This analysis will evaluate potential changes in sediment transport, potential for channel filling or erosion, and potential impacts on regional stormwater channels or adjacent properties. Where the changes in sediment transport may negatively affect channels or properties, appropriate mitigation measures are to be included in the flood hazard design.

Given the complexity of sediment transport analysis, it is recommended the proponent discuss methods with CVWD before proceeding.

8.6 Submissions for Projects near or within CVWD Facilities

Where a structure is proposed that may affect hydraulic conditions within an existing stormwater channel, CVWD requires a proponent to submit a report documenting the impact of the structure on the channel and providing mitigation if the function of the channel is impaired. In general, the report will provide analyses of existing and proposed hydrology, hydraulics, scour and other engineering analyses and compare existing and proposed conditions to determine mitigation. Section 8.5 provides design standards for existing and proposed conditions.

Appendix K-1 describes the minimum requirements for submissions to CVWD on proposed projects near or within CVWD's facilities. The following subsections provide guidance for typical projects such as bank protection, utility crossings, bridges or other crossings, storm drains entering a stormwater channel, modification or repair of levees, and other projects that may affect performance.

8.6.1 Slope (Bank) Protection for Adjacent Developments

Slope (bank) protection is required on the banks and levees of stormwater channels where developments near the facilities are at risk from lateral erosion, or as directed by CVWD.

CVWD recommends that slope protection consist of a concrete revetment extending from above the 100-Year water surface elevation to the elevation of the lowest point of the channel bed, with a cutoff wall extending from that point to the maximum scour depth or minimum scour elevation (Guideline K-2). Guideline K-3 provides guidance on calculating minimum scour elevations. In some cases, where hydraulic conditions are appropriate, the concrete revetment can be combined with, or replaced by reinforced turf or other grass and soil combinations.

The requirement for slope protection may be waived for a proposed development that will have buildings and/or structures 300 or more feet away from the top edge of incised channels such as the Whitewater River/Coachella Valley Stormwater Channel (WWRSC/CVSC).

An exception to the requirement of slope protection within 300 feet of a building and o/or structure is the La Quinta Evacuation Channel (LQEC) where a detailed analysis indicated that the LQEC has a nearly flat (gentle) slope and lower velocities (4 ft/sec or lower) during the 100-year flood. The analysis indicated the potential of LQEC bank failure due to erosion and the associated risk of inundation during the 100-year flood is minimal. For the LQEC the City of Austin (2013) Erosion Hazard Zone guidelines for setback determination was followed. **Consequently, proposed developments adjacent to the LQEC** may receive a variance on the slope protection requirement if all the following apply:

- Proposed footprints of buildings are 75 feet or more away from the top edge of the LQEC,
- The proposed finish floor elevations for the buildings are higher than the water surface elevation within the LQEC plus three feet of freeboard (incised) or four feet of freeboard (levee).

Proposed developments that satisfy these criteria and are adjacent to the unlined portion of the LQEC can request for a waiver of the slope protection requirement which applies to the WWRSC/CVSC and other regional stormwater facilities. The waiver will not apply for proposed developments that are adjacent to existing stormwater facilities which do not satisfy CVWD's or FEMA's design standards for regional stormwater facilities.

8.6.2 Utility Crossings

Crossings are only allowed in special circumstances after review and approval of engineering plans and specifications. Guideline K-2 provides details on standards for utility crossings of both “soft-bottom” or earthen channels and concrete-bottom channels; Guideline K-3 provides details on scour calculations.

8.6.3 Bridges or Crossings

Bridges or other crossings shall be designed to pass the design flood with no increase or rise of upstream water levels and provide adequate clearance in accordance with Ordinance 1234.2. Any project alteration of upstream and downstream conditions must be fully mitigated. CVWD may relax the “no rise” standard and not require mitigation where there is substantial existing freeboard.

CVWD requires a factor of safety on the toe depth of bank protection upstream, through and downstream of the bridge opening. The lower toe elevation, as compared to that for bank protection further from the bridge, is to ensure that the bridge structure and adjacent facilities survive flows greater than the 100-Year flood. Guideline K-3 provides further details on procedures to calculate minimum scour elevations for design of bank protection near bridges and the required extent of protection. The proponent shall also ensure that the toes of bank protection near the bridge are not undermined by erosion or scour holes that form around piers or abutments.

CVWD also recommends that proposed bridges integrate utility corridors in their design.

8.6.4 Storm Drains

Storm drain outlets discharging into CVWD stormwater facilities shall provide adequate protection at their outlets to prevent scour and erosion in “soft-bottom” channels, such as the WWRSC/CVSC, Thousand Palms Stormwater Channel, or La Quinta Evacuation Channel. Protective measures may include riprap or concrete blankets. The outlet protection works will be designed in accordance with Guideline K-4.

Where storm drain outlets are proposed to discharge into concrete-bottomed channels (e.g. Palm Valley Channel or West Magnesia Channel), box culverts or pipes, the proponent should consult with CVWD to determine if the discharge is feasible, given capacity constraints and the highly-engineered hydraulic design of these channels.

Refer to subsection 8.3.4 for information on compliance with the MS4 Permit.

8.6.5 Modification or Construction of Levees

Ownership, maintenance and certification to FEMA of levees are CVWD's responsibility. Private ownership and maintenance of levees along CVWD's facilities is not allowed. Development projects that include modification and/or construction of levees, berms, floodwalls, training dikes, etc., as part of a flood control scheme should consult with CVWD prior to designing such a project, as the studies and requirements are typically very onerous.

Construction plans that involve modification of or encroachment on a United States Bureau of Reclamation (USBR) dike (levee) will require review and approval by the USBR following review and approval of design and flood management plans by CVWD.

8.6.6 Other Projects

Contact CVWD for discussion of requirements for projects not described above or in Guideline K-5.

8.7 Submissions for Development Projects

Where a development is proposed within an identified flood hazard zone or where hazards have not been identified but are likely, CVWD requires a proponent to submit a report describing the development, existing flood hazards, proposed mitigation, and the impact of the project and mitigation on adjacent properties. Where the mitigation includes channels or other features to manage regional stormwater, these channels must meet the standards described in Subsections 8.5 and 8.6.

CVWD reviews the submission for compliance with CVWD standards, Riverside County or City Floodplain Ordinances, and State and Federal requirements, such as California Drainage Law. Guideline K-5 provides minimum requirements for developer reports submitted to CVWD.

8.7.1 Existing Hazard Studies and Maps

Existing flood hazards are shown on FEMA County-wide Flood Insurance Rate Maps (FIRM), CVWD Stormwater Master Plans and in other studies prepared by, or for, CVWD. Please contact CVWD to obtain information on the most recent hazard studies for sites with the Stormwater Boundary Unit.

CVWD recognizes that there are sites that have flood hazards but the hazards are not identified on FEMA County-wide Flood Insurance Rate Maps (FIRM). Developers of sites in such areas will be required to carry out studies to define the specific hazards on their property.

8.7.2 Types of Flood Hazards

The following specific flood hazards occur within CVWD's Stormwater Unit Boundary:

- Riverine hazards, including high in-channel velocities, overtopping or eroding of banks and spreading of floodwaters across the floodplain.
- Alluvial fan hazards, including unpredictable flow paths, a broad extent of flooding and erosion that may undermine structures. "Alluvial Fan Flooding", prepared by the Committee on Alluvial Fan Flooding (1996) and "Guidelines for Flood Risk Analysis and Mapping: Alluvial Fans" prepared by FEMA (2016) further describe these processes.
- Valley floor hazards, flooding at sites not on alluvial fans or within a riverine hazard zone.
- Coastal or lakeshore hazards relating to inundation from the Salton Sea, including wave erosion and other coastal hazards described in various FEMA publications.

Some sites may be exposed to more than one type of hazard. For instance, sites near the toes of fans may also be exposed to riverine flooding. The general requirements for submissions for the four types of hazard areas are described below. Guideline K-5 provides further details on minimum reporting requirements.

8.7.3 Developments in Floodplains

Riverine flood hazards occur along or adjacent to natural and stormwater channels in the Coachella Valley, such as the flow of the Whitewater River through WWRSC/CVSC. CVWD's stormwater channels mostly either contain the 100-year flood or have accredited levees that provide protection to the floodplain. However, overtopping of banks and levees does occur along the CVSC, from downstream of Monroe Street to the Salton Sea.

CVWD has also identified riverine flood hazards along the I-10 corridor between North Gene Autry Trail and Washington Street as a result of conveyance of floods from Morongo Wash and other north side tributaries along the corridor to the east (Northwest Hydraulic Consultants 2014).

Given the complexity of flows on floodplains, existing and proposed 100-year hydraulic conditions will be based on two-dimensional models developed to meet FEMA's analysis standards for non-accredited levees, where these are present. CVWD has prepared two-dimensional floodplain models for the CVSC downstream of Monroe Street and for the riverine flows along the I-10 corridor. Developers or their engineers should contact CVWD to obtain the most recent versions of these hydraulic models. Developers are responsible for modifying the models to reflect project conditions. If no suitable model exists, developers are responsible for developing existing and proposed conditions two-dimensional models.

Some development sites exposed to riverine flooding may also be exposed to flows from alluvial fans. Where this occurs, the developer must determine if the two hazards are independent or not. Where independent, conditions for design are adopted by calculating depths and velocities for each hazard type and then selecting the maximum depths and velocities over the property. Multiple simulations of both types of flood hazard may be required to determine combined "worst case" existing and project conditions and to determine project impacts on lands adjacent to the development.

Design of mitigation facilities for riverine floodwaters crossing the property will be based on determining peak discharges from appropriate cross sections in the two-dimensional model. The design may need to consider that flows arrive from different directions for different flood hazard types and under some flood conditions.

8.7.4 Developments on Alluvial Fans

Hazard studies for properties or sites on or adjacent to an alluvial fan follow the *Guidelines for Flood Risk Analysis and Mapping: Alluvial Fans* (FEMA 2016). This document recommends a three stage process to study these hazards: Stage 1-identify alluvial fan landform boundaries and Stage 2-identify active and inactive areas on the fan. CVWD's approach to Stage 3 (flood hazard analysis) is discussed below.

The hydrologic standard for analysis of flood hazards and design of regional facilities on alluvial fans is the 100-Year flood. CVWD has calculated 100-Year floods for the canyons at the head of many alluvial fans as part of Stormwater Master Plans within their Stormwater Unit Boundary and these flows will be used for analysis, unless specifically directed otherwise by CVWD. Some tributaries may not have been analyzed in these documents because they were not significant to regional flows, as a result of timing or small watershed areas. It is the responsibility of the developer to identify all potential sources of floodwater to their project and prepare hydrologic analyses to meet Guideline K-6 if they have not been previously analyzed.

For projects on active alluvial fans, CVWD generally requires that hazard analysis and peaks flows for design of mitigation be calculated via a two-dimensional hydraulic model that routes the 100-year fan head hydrograph(s) to the development site and, if necessary, downstream to a regional stormwater facility. Generally, multiple scenarios are recommended to adequately define the hydraulic conditions at the development site. These scenarios often consist of blocking different channels on the fan surface to simulate avulsions. CVWD will provide further details, if required.

For simple projects, CVWD will accept design of flood mitigation facilities based on the sum of the 100-year peak flows from all of the fans that potentially flow towards the project. Such a design peak flow will almost certainly be larger than the one calculated by routing with a two-dimensional model.

If the development is on an inactive portion of a fan, a one-dimensional hydraulic model may be utilized to define the design hydraulics if confined and stable channels cross the inactive surface. Here, uncertainty with regard to flow paths may be disregarded. The one-dimensional models may require a more detailed hydraulic analysis at the fan head to determine the distribution of the design flood over the various channels and surfaces on the fan. Hydrologic analysis will also be required for flow generated by rainfall on the inactive fan surface that reaches the development.

CVWD requires analysis of project impacts on adjacent properties and also on their downstream facilities. The impacts to be analyzed for their facilities will include changes in 100-year floods, changes in sediment loads and adjustments of the channel as result of changed hydrology or sediment. All impacts to CVWD facilities will require mitigation.

8.7.5 Developments on Valley Floors

Some development sites do not lie within the riverine Special Flood Hazard Area (SFHA) and are not on a fan. Flood hazards result from fan flows that discharge onto the valley floor toward the development and from flows resulting from rainfall on upstream areas on the valley floor.

If the site is exposed to flows leaving an active alluvial fan, a 2-dimensional hydraulic model is extended from the apex of the active fan, or other suitable points, to include the development area. Multiple scenarios may be needed to route flows across the fan, onto the valley bottom, and to a downstream stormwater facility, if appropriate. Such a model might also include inflows from the valley bottom tributary area and inactive fan surface.

Where the development site is only exposed to flows from the valley floor, the developer will calculate the 100-year flood from the procedures in Guideline K-6. This flood will then be used to design mitigation works.

8.7.6 Projects on Lakeshores

Coastal or lakeshore hazards related to the Salton Sea have not been studied nor have the extent of these hazards been mapped. CVWD may require developers of properties adjacent to the Salton Sea to complete specific studies of these hazards that follow applicable FEMA Guidelines.

8.8 Flood Hazard Mitigation

The basic standard for stormwater management on the development site is to protect it from flooding while conveying water through or around the site in such a manner that flood hazards are not modified for adjacent properties. To help meet this goal, the disturbance of natural watercourses on the site shall be minimized and the points where channels or runoff historically have entered or exited a property shall be maintained (California Drainage Law).

The recommended approach for evaluating potential impacts of development on adjacent properties is to repeat the hydraulic analysis or modeling for existing conditions with the development and the proposed flood hazard mitigation in place. The existing and project hydraulic conditions are then compared for upstream, downstream and adjacent to the development site. Where the project changes water levels, velocities, or other hydraulic parameters on adjacent properties or stormwater channels, either the flood hazard mitigation works are modified to eliminate these changes or suitable protective works are developed for the adjacent channels and properties.

8.9 Long Term and Post Storm Operation & Maintenance Plans

Operations and Maintenance (O&M) plans are required for proposed flood control facilities, whether the facilities are to be deeded to CVWD or owned by the development. O&M plans will include maintenance access easements through the development, equipment access routes in and out of facilities, disposal sites, vegetation management plans, and provide local, state and federal permits which allow long-term and post-storm repair and restoration activities. The O&M plans will provide detailed instructions and requirements for the long-term maintenance required to ensure performance and for post-storm maintenance and repairs to restore functioning.

Developers are required to submit long term and post storm O&M plans concurrently with each phase of design plans (conceptual to final). This will help ensure that an adequate O&M plan is provided as part of design and development plans.

8.10 Conditional Letters of Map Revision

The Ordinance 1234.2 freeboard standards provide greater flood protection to adjacent lands than FEMA's freeboard standards. Developers that plan to submit a Conditional Letter of Map Revision (CLOMR) to FEMA will need to demonstrate that their proposed regional facilities meet both CVWD and FEMA standards before CVWD will support the CLOMR submission.

Development projects that may affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective Base Flood Elevations (BFEs), or the Special Flood Hazard Area (SFHA) are required to prepare a Conditional Letter of Map Revision (CLOMR) report for review and approval by CVWD for submittal to the FEMA.

Similar to the CLOMR, a Letter of Map Revision (LOMR) will be submitted to CVWD for review and approval. The developer shall submit the report to FEMA to obtain a LOMR which removes the development from the special flood hazard area.

8.11 Technical Appendix

Further technical guidance and recommended report formats and contents are included in Appendix K to the Design Manual. This Appendix includes CVWD's Stormwater Unit Boundary Map and the following specific guidelines:

- Guideline K-1: Report Format and Contents for Projects Adjacent to CVWD Stormwater Facilities

- Guideline K-2: Bank (Slope) Protection Design Guidance
- Guideline K-3: Scour Calculation Guidance
- Guideline K-4: Storm Drain Outlet (Laterals) Design Guidance
- Guideline K-5: Report Format and Contents for Development Projects
- Guideline K-6: Framework for Hydrologic Modeling
- Guideline K-7: CVWD Ordinance No. 1234.2
- Guideline K-8: Stormwater Annexation Form

8.12 References

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Section 9
Design Criteria
Non-Potable Water Facilities

9.1 Background

For the purposes of this section, non-potable water means reclaimed wastewater (recycled water), Colorado River water (canal water) or a blend of recycled water and canal water.

CVWD has provided non-potable water in the form of recycled water to golf courses and large greenscape areas since 1968 when it acquired Water Reclamation Plant No. 9 (WRP 9), which was decommissioned in 2016. CVWD currently has 20 water customers that use recycled water or a blend of recycled water and canal water from WRPs. Table 9.1 gives the statistics for the 2 WRPs that provide recycled water for non-potable water customers.

Table 9.1 Water Reclamation Plants (WRPs) and Non-Potable Water

Facility	Plant Capacity (mgd)	Tertiary Treatment Capacity (mgd)	Number of Non-potable Water Customers	Non-potable Pumping Capacity*
WRP-7[1]	5.0	2.5	2	6.62(mgd)
WRP-10[2]	18.0	15.0	18	
High-Pressure			8	17.28 (mgd)
Low-Pressure			10	16.20 (mgd)
Total	23.0	17.5	20	

*Limited capacity based on existing demand

[1]WRP-7 is located near the Coachella Canal and canal water is blended with tertiary treated wastewater to serve 2 NPW customers.

[2]WRP-10 is the endpoint for the Mid-Valley pipeline where canal water is blended with disinfected tertiary recycled water to serve 18 NPW customers.

CVWD also provides canal water to 36 golf courses in the East Valley via the Coachella Canal and associated Irrigation Distribution System. Requirements for golf course connection to the Irrigation Distribution System is defined in Section 7.

The Non-Potable Water System includes 4 pump stations and 31 miles of distribution system piping.

The Non-Potable Water System design/construction standards and regulations for service are governed by the following documents:

- Sanitation System Standard Specifications-Appendix I
- Section 6-Design Criteria-Sanitation Facilities
- California Regional Water Quality Control Board of Colorado River Basin Region Board Order No. 97-700, General waste discharge requirements for discharge of recycled water for golf course and landscape irrigation
- California Department of Public Health Statutes and Regulations Related to Recycled Water, including those found in Titles 17 and 22 of the California Code of Regulations, and excerpts from the Health and Safety Code and the Water Code
- Green Book
- AWWA Standards
- CVWD's Ordinance No. 1302.1 Landscape and Irrigation System Design Criteria
- State Water Resources Control Board Resolution No. 2009-0011 (Recycled Water Policy) and subsequent amendments to this policy.

9.2 Water Code Sections 32600 - 32603

Water Code Sections 32600 - 32603 declares that the use of potable water for non-potable uses in the CVWD service area is a waste and unreasonable use of water. If a suitable non-potable water source is available and complies with the conditions found in this section, then person or local public agency using the potable water may be ordered to use non-potable water or to cease using potable water. Non-potable water can be recycled water, canal water or a combination of both. A copy of Water Code Sections 32600 - 32603 is located in Appendix L. The provisions of Water Code Sections 32600 - 32603 are summarized below:

- Applies to cemeteries, parks, highway landscape areas, new industrial facilities (after 2010) and golf courses
- The CVWD Board will enforce the use of non-potable water when following conditions are met:
    - Non-potable source is of adequate quality for the proposed use
    - Non-potable water can be provided at a reasonable cost
    - Use of non-potable water will not adversely affect groundwater rights, degrade water quality or be injurious to plant life, fish and wildlife
- California Department of Public Health determines that non-potable use will not be detrimental to public health
- California Regional Water Quality Control Board determines that the non-potable source will comply with the water quality control plan

CVWD strongly supports Water Code Sections 32600 - 32603 and will work with developers to ensure compliance. CVWD is also supportive of dual water systems in which the landscape irrigation needs of the development are served by a separate non-potable water system.

9.3 Non-Potable Demand Criteria

In cases where developments are proposing dual piping systems (a potable water distribution system and a non-potable water distribution system), the on-site and off-site non-potable water infrastructure shall be sized to meet the Peak Daily Demand (PDD) of the proposed development in accordance with the following design criteria:

Pipelines: PDD + Fire Flow (if allowed)

Storage: PDD + Fire Flow (if allowed) + Emergency Storage

Pump Station: PDD + Fire Flow (if allowed)

CVWD is located in a hot desert environment and peak demands are significant. CVWD will work with the developer/engineer to establish a PDD allowance to ensure adequate service during the hot summer months. CVWD may adjust this factor depending on the location of the project, type of development and proposed landscaping. Non-potable water customers are required to maintain and have available a back up source of water equal to one hundred percent of its peak irrigation water demands, as the non-potable water delivery is an interruptible supply.

9.4 Non-Potable Pipeline Sizing Criteria

The Non-Potable Water Pipeline requirements will be the same as those for Domestic Water Pipelines, as presented in Section 5 with the following exceptions:

Table 9.2 provides the non-potable water pipeline exceptions to the domestic water design criteria to be utilized for all hydraulic analyses.

Table 9.2 Non-Potable Water Pipeline Design Criteria

Design Criteria	**Standard**
Maximum Velocity	
12 inch and smaller	7.5 ft/sec
Maximum Head loss	
18” and larger	7 ft /1,000 feet of pipeline

Pipelines shall be 12, 18, 24, 30, 36 or 42 inches in diameter. Pipelines larger than 30 inches in diameter may be required for projects with high demand requirements. No pipe smaller than 12 inches in diameter shall be permitted. A Hazen-Williams Coefficient (C) for new CML ductile iron shall be C = 120.

9.5 Connection to CVWD Non-Potable Water System

All connections to the existing CVWD non-potable water system will be made by CVWD at the Developer's expense. The Contractor may connect to an existing valve when approved by CVWD under CVWD inspection.

1. Obtain coverage under the general waste discharge requirements for discharge of recycled water for golf course and landscape irrigation Order No. 97-700 or equivalent version of this permit from the California Regional Water Quality Control Board of the Colorado River Basin Region (Regional Board) by submitting a Notice of Intent to the Regional Board and paying application/annual fees.
2. Enter into an agreement with CVWD for receiving non-potable water for golf course and landscape irrigation. The agreement between discharger and CVWD must be provided to the Regional Board within 90 days of receiving coverage under the permit referenced above in item #1.
3. Landscape and Irrigation system plans must meet regulatory requirements of Order 97-700 or equivalent version of this permit, the State Board's Recycled Water Policy, and California Department of Public Health (CDPH) Statutes and Regulations related to recycled water, such as the Health and Safety Code, the Water Code, Title 17 and Title 22 Code of Regulations. These requirements include but are not limited to the following:

    - An air-gap separation, a vertical measured distance between supply pipe and receiving vessel must be present and meet the required distance for the size of the supply pipe.
    - The appropriate type of backflow protection is to be installed for auxiliary water supplies and recycled water.
    - The required separation distance between recycled water lines and impoundments and application area; and domestic wells and water lines is maintained and approved by CDPH.
    - The design of the irrigation system shall not cause the occurrence of ponding anywhere in the reuse area, and overspray or mist around dwellings, outdoor eating areas and/or food handling facilities is eliminated. Irrigation runoff shall be confined to the recycled water use area unless authorized by CDPH.
    - Drinking fountains will be protected from spray, mist or runoff by use of a drinking fountain cover or shelter approved for this purpose.
    - Hose bibs are not allowed on portions of the recycled water systems accessible to the general public. Quick couplers that differ from those used on the potable water system are allowed.
    - Signs are posted in areas that the public has access to that are no less than 4 inches high by 8 inches wide and include "RECYCLED WATER – DO NOT DRINK" and the international do not drink symbol as indicated in CCR Title 22

Division 4 Chapter 3 Article 4 Section as figure 60310-A. The number and locations of these signs will be approved by CDPH.

- The recycled water irrigation system is able to be operated during a time of day that will minimize contact with the public.
- All pipes installed above or below ground on or after June 1, 1993 designed to carry recycled water are to be colored purple or wrapped in purple tape.
- Golf course pump houses utilizing recycled water are appropriately tagged with warning signs with proper wording of sufficient size to warn the public that recycled water is not safe for drinking. All new and replacement at grade valve boxes shall be purple or appropriately tagged for water reuse purposes. All other appurtenances and equipment used for recycled water must be identified as used for recycled water distribution per the recommendations of CDPH.

4. Prior to construction, landscape and irrigation system plans must be submitted for approval to the following agencies (please allow for a 30 day comment period):
   - Regional Board Water Quality Control Board
   - California Department of Public Health, and
   - CVWD.
5. Upon approval from the Regional Board and CDPH, the discharger shall provide notification that recycled water will be used for irrigation to people who reside adjacent to the recycled water use area and to golf course patrons though a method approved by the Regional Board's Executive Officer and CDPH at least 30 days prior to use of recycled water.
6. A Use Site Supervisor must be designated and his or her name and contact information must be provided in writing to CVWD and the Regional Board 30 days prior to discharge of recycled water. This person will be available to be contacted and receive periodic education and training on the uses and restrictions of recycled water.
7. A cross-connection control test will be performed on the irrigation and domestic systems prior to the discharge of recycled water and at least once every four years thereafter. This test is to be conducted by an American Water Works Association (AWWA) certified cross-connection control program specialist or equivalent. The results of these tests are to be submitted to CVWD, CDPH, and the Regional Board within 30 days of test completion.
8. "As-Built" plans and specifications showing the domestic and irrigation systems, location of all potable and recycled water connections and location of all on-site and nearby wells to CDPH, as per the CDPH requested time frame.

9.6 Booster Pump Stations and Pressure Reducing Valve (PRV) Stations

All Booster Pump Stations and Pressure Regulating Valves shall conform to the requirements in Section 5.8.

9.7 Emergency Standby Power Facilities

All Emergency Standby Power Facilities shall conform to the requirements in Section 5.9.

9.8 Services & Meters

Services and meters shall conform to the requirements in Section 5.13.

9.9 Pipe Material, Valves, Combination Air and Vacuum Relief Valves and Blow-off Assemblies

All materials must meet California Department of Public Health statutes and regulations related to the use of recycled water. Pipe Material, Valves, Combination Air and Vacuum Relief Valves and Blow-off Assemblies Pipe material shall conform to Sections 5.13, 5.14, 5.15 and 5.16, respectively. All above ground infrastructure shall be painted Pantone 512 and marked “Non-Potable Water Do Not Drink” with the universal symbol.

Non-Potable Water Pipeline Requirements will be the same as those for Domestic Water Pipelines as presented in Section 5 with the following exceptions:

- All piping shall be in accordance with the color-coding, and labeling requirements per Section 116815, California Health and Safety Code of Regulations.
- Separating distances shall be the same as Sewer Pipelines (See Section 6)

Please see documents in Appendix N for reference (Pipe Materials for Non-Pressurized Pipeline Projects and Pipe Materials for Pressurized Pipeline Projects).

9.10 Construction

Detectable Locating/Warning tape shall be installed over the pipeline at a depth of two feet and shall be 5 mils thick and feature a print style which cannot be scraped off or erased. Detectable warning tape shall be six (6) inches in width and shall read: “CAUTION – Buried Reclaimed Pipeline Below” and follow American Public Works Association color code (Purple for Reclaimed). Detectable warning tape shall be woven reinforced for non-stretch, non-distorting, high-strength for plowing requirements. Acceptable manufacturers shall be Reef Industries, Terra Tape, Sentry Line Reinforced Detectable or Approved Equal.

Section 10
Design Criteria Landscape/Irrigation

10.1 Landscape Water Conservation

As much as 80 percent of water use in the Coachella Valley occurs outdoors. CVWD considers it imperative that landscape irrigation be efficient. Accordingly, all new development projects within the CVWD service area must comply with CVWD Ordinance No. 1302.1 and submit landscape irrigation drawings for review and approval.

The requirements of Ordinance No. 1302.1 have proven to provide beautiful landscapes, excellent design flexibility, and landscapes that use relatively little water. The ordinance provides detailed requirements for landscape design, allowing flexibility and imagination, while reducing water use and avoiding runoff to the streets. It also addresses the design of the irrigation system with specifications for efficiency, including spray, rotor and drip irrigation systems.

To provide maximum design flexibility while reducing water use, the criteria rely on water use calculations. The calculations are based on plant water use classifications and irrigation system efficiencies. The estimated water use of the proposed landscape must be less than or equal to the maximum water allowance calculated for a “model” landscape of the same size.

All design criteria can be found in Ordinance No. 1302.1 Landscape and Irrigation System Design Criteria (see Appendix M). The Water Management Division is part of the Service Department. Water Management staff are available to assist in meeting the requirements of the Ordinance and preparing the drawing submittal.

10.2 Applicability

The provisions of Ordinance No. 1302.1 shall apply to all of the following landscape projects:

- New construction and rehabilitated landscapes for public agency projects and private development projects requiring a building or landscape permit, plan check or design review;
- New construction and rehabilitated landscapes which are developer-installed in single-family and multi-family projects requiring a building or landscape permit, plan check or design review; and
- New construction and rehabilitated landscapes which are homeowner-provided and/or homeowner-hired in single family and multi-family residential projects with a total project landscape area equal to or greater than 5,000 square feet requiring a building or landscape permit, plan check or design review.

These criteria do not apply to:

- Registered local, state or federal historical sites;
- Ecological restoration projects that do not require a permanent irrigation system;
- Mined-land reclamation projects that do not require a permanent irrigation system; or
- Plant collections, as part of botanical gardens and arboretums open to the public.

10.3 Landscape/Irrigation Submittal Package

Appendix A of Ordinance 1302.1 provides the format for the Landscape Document Package Checklist which includes the following key items:

1. Maximum Applied Water Allowance
2. Estimated Total Water Use by Hydrozone
3. ETWU < MAWA
4. Landscape Design Plan
5. Irrigation Design Plan
6. Grading Design Plan
7. Soil Management Report
8. General Project Information

Landscape/irrigation drawing requirements are included in Section 2-Drawing Format and Requirements. The Landscape and Irrigation Pre-Submittal Checklist is located in Appendix E.

Two copies of the landscape/irrigation submittal package shall be forwarded to the Water Management Division. See the Fees section for the most current landscape/irrigation plan check fees. The package will normally be returned to the applicant with comments if applicable within ten (10) days of receipt. After noted corrections have been made to the drawings, the applicant shall submit the original landscape and irrigation plans for final approval. A copy of the approved landscape package along with the approved plans will be released after the developer/applicant has provided all the post plan check documents (see Figure 1).

CVWD Water Management staff will inspect the landscaped area(s) for conformance with the approved landscape/irrigation package.

10.4 CVWD Easements

CVWD requires easements to ensure the ability to properly operate and maintain its facilities. Please see Section 2-Drawing Format and Requirements and Section 3-Right-of-Way for more details on easement width requirements and the detailed process for securing and dedicating easements to CVWD.