



ELSINORE VALLEY

MUNICIPAL WATER DISTRICT

VOLUME 1 DESIGN STANDARDS

JUNE 2023

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END OF SECTION

PART 1 - GENERAL INFORMATION

1.01 GENERAL

- A. These specifications establish standards for design, materials, and construction procedures for improvements to the potable water, recycled water, and sewerage systems of the Elsinore Valley Municipal Water District. These specifications are not intended to establish general requirements or special conditions for a particular job, but rather are to be used as technical standards for all work performed by Developers, Engineers, Contractors, or Individuals within the District.

1.02 REFERENCE SPECIFICATIONS

- A. Wherever reference is made within these documents to certain standard specifications, the reference shall be construed to mean the latest standards, with all subsequent amendments, changes, or additions as thereafter adopted and published that are in effect at the date of approval by the District of the plans and specifications prepared by the engineer.
1. Reference to ASTM specifications refers to American Society for Testing and Materials.
 2. Reference to AWWA specifications refers to American Water Works Association.
 3. Reference to ASME specifications refers to the American Society of Mechanical Engineers.
 4. Reference to ANSI specifications refers to the American National Standards Institute.
 5. Reference to ACI specifications refers to the American Concrete Institute.
 6. Reference to SSPWC or "Green Book" specifications refers to the Standard Specifications for Public Works Construction.
 7. Reference to UFC requirements refers to Uniform Fire Code.

1.03 DEFINITION OF TERMS

- A. Whenever in these specifications or other contract documents where these specifications govern, where the following terms are used, they shall be defined as follows:
1. **Acceptance.** That action by the General Manager or his/her designee acknowledging that all provisions of the Agreement between the District and the Applicant or Owner have been fulfilled in all respects.
 2. **Agreement.** The document setting forth the terms and conditions agreed to by the District and the Applicant related to the Irrevocable Offer of Dedication of the facilities constructed pursuant to these General Conditions as well as the Grant of Easement for access to the facilities.

3. **Applicant.** Shall mean any property owner who makes application for District service or enters into an agreement with the District.
4. **Approved Materials List.** List of pre-approved materials to be used for construction of facilities in the District. The list is included in Volume 4 of the District's Standards.
5. **Approved, directed, satisfactory, proper, acceptable, required, necessary, and/or equal.** Shall be defined as considered approved, directed, satisfactory, proper, acceptable, required, necessary, or equal in the opinion of the District.
6. **Appurtenances.** Valves, stops, bends, elbows, reducers, services, back flow preventers, bushings, plugs, caps, blocks, jackets, wyes, cleanouts, manholes, frames and covers, lateral markers and all other fittings, or work required to make a complete installation.
7. **Board.** The Board of Directors of Elsinore Valley Municipal Water District.
8. **Contract.** The Contract between the Applicant (property owner) and his Contractor.
9. **Contractor.** The independent person, firm, corporation or partnership with whom the District or Developer contracts for the performance of the work or any part thereof covered by the Approved Plans and these Standard Specifications. Instructions or information given by the District to the Contractor's superintendent or agent on the Project shall be considered as having been given to the Developer.
10. **Days.** Unless otherwise specified, days shall mean calendar days.
11. **Design Standards.** Standards for construction of facilities in the District.
12. **Design Guidelines.** General guidelines and design examples based on current and working facilities within the District. Included in Volume 4 of the District's Standards.
13. **District.** The Elsinore Valley Municipal Water District.
 - a. For the unique purpose of these Standard Specifications, District shall also refer to the District's representative(s) acting within the scope of the particular duties entrusted to them.
 - b. The District shall resolve any and all issues which may arise with regard to the quality or acceptability of approved materials furnished or work performed, to the manner of performance and rate of progress of the work and shall answer all questions relating to the interpretation of the Standard Drawings, the Approved Plans, the job specifications, if any, and these Standard Specifications as well as the acceptable fulfillment of the Contract on the part of the Developer.
14. **District Engineer.** The District's Chief Engineer, or the DISTRICT's General Manager, acting either directly or through properly authorized

agents, such agents acting severally within the scope of the particular duties entrusted to them.

15. **Elevation.** All elevations referred to herein are to be based upon the U.S.C. & G.S. datum, NAD 1983
16. **Engineer** shall mean a Civil Engineer or Structural Engineer registered or licensed in California who is qualified to act as an agent of the Developer in preparing plans for facilities to be approved and accepted by the District and incorporated thereafter into the District's system.
17. **EVMWD.** Elsinore Valley Municipal Water District.
18. **Facilities.** Any water, recycled water and or sewer infrastructure including but not limited to; waterline, recycled waterline, sewer line, pump station, lift stations, reservoirs, pressure reducing stations.
19. **Inspector.** The personal representative of the District acting through the District Engineer and/or General Manager.
20. **Local Agency.** Any subdivision of state government that has responsibility of land use within its jurisdictional boundaries, typically a county, city, or special district. The Local Agencies within EVMWD's boundary include but are not limited to, the County of Riverside and Cities of Lake Elsinore, Canyon Lake, Wildomar, and Murrieta.
21. **Owner (Developer).** Any person or entity who agrees to construct and install facilities which after acceptance will become part of the District's system and who must select and employ a Contractor as defined herein.
22. **Plans.** The official scale and full-size approved detail drawings, or exact reproductions thereof, which show location, character, dimensions, elevations, and details of the work to be performed and which have been approved by the District.
23. **Private Contract Work.** Work done pursuant to a Contract between the Contractor and Applicant or Owner.
24. **Private Engineer.** A Civil Engineer or Structural Engineer registered or licensed in California who is qualified to act as an agent of the Developer in preparing plans for facilities to be approved and accepted by the DISTRICT and incorporated thereafter into the District's system.
25. **Public Projects.** Projects whose design and construction is funded by the District or other public entity, directly or indirectly, and the Contractor is selected through a competitive public bid process.
26. **Rules and Regulations.** The applicable "Rules and Regulations of the Elsinore Valley Municipal Water District" covering water, water system, recycled water system, sewerage and sewer system requirements for subdivisions and other extensions within the boundaries of the Elsinore Valley Municipal Water Districts as adopted by the Board of Directors including all amendments thereto.

27. **Safety.** All local, District, City, County, State, Federal, and OSHA laws shall be addressed.
28. **Standard Specifications.** The Standard Specifications for materials and construction of District facilities. Included in Volume 3 of the District's Standards.
29. **Standard Drawings.** The Standard Drawings for construction of District facilities. Included in Volume 2 of the District's Standards.
30. **Subcontractor.** Any person or entity who has a contract with the Contractor to perform any of the work at the site. Subcontractor also means any person who has a contract with a subcontractor to perform any of the work at the site. All subcontractors must be properly licensed and approved by the District.
31. **Utility.** Public or private facilities for the transportation of fluids, gases, stormwater, power, signals, or communications.
32. **Work.** shall mean the public improvement to be constructed in whole or part within the boundaries of the District.
33. **Written Permission or Written Consent:** A formal approval notice from the General Manager and/or District Engineer granting a variance from a specific standard requirement.
34. **Definitions Related to Sewers.** Terms used herein are defined as follows:
 - a. **"Building Sewer" or "Building Lateral"** shall mean that part of the horizontal piping of a drainage system which extends from the building drain and which receives the discharge of the building drain and conveys it to public sewer, private sewer, individual sewage disposal system, or other point of disposal.
 - b. **"Service Lateral" or "Street Lateral"** shall mean the sewer pipeline from a building sewer at the property line to a collection line within public right-of-way or easement. This facility is privately owned and maintained by the property owner.
 - c. **"Collection Line"** shall mean the District's sewer pipeline to which the service laterals are connected.
 - d. **"Trunk Line"** shall mean a main line sewer pipeline to which collection lines are connected and that services the primary purpose of transporting sewage from collection lines to the treatment plant.
35. **Definitions related to Water Systems.** Terms used herein are defined as follows:
 - a. **"Distribution Main"** shall mean the underground pipeline to which customer services and fire hydrants in the public right-of-way or easement are connected.

- b. **“Fire Line”** shall mean the underground pipeline, public or private, to which fire hydrants or fire department connections are connected on private property.
- c. **“Fire Service”** shall mean the piping and appurtenances from a connection point at a distribution main or a transmission main to the discharge side of the approved fire detector check assembly most commonly referred to as, a double detector check assembly.
- d. **“Transmission Main”** shall mean the underground piping to which distribution mains are connected. These mains typically originate at a reservoir or a booster pump station.
- e. **“Water/Recycled Water Service”** shall mean the piping and appurtenances from the connection point with the distribution main to the discharge side of the customer’s water meter.

1.04 ABBREVIATIONS

- A. The abbreviations used in the plans and specifications are the meanings of which are established by general usage throughout the industry.

1.05 WILL SERVE LETTER

- A. A will serve letter indicates to the Developer if water and/or sewer service is available to the requested parcel(s). This letter is often request by governing agencies as part of their submittal requirements.
- B. The applicant can request the will serve letter by submitting a will serve application. The letter does not contain an estimate for capacity or deposit fees.
- C. The District considerer the conditions to have expired automatically two years from the issuance date of the will serve letter.
- D. Refer to EVMWD Administrative Code §3901.

1.06 CAPACITY FEES

- A. Capacity fees are one-time charges to new development connecting to the District’s water and/or sewer system. The fees consist of the property’s fair share of facilities and treatment plants to construct, operate, and maintain the public water and/or sewer system.
- B. For projects that do not require public main line or facility construction, the capacity fee letter will be issued upon receipt of the will serve application. For applicants with project that require main line or facility construction, the capacity fee letter will be issued during the plan check or inspection phase of the project.
- C. The capacity fee letter is considered expired automatically at the end of the current fiscal year. Capacity fees are subject to change without notice by the Board of Directors.

- D. Capacity fees shall be paid prior to the first meter or sewer connection of a project.
- E. Refer to EVMWD Administrative Code §2308, §2350, §2408, §2409, and §4053.

1.07 FEE CREDITS

- A. Refer to EVMWD Administrative Code §3005.

1.08 REIMBURSEMENT AGREEMENTS

- A. Refer to EVMWD Administrative Code §3004.

1.09 DUE DILIGENCE (SERVICE REQUIREMENTS)

- A. A due diligence meeting is where the Developer's project team meets with the District staff to discuss the project's infrastructure requirements, procedure, applications, fees and deposit to serve the project water and/or sewer service. The required infrastructure may include main line, lift stations, pressure reducing stations, pump stations, reservoirs, etc.
- B. A due diligence application and site plan shall be submitted to the District to schedule the due diligence meeting. Upon completion of the due diligence meeting, a preliminary or final service requirements letter will be issued.
- C. The due diligence meeting shall be held prior to the submittal of plan check.

1.10 REQUESTS FOR INFORMATION

- A. Requests for files research, copying, and data compilation require the applicant to submit a utility request form. Upon receipt of the utility request form, the District will provide the information to the applicant.

1.11 STUDIES

- A. An application shall be submitted to the District for the review of studies such as, but not limited to, hydraulic water analysis, hydraulic sewer analysis, preliminary design reports, reservoir sizing analysis, etc.
- B. The water demand for a development shall be analyzed for average day demand, peak hour demand, max day demand, max day + fire demand and static pressure based on reservoir HGL full and half full.
- C. Once the studies have been reviewed and approved, an approval letter will be issued to the applicant.
- D. Projects with no activity for a period exceeding two years from the date of the last submittal will be terminated and the process will begin from application package stage.

- E. The studies for the project must be approved prior to the applicant submitting improvement plans.

1.12 EASEMENTS

- A. The applicant shall convey to the District easement and irrevocable offer of dedication documents covering property in which potable water, recycled water and/or sewer facilities are constructed in all instances when the facilities are not located in dedicated streets.
- B. The District requires separate water, recycled water and/or sewer easement documents to be submitted to the District. All easements within a project shall be prepared by the licensed surveyor and delivered to the District for recording with the County Recorder's office. Easements must be shown on the improvements plans along with their recordation number. Easements indicated only on Tract or Parcel maps are not acceptable. The following procedure shall be followed in order to process easements:
 - C. Prepare and submit the originals of the following documents prior to District approval of the easement:
 - 1. Original Grant of Easement form signed by all legal property owners. The document must have original signatures and be notarized by a California licensed notary. The District template Grant of Easement language shall be used without any deviations or exceptions.
 - 2. Original Plat of the easement with a wet stamp and original signature from a California licensed Land Surveyor or licensed Civil Engineer who obtained a California license prior to January 1982.
 - 3. Original legal description of the easement with a wet stamp and original signature from a California licensed Land Surveyor or licensed Civil Engineer who obtained a California license prior to January 1982.
 - 4. Copies of all pertinent record information (maps, lot line adjustments, etc.) relating to the creation of the easement, either by reference in the legal description or which plat is based upon.
 - 5. Copy of the property Grant Deed and Title Report.
 - 6. Deposit per EVMWD Administrative Code §2600.
 - D. All District easements shall be accessible at all times. Utility easements through private property shall be separated from the property by a permanent fence and gate connected to a public street. Easements shall be paved. Gate locks will be maintained by the District.
 - E. The easement shall be reviewed and found to be recordable prior to approval of the improvement plans.

- F. A digital copy of the recorded easement will be provided to the applicant once it has been recorded by the District.
- G. Refer to EVMWD Administrative Code §3903.D.

1.13 TERMINATION OF EASEMENT (QUITCLAIM)

- A. The District reserves the right to terminate an easement if the easement is no longer required for the construction, maintenance or access to a public utility facility at the District discretion. The termination of easement shall be formally requested by the applicant in writing. All termination of easements shall be prepared by the licensed surveyor and delivered to the District for recording with the County Recorder's office.
- B. The applicant shall submit the following documents prior to District approval of the Termination of Easement:
 - 1. Copy of the recorded easement that will be terminated.
 - 2. Original Plat of the termination of easement with a wet stamp and original signature from a California licensed Land Surveyor or licensed Civil Engineer who obtained a California license prior to January 1982.
 - 3. Original legal description of the termination of easement with a wet stamp and original signature from a California licensed Land Surveyor or licensed Civil Engineer who obtained a California license prior to January 1982.
 - 4. Copies of all pertinent record information (maps, lot line adjustments, etc.) relating to the creation of the easement, either by reference in the legal description or which plat is based upon.
 - 5. Copy of the property Grant Deed and Title Report.
 - 6. Deposit per EVMWD Administrative Code §2600.
- C. A digital copy of the recorded termination of easement will be provided to the applicant once it has been recorded by the District.

1.14 WATER RIGHTS GRANT DEED

- A. As a condition of service, all residential, commercial, institutional, industrial, residential/commercial landscape irrigation, and commercial agricultural applicants for potable and recycled water shall execute a notarized Grant Deed conveying to the District all rights to water, including surface and groundwater rights over, upon and under the Property and which are appurtenant thereto or are otherwise associated with the property. An individual property owner developing one single-family residence will be exempt from the requirement of conveying the property water rights. All Water Rights Grant Deeds shall be prepared by the licensed surveyor and delivered to the District for recording with the County Recorder's office.

- B. Prepare and submit the originals of the following documents prior to District approval of the water rights grant deed.
 - 1. Original Water Rights Grant Deed form signed by all legal property owners. The document must have original signatures and be notarized by a California licensed notary. The District template Water Rights Grant Deed language shall be used without any deviations or exceptions.
 - 2. Original Plat of the Water Rights Grant Deed with a wet stamp and original signature from a California licensed Land Surveyor or licensed Civil Engineer who obtained a California license prior to January 1982.
 - 3. Original legal description of the Water Rights Grant Deed with a wet stamp and original signature from a California licensed Land Surveyor or licensed Civil Engineer who obtained a California license prior to January 1982.
 - 4. Copies of all pertinent record information (maps, lot line adjustments, etc.) relating to the creation of the easement, either by reference in the legal description or which plat is based upon.
 - 5. Copy of the property Grant Deed and Title Report.
 - 6. Deposit per EVMWD Administrative Code §2600.
- C. The Water Rights Grant Deed shall be reviewed and found to be recordable prior to approval of the improvement plans.
- D. A digital copy of the recorded Water Rights Grant Deed will be provided to the applicant once it has been recorded by the District.
- E. Refer to EVMWD Administrative Code §3903.E.

1.15 PROPERTY GRANT DEED

- A. The property for all District lift stations, pump stations, reservoirs and treatment plans shall be deeded to the District. All Grant Deed shall be prepared by the licensed surveyor and delivered to the District for recording with the County Recorder's office.
- B. Prepare and submit the originals of the following documents prior to District approval of the grant deed.
 - 1. Original Grant Deed signed by all legal property owners. The document must have original signatures and be notarized by a California licensed notary.
 - 2. Original Plat of the Grant Deed with a wet stamp and original signature from a California licensed Land Surveyor or licensed Civil Engineer who obtained a California license prior to January 1982.
 - 3. Original legal description of the Grant Deed with a wet stamp and original signature from a California licensed Land Surveyor or licensed Civil Engineer who obtained a California license prior to January 1982.

4. Copies of all pertinent record information (maps, lot line adjustments, etc.) relating to the creation of the easement, either by reference in the legal description or which plat is based upon.
 5. Copy of the current property Grant Deed and Title Report.
 6. Deposit per EVMWD Administrative Code §2600.
- C. The Grant Deed shall be reviewed and found to be recordable prior to approval of the improvement plans.
- D. A digital copy of the recorded Grant Deed will be provided to the applicant once it has been recorded by the District.

1.16 PLAN REVIEW (PLAN CHECK)

A. Plan Check Application

1. Review of the Plans will commence by the District as soon as a complete Plan Check Application is accepted as soon as possible following receipt of all the items noted below. Incomplete submittals will be returned or will not be reviewed until all items are received.
 - a. Signed District Plan Check Application including all required documents outlined therein.
 - b. One digital copy of the facility design drawings shall be submitted to the District for plan review. The drawings shall be accompanied by a complete description of all materials, structures, and mechanical equipment to be used on the project.
 - c. One digital copy of street improvement plans. An approved set of street improvement plans is required prior to District approval of water and/or sewer improvement plans.
 - d. One digital copy of storm drain or drainage improvement plans. An approved set of storm drain or drainage improvement plans is required prior to District approval of the water and/or sewer improvement plans.
 - e. One digital copy of grading plans.
 - f. One digital copy of irrigation plans that show the locations of the irrigation meters.
 - g. One digital copy of the tentative tract or parcel map indicating phasing schedule, if project is part of a larger, phased project.
 - h. One digital copy of the final tract or parcel map.
 - i. One digital copy of the Conditions of Approval.
 - j. One digital copy of Grant Deed for the property and Title Report.

- k. One digital copy of the hydraulic study and design calculations for sizing of the water and sewer improvements.
- l. Letter of Fire Flow Requirements from City or Riverside County Fire Departments. The requirements may be included in the Conditions of Approval.
- m. Deposit per EVMWD Administrative Code §2600.
- n. Private Engineer's cost estimate for all public Facilities utilizing the standard unit costs provided by the District. Cost items not identified on the District's form shall be estimated by the Private Engineer.
- o. When using restrained joints, calculations for length of restrained joint piping including all assumptions used. The calculations shall be stamped by a licensed engineer in the State of California.

B. Plan Review (Corrections)

- 1. The review of the proposed plans shall proceed as follows:
 - a. After all items are submitted the initial plan review will be performed and redline comments returned to the Private Engineer for use in revising the plans.
 - b. The plans shall be revised, and a set returned to the District or their representative for additional plan review along with the last set of marked-up plans with a response to the comments. Any other information requested by the plan reviewer shall also be submitted. Failure to return the marked-up plans may be cause for starting the entire plan review process over.
 - c. The process shall be repeated until all corrections or modifications to the plans are complete.
 - d. During the plan review process if any of the other project reference information such as the street, storm drain or grading plans, or final maps are revised, updated copies of these shall be submitted to the District or their representative.
 - e. Once the plans have been reviewed and there are no further comments, the plan checker will request the Private Engineer to obtain signatures required by any agency other than the District. Once those signatures have been obtained, the digital copy of the plans shall be returned to the District.
 - f. The District shall review the files to assure that all outside signatures have been obtained, all easement documents and all other necessary data and payments have been submitted. The District shall then sign the plans digitally for approval.
 - g. Once the plans are approved, an approval letter will be issued to the applicant with a digital copy of the signed plans.

2. All proposed work prepared by a Private Engineer shall be submitted to the District for review on sheets which conform to the requirements of this section. All work shall be shown in a clear, neat, and orderly manner as necessary to describe the proposed project. All sheets shall be signed, sealed, and dated by the Private Engineer responsible for the designs.
3. The overall size of each sheet shall be 24 inches high by 36-inches wide. Each sheet shall have a 2-inch-wide margin on the left-hand border and ½-inch wide margins on the top, bottom, and right-hand borders.
4. Digital files with the District's standard title block, border and General Notes are available on the District's website.
5. The revision box shall include the number of the revision, date made, description of change and space for the initials of both the person making the change and for District approval. Revisions shall be marked with small triangles containing the number of the revision and placed near the location of such change.
6. All letters and notes shall be block (upper-case) lettering. All lettering shall be clear and sharp and shall be performed in a uniform manner for an orderly, easy-to-read presentation. The size of normal notes shall be approximately 0.1-inch high, vertical or slightly slanted. Subtitles, street names, easements, etc. shall be lettered approximately 3/16-inch high. Main titles shall be a minimum ¼-inch high.
7. The presentation format of the plans shall be structured to achieve the goal of the production of clear, concise, and easy-to-read plans. This will entail a proper organization of the construction notes, details and other information presented on the plans. In addition, an appropriate differentiation of line types and line weights for the various items of information shown on the plan is required to assist with achieving the aforementioned goal.
8. Each set of plans shall contain a legend and list of abbreviations within the general sheets for use in defining the symbols and abbreviations used on the sheets. Any abbreviation shown on the general sheets of the plan set do not need to be redefined within the plans.
9. A lateral and service table is required for each project. The tables must be placed on a separate sheet and not on a plan and profile sheet. For water services include a column for lot number, design station, as-built station, pressure regulator, HGL, static pressure and length of service. For sewer laterals provide lot number, design station, as-built station, length of lateral, invert elevation at property line and a column to indicate the use of a backflow valve.

B. Cover Sheet. The first sheet of each set of drawings shall be the cover sheet, which shall contain the following information:

1. The title of the project in large lettering shall appear on the general District title block referenced in paragraph A.4 above the words "ELSINORE VALLEY MUNICIPAL WATER DISTRICT" shall appear above the title, centered, near the top of the sheet.
2. The name and registration number of the Private Engineer responsible for the preparation of the Plans, as well as the name of the firm for which the Private Engineer is employed.
3. A vicinity map at a scale of 1 inch = 2,000 feet showing township, range and section and labeling the boundary of the project in relation to major streets, district boundaries, adjacent developments and other pertinent features and also showing streets within the project and major water and sewer locations. The location map shall have a north arrow oriented towards the top of the sheet.
4. A location map at a scale of 1 inch = 200 feet (minimum) to show the entire project without match lines. The location map shall contain lot boundaries, street right-of-way lines and names, a general layout of the sewer and/or water lines, location of manholes, main line valves, fire hydrants, blow-offs, air and vacuum valves and other major appurtenances, and other features, natural or artificial, necessary for a general understanding of the project. The boundaries of all water or recycled water pressure zones should be delineated. The location map shall have a north arrow oriented towards the top of the sheet. State plane coordinates for all street intersections and at project boundary corners and centerline of streets and project boundaries shall be shown in table format adjacent to the location.
5. Concrete manholes shall be numbered in numerical sequence from the downstream end of the sewer line and increase upstream.
6. A written description of benchmarks, including locations and elevations.
7. Approval blocks for City or County Road Departments, County or Special District Fire Departments, County Public Health Department and any other special Districts or Associations.
8. Quantities of units to be installed and the District Standard Drawing No. (i.e. 8-inch sewer pipeline per Standard Drawing No. S-1).
9. The District is not responsible for the accuracy of the location of underground lines and the following note is required on the Title page of each plan: "Approval of this plan by the Elsinore Valley Municipal Water District does not constitute a representation as to the accuracy of the location of, or the existence of, any underground utility, pipe, or structure within the limits of this project." The District accepts no responsibility for any reimbursement due to additional facilities or time delays as a result of these additional facilities.
10. Any other general notes required by the Private Engineer that may apply to all of the project sheets shall be listed under the heading of General

Construction Notes. Any general notes included by the Private Engineer shall not be added to the District's General Notes.

11. Fire certification for Private Engineer to sign that certifies the design of the water system, as shown on the plans, is in accordance with the fire department that has jurisdiction in that area.
12. A signature block for the District Engineer and various Departments (Water, Sewer and Engineering) shall appear only on the cover sheet.
13. A separate index map to all remaining drawings shall be provided on the sheet following the cover sheet. This sheet may also contain hydrant details requested by the Fire Department and basis of bearing information.
14. The pressure zone(s) shall be indicated in the space provided on the title block on this and all sheets with water or recycled water facilities.

C. Plan Drawings. The following items are required to be shown on the plan view of all Plan sets:

1. All existing utilities shown on the plans shall be potholed for verification of utility alignment and elevation. A pothole table shall be included on the plans indicating the pothole number, utility type, size, material, depth from finish surface and elevation.
2. Minimum scale of 1"=40' must be shown clearly on the plan sheet for pipelines. Use of a different scale requires prior written District approval.
3. The interrelationship of the sewer and/or water and recycled water facilities with street centerlines, lot lines, curb grades, storm drains, driveways, and other utilities both proposed and existing that cross or parallel the sewer and/or water facilities shall be indicated. Elevations for top of pipe and bottom of pipe shall be indicated as required by the Riverside County Department of Environmental Health.
4. All existing utilities must have a callout including the plan reference number (or project name if number is not available) from the utility and the name of the utility owner.
5. Stationing of all water, recycled water and sewer mainlines, valves, manholes, appurtenances, bends, branch line tees, beginning and ending of curves or deflections shall be in relation to the street or easement centerline and shall be labeled on the plans.
6. All manhole numbers, mentioned in paragraph B5, of this section shall be shown on the plan drawings.
7. Easements must be clearly indicated on the plans and called out for width, alignment, type and ownership. Easements proposed to the District must be called out on the plans as follows:

X-foot wide utility easement dedicated to EVMWD

Per Instrument No. _____

Dated _____

8. The plans shall show the alignment with bearings and distances and width of all easements for facilities not within public rights-of-way.
9. The plans shall clearly show all fences, walls, trees, etc. that are within easements.
10. The plan shall include a north arrow oriented generally to the top of the sheet.
11. Stationing on sewers shall generally increase from downstream to upstream and from left to right except where necessary to keep north arrow up, then stationing may proceed from right to left. Stationing on water lines shall increase from left to right.
12. The title shall be shown beneath the plan and shall include the scale of the plan.
13. Match lines shall be used where proposed utilities cannot be shown as a continuous line. Match lines must indicate the stationing of the line and the sheet location of the matching portion of plan whether it is on the same or different sheet. Match lines shall occur at even stations or half stations.
14. All existing monuments in existing streets shall be shown.
15. Curvilinear pipeline data shall be shown in table format including the delta angle of the curve, radius, length and tangent. Curve data shall be indicated only for the portions of the curve shown on a specified sheet. When branch lines occur within a curve, curve data shall be shown to the center of the branch tee. Radial bearings shall be indicated for beginning and ending of non-tangent curves. A “comments” column shall be provided on the right-hand side of the data table. Typically, the size and pipe material of the pipe shall be shown in the “comments” column.
16. Label all BC, EC, PCC and PRC locations for proposed pipeline improvements.
17. Provide all dimensions for street widths and dimensions from centerline to all proposed and existing utilities.
18. The size of pipe, pressure rating, and direction of flow; material and lengths shall be shown between all structures in the plan.
19. Show all lot numbers and pad elevations. Driveway locations can appear as screened or grayscale.
20. All construction notes applicable to a specific sheet shall be shown on that sheet. Where applicable, construction notes shall include identification of end connections for fittings and valves, etc.
21. Appurtenances shall be located and indicated on the plans in accordance with District Standards.
22. Special details shall be prepared in accordance with the General Conditions. All special details shall be appropriately referenced on the plan drawings.
23. Labels for manholes shall include the manhole number, station and construction note for type of manhole.

24. Plan sheets that have multiple pressure zones within a single street shall clearly indicate which pipelines are in each specific zone.
25. Topographic background and contour lines are not to be shown on the plan view for pipelines within new tracts when grading, storm drain and street improvement plans are being submitted along with the water and sewer plans. However, for pipelines within existing streets, topographic background and contour lines typically are required to assist with defining the project. In these cases, the existing information should be screened or plotted at a gray scale so as not to interfere with the definition of the proposed improvements.

D. Profile Drawings

1. Profile drawings shall normally be shown on the same sheet and directly above the corresponding plan view so that manholes, valves, fire hydrants, air and vacuum valves and other appurtenances in both the plan and profile view are vertically aligned as nearly as possible. Profile drawings shall be drawn at the same horizontal scale as the plan view. The vertical scale normally shall be 1"=4'. The vertical elevations shall be written on both the left and right sides of the profile.
2. Profile drawings shall show and label the following information, as applicable:
 - a. Profile (at centerline of street or easement) of existing and proposed ground surface.
 - b. Size (diameter), slope (to 4 significant figures), pressure rating, length and material of pipeline. Pipeline slope shall be indicated as negative, where applicable.
 - c. All deflection angles labeled as Grade Break (G.B.). The angle shall be shown in degrees and decimal portions thereof to two places following the decimal point.
 - d. The station and invert elevation of horizontal bends, BC, EC, PCC or PRC.
 - e. Survey stationing of street centerline between centerline of manholes or valves and actual distance between centerline of valves or outside of manhole to outside of manhole.
 - f. Pipeline elevations to the nearest 0.01 foot of invert for sewer and water. The invert of the pipeline shall be shown in profile and labeled as "invert elevation".
 - g. Any existing or proposed pipeline, utility, or similar structure, 1½ inches or more in diameter, that crosses the waterline or parallels the line within 5 feet or any existing or proposed overhead power lines crossing the alignment. Portions of existing utilities may be required to be shown depending on their potential construction impact on the proposed improvement. Storm drains within the same street,

existing or proposed, shall be shown in the profile when in parallel alignment of the water and the sewer unless such storm drain pipes are at least two feet below both the water and the sewer, whichever is deeper.

- h. Where water, recycled water, and sewer lines cross or where they cross other facilities such as drainage structures, the profile shall show elevations of top and bottom of the lines at the crossings.
 - i. The location and limits (include station) of other features such as a steel casing, concrete encasement, extra strength pipe, transition of pipe materials, restrained joint sections, special pipe bedding, etc.
 - j. Rim elevation of manholes or other structures.
 - k. Depth of manhole from rim to flow line of lowest pipe invert.
 - l. The stationing of manholes and the manhole number.
 - m. Elevations at the inlet and outlet of the manholes.
 - n. Private sewer laterals must be shown in profile where they cross other utilities (potable water, recycled water or storm drain) where it appears a potential conflict exists and when the distance between the bottom of the water and the top of the sewer line is two feet or less (when these facilities are in parallel alignments).
 - o. The size, grade, and lengths of pipe shall be shown between structures in the profile.
 - p. Sewer laterals shall be shown in the profile where crossings of the water main occur and separation between top of sewer and bottom of water is less than 2 feet or as required by the District.
 - q. Typical minimum depths of cover for water lines, at least once in each profile.
 - r. Fire hydrants, line valves, air release valves and blow-off locations.
 - s. Copies of street improvement plans with superimposed water and sewer will not be acceptable.
3. Profile drawings shall be discontinued at match lines with survey stationing and cross- referencing corresponding to the match lines shown on the plan drawing.

E. Standard Details

- 1. Where the Private Engineer intends to use any of the Standard Details without modification, these details need not be reproduced on the Plans provided that specific reference is made to each detail. For example, a manhole detail would not be required provided that a note similar to "all manholes shall conform to Figure S-5 of the Standard Details of the Elsinore Valley Municipal Water District" was included on the drawings. Where the Private Engineer intends to modify any of the Standard Details, these revised details shall be included in the Plans in their entirety for District approval.

F. Special Details

1. Special details are required for any tie-in to an existing waterline, recycled waterline or sewer line or as required by the District. Such details must include all pipe and fitting materials, couplings, fittings and adapters necessary to construct the tie-in. Other special details may be requested by the District where deemed appropriate to further define the improvements to be constructed.
2. Modifications to the standard details contained in Standard Drawings may be made only with District approval.

G. Advertising

1. Plans shall be free of advertising, insignia, labels, emblems, seals, or other markings not relevant to the work. When approved and accepted by the District, such plans shall become the property of the Elsinore Valley Municipal Water District.

1.18 PRE-CONSTRUCTION

A. Inspection Application

1. The applicant will submit the inspection application to the District's Engineering Department. The inspection application must include the following:
 - a. Copy of the approved improvement plans.
 - b. Copy of the signed Work Order Request form/Responsible Party form. The Developer must be the responsible party.
 - c. Copy of the signed itemized Contractor's Bid or Contract.
 - d. Copy of the Contractor's Class "A" License, or approved C-34, or C-42.
 - e. Copy of Emergency Contact Information form. A minimum of two (2) references is required.
 - f. Copy of City, County, State, or any other governing agency/municipality's encroachment permits.
 - g. Permit for Recycled Water Service (Appendix D) if applicable.
 - h. Copy of Worker's Compensation Insurance and Liability Insurance in compliance with District Insurance Requirements. Date of all certifications shall cover duration of project. If expiration occurs during project, Developer/Contractor is required to provide updated certifications 30 days in advance to avoid any interruption in inspection or service.
 - i. Material submittal checklist, material submittal cover sheet and material submittals/shop drawings. A separate form shall be submitted for each submittal number.
 - j. Copy of the construction schedule.

B. Other Permits

1. The applicant, or their authorized representative, shall obtain the necessary permits or approvals relative to the construction work. These permits include, but are not limited to, encroachment permits (State, City or County), excavation permits and NPDES permits (including preparation of a storm water pollution prevention plan). It shall be the responsibility of the Applicant or his authorized representative to identify and obtain all the permits required for the construction work to proceed. A request for a construction permit application shall be made, and upon receipt, shall be completed and submitted to the District. This application includes the estimated inspection fee which must be made part of the application and must accompany the application when it is submitted to the District.

C. Shop Drawing Submittal

1. The shop drawings information submitted shall be of sufficient detail to determine manufacturer, model no. or type, materials used in manufacture, and size of specific item in order to assure compliance with the approved materials list. Construction, except potholing, and pre-construction meeting will not be allowed to commence until shop drawings have been submitted, reviewed, and returned to the Contractor. The District's material submittal form and checklist must be used for all shop drawing submittals.

D. Pre-Construction Meeting

1. Once the inspection application and material submittals are approved, a pre-construction meeting shall be scheduled. The District, Contractor, Owner, and the Private Engineer shall be present at the meeting, or the meeting will be rescheduled.
2. Public Notice of Starting Construction Work
3. The Applicant or their Contractor shall provide and distribute to all occupants along the streets of the proposed work, printed notices 8-1/2 inches x 11 inches in size, with at least two (2) working days advance notice prior to commencing work. Notices shall be two-sided to accommodate the printing of both English and Spanish language notices on a single sheet of paper.

1.19 CONSTRUCTION

A. Notification for Inspection Services

1. The District shall be notified a minimum of five (5) working days prior to the commencement of construction and a digital pdf file of the water and sewer cut sheets shall be submitted to the District.

B. Inspection

1. The District will provide inspection for all work which is to be dedicated to the District upon completion. All materials and work shall be performed

only in the presence of the District's authorized representative and any work done in the absence of said District's authorized representative shall be subject to rejection. The Contractor shall notify the District two working days in advance of any work to be done, in order that inspection services can be provided. No inspection shall be available on weekends, holidays or before 7:30 a.m. or after 4:30 p.m. unless approved in advance by the District and paid for in advance by the Applicant. All inspection work outside these hours is susceptible to overtime billing.

C. Final Inspection

1. When all construction work has been completed, the Applicant shall notify the District that the work is ready for final inspection. A District representative shall there upon inspect the finished work and either approve it or reject it pending fulfillment of unsatisfied requirements. The

D. Record Drawings

1. Upon completion of the project the District shall be given a complete set of full-size redline as-builts that shall show, in complete detail, all elements of the project, as constructed. The District will review and provide comments to the redlines. Once the redlines have been approved by the District, the project engineer will make corrections as marked on the redline inspector's copy to the approved design plans and remove any revision clouds, deltas, and/or sheet number revisions (1A, 2B, etc.). Any facilities NOT built per plan must be removed or clearly identified as future improvements and not a part of plans. The words "Record Drawings" shall be boldly noted on each sheet in ½ inch high bold block letters on the lower right-hand corner of all sheets. The Record Drawings shall be printed in mylar. The Record Drawings will be reviewed and must be signed off by the Inspector. Record Drawings shall be submitted to the District within 5 days of completion of construction. In the event Record Drawings are not received timely, the District may elect to withhold setting water meters or approving occupancy.

E. Notice of Completion

1. Once all the improvements as shown in the plans have been constructed, tested, connected and the record drawing have been accepted by the District, the Notice of Completion shall be signed by the contractor. The District will record the Notice of Completion with the County's clerk office and provide a copy of the recorded document to the applicant.

F. Grant Deed of Facilities (Acceptance of Facilities)

1. Upon satisfaction of all the foregoing requirements, including performance of the terms and conditions of the agreement with the District, the District will accept the Irrevocable Offer of Dedication and will thereafter own, operate, and maintain the facilities. The Grant Deed of facilities shall be signed by the Developer with notary acknowledgement and submitted to the District. The

District will record the Grant Deed of facilities with the County's clerk office and provide a copy of the recorded document to the applicant.

G. Warranty Period

1. The constructed infrastructure shall be warrantied for a period of one year unless otherwise noted on the approved specifications of the project. The warranty period begins on the date the work was completed as noted in the Notice of Completion. The Developer, Contractor, and District Inspector shall attend a warranty inspection towards the termination of the warranty period. A letter will be provided by the District indicating any warranty repairs that are necessary. The repairs shall be conducted within a reasonable timeframe after the letter is issued by the District.

H. Close Out

1. Upon satisfaction of all the foregoing requirements, the District will close-out the project and refund any remaining deposit funds for the project to the Developer.

I. Meter Connection

1. Prior to meter release, the following shall be satisfied:
 - a. The public water and/or sewer facilities as shown on the approved improvement plans shall be constructed, tested, and connected to the public system.
 - b. The Notice of Completion shall be recorded.
 - c. The Grant Deed of Facilities shall be recorded.
 - d. The Record Drawings shall be accepted.
 - e. The meter release inspection shall be completed, and the water service and meter box shall be installed per standard.
 - f. The capacity fees shall be paid for the lots requiring meters.
 - g. All outstanding deposit fees shall be paid.
 - h. The lots shall be fine graded.
 - i. The sidewalks and driveways shall be placed.
2. For new developments, the Developer/Owner is responsible that at the time of the meter release request, the water service, meter box and fittings comply with District standards and all material is a good working condition.

J. Sewer Connection

1. Prior to sewer connection, the following shall be satisfied:

- a. The public water and/or sewer facilities as shown on the approved improvement plans shall be constructed, tested, and connected to the public system.
- b. The Notice of Completion shall be recorded.
- c. The Grant Deed of facilities shall be recorded.
- d. The Record Drawings shall be accepted.
- e. The meter release inspection shall be completed, and the water service and meter box shall be installed per standard.
- f. The capacity fees shall be paid for the lots requiring meters.
- g. All outstanding deposit fees shall be paid.
- h. The lots shall be fine graded.
- i. The sidewalks and driveways shall be placed.
- j. The dry utilities shall be installed.
- k. The streets shall be paved,
 - l. The sewer manholes shall be at street grade.
 - m. The building slabs slab shall be placed.
- 2. For new developments, the Developer/Owner is responsible that at the time of the sewer connection, the sewer lateral complies with District standards and all material is a good working condition.

1.20 COMPLIANCE WITH LAWS AND REGULATIONS

A. Compliance

- 1. The Applicant and the Contractor shall keep themselves informed of all laws, ordinances, and regulations in any manner affecting those employed on the work, or materials used in the work, or in any way affecting the conduct of the work, and of all orders and decrees of agencies having any jurisdiction or authority over the same. They shall at all times observe and comply with, and shall require all their agents, employees, contractors, and subcontractors to observe and comply with all such applicable laws, ordinances, regulations, orders, and decrees in effect or which may become effective before completion of the work.

B. Taxes, Permits and Licenses

- 1. Unless otherwise explicitly provided in the Specifications, all permits and licenses necessary from the City, County, State or Federal regulatory agencies for prosecution of the work shall be secured by the Applicant or their Contractor at no expense to the District, and he shall pay all taxes assessed against their equipment or property used in connection with the work.

1.21 CONTRACTOR'S RESPONSIBILITY

A. Excavation Permit

1. Before any work is commenced, the Contractor shall secure and pay for an excavation permit, if such is required by the California Division of Occupational Health and Safety, and shall furnish the District with a copy thereof or a copy of the exemption letter prior to commencing any excavation.
2. Shoring plans shall be prepared by a California licensed professional engineer for all trench excavations 15-feet or deeper or as required by the District.
3. Shoring plans shall be prepared by a California licensed professional engineer for unstable soil conditions such as parallel cracking, changes in soil moisture conditions, spalling or bulging of the trench wall.
4. The trench wall shall be a minimum of 3-feet from an existing public pipeline. For existing public pipelines parallel to a trench, if the public pipeline is exposed or the trench opening is within 3-feet of the mainline, the existing pipeline shall be shutoff and replaced due to potential current or future failure of the pipeline. A temporary bypass may be required to provide continuous service to customers. For existing public pipelines crossing a trench, the pipelines shall be supported 5-10-feet and a California licensed professional engineer shall prepare a design to support the exposed pipe.

B. Insurance

1. Worker's Compensation Insurance. The contractor shall provide a certificate(s) of insurance certifying that they have obtained for the period of the contract full Worker's Compensation Insurance coverage, as well as the entire Worker's Compensation policy and current endorsement for all persons whom they employ or may employ in carrying out the work under the contract. This insurance shall be in strict accordance with the requirements of the most current laws.
2. Liability Insurance. The contractor shall provide a certificate(s) of insurance showing that they have Liability Insurance coverage with limits not less than those established by the District.
3. The Liability Insurance coverage shall include each of the following types of insurance:
 - a. General Liability
 - (1) Comprehensive Form
 - (2) Premises – Operations
 - (3) Explosion and Collapse Hazard
 - (4) Underground Hazard

- (5) Products/Completed Operations Hazard
 - (6) Contractual Insurance
 - (7) Broad Form Property Damage Including Completed Operations
 - (8) Independent Contractors
 - (9) Personal Injury
 - b. Automobile Liability
 - (1) Comprehensive Form Including Loading & Unloading
 - (2) Owned
 - (3) Hired
 - (4) Non-Owned
 - c. The Liability Insurance Shall Include as Additional Insured:
 - (1) Elsinore Valley Municipal Water District in the amount as specified in the Inspection Application.
 - 4. The contractor will be required to furnish the District proof of full compliance with all insurance requirements as specified above.
- C. Protection of the Work
- 1. The Contractor shall take all necessary measures to protect the work and prevent accidents during the construction. The Contractor shall provide and maintain sufficient night lights, barricades, guards, temporary sidewalks, temporary bridges, danger signals, watchmen, and necessary appliances and safeguards to properly safeguard life and property. The Contractor shall also protect all excavations, equipment, and materials with barricades and warning signs and signals so that the public will not be endangered. The Contractor's construction price to be paid by the Applicant/Owner shall include all costs for safety and protection of the public and their employees.
- D. Traffic
- 1. The Contractor shall so conduct their operations as to offer the least possible obstruction and inconvenience to traffic and the public and shall have under construction no greater amount of work than the Contractor can handle properly with due regard for the safety of the public. All traffic shall be permitted to pass through the work with as little delay and inconvenience as possible, unless otherwise authorized by the governing agency. When the governing agency does not have a traffic manual, the WATCH manual shall be used. No road or street closures shall be permitted without the approval of the Local Agency, Caltrans, or other governing agency.
- E. Convenience of Abutting Owners
- 1. Convenience of abutting owners shall be provided for as far as practicable. Convenient access to mailboxes, driveways, houses, and buildings adjoining the work, as well as fire hydrants and valves, shall be maintained

and temporary approaches to intersections shall be provided and kept in good condition. When a section of surfacing pavement or a structure has been completed, it shall be opened for use by traffic at the request of the District. In order that unnecessary delay to the traveling public may be avoided, the Contractor, when so ordered, shall provide trained, competent flagmen whose sole duty shall consist of directing traffic either through or around the work. The Contractor shall notify all emergency and community services in advance (48 hours) of construction or detours on public streets. These shall include but are not limited to: ambulance, fire, sheriff, mail, school districts, bus services, and the newspaper. A traffic control plan shall be submitted to, and approved by, the governing authority as required.

1.22 MATERIALS AND WORKMANSHIP

- A. New Materials. Unless otherwise specified, all materials incorporated in the permanent work shall be new. Materials not otherwise designed by detailed specification shall be of the best commercial quality and suitable for the purpose intended.
- B. Workmanship. All workmanship shall be in conformance with the best trade practices. Particular attention shall be given to the appearance of exposed work. Any work or workmanship not conforming to the best practices shall be subject to rejection.

1.23 PROJECT CLEANUP

- A. The Contractor shall at all times maintain an orderly job. Tools, rubbish, and materials shall be picked up and stored in a workmanship manner or disposed of at all times. The Contractor shall remove from the vicinity of the completed work all material, etc., belonging to them or used under their direction during construction. Surfaces shall be returned to a condition acceptable to the District. All excess material shall be disposed of as directed by the District or removed from the job site.

1.24 DEFECTIVE WORK

- A. The inspection of the work shall not relieve the Developer or Contractor of any of their obligations to fulfill the Districts requirements. Defective work shall be made good, and unsuitable materials may be rejected, notwithstanding that such work and materials may have been previously inspected by the District and accepted. If the work, or any part thereof, shall be found defective at any time the Developer or his Contractor shall correct such defect in a manner satisfactory to the District. All costs for retesting and re-inspection which are necessitated by defective materials and/or workmanship shall be at the sole expense of the Developer or their Contractor.

1.25 GUARANTEE

- A. Defective Materials or Workmanship
 - 1. The Contractor and Applicant shall guarantee all parts of the work against defective materials or workmanship and against settlement of backfill and

damage to resurfacing for a minimum period of one year from the date of its acceptance by the District. This does not limit any additional guarantees provided by any suppliers, nor does it limit any remedies for defective work including, but not limited to, California Code of Civil Procedure section 337.15.

B. Repair Work

1. When defective material or workmanship is discovered in the work, requiring repairs to be made under this guarantee, all such repair work shall commence by the Contractor or Applicant at their own expense within ten (10) days after written notice has been given by the District and completed in as short a time as necessary. Should the Contractor or Applicant fail to begin repairs as directed within ten (10) days thereafter or vigorously pursue the work, the District may make the necessary repairs and charge the Contractor or Applicant with the actual cost of all labor and materials required plus overhead. In emergencies demanding immediate attention, the District shall have the right to repair the defect or damage and charge the Contractor or Applicant with the actual cost of all labor and material required plus overhead.

C. Performance Bond

1. As directed by the District.

1.26 REFERENCE TO PUBLICATIONS

A. Publications

1. Within these Standards reference is made to other publications. These other publications are made a part of the Standards whether in whole or in part as specified in each reference.

B. Applicable References

1. The publications listed below form part of the standards to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.
 - a. American Society for Testing and Materials (ASTM):
 - (1) A48 Gray Iron Castings
 - (2) A283 Low and Intermediate Tensile Strength Carbon Steel Plates of Structural Quality
 - (3) A569 Steel, Carbon (0.15 Maximum, Percent) Hot-Rolled Sheet and Strip, Commercial Quality
 - (4) A615 Deformed and Plain Billet Steel Bars for Concrete reinforcement
A62 Composition Bronze or Ounce Metal Castings
 - (5) B88 Seamless Copper Water Tube C33 Concrete Aggregates
 - (6) C150 Portland Cement

- (7) C330 Lightweight Aggregates for Structural Concrete American National Standards Institute Inc. (ANSI):
 - (8) A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and (AWWA C104) Gray-Iron Pipe and Fittings for Water
 - (9) A21.6 Gray-Iron Pipe Centrifugally Cast in Metal Molds, for (AWWA C106) Water or Other Liquids
 - (10) A21.8 Cast-Iron Pipe Centrifugally Cast in Sand-Lined Molds, (AWWA C108) for Water or Other Liquids
 - (11) A21.10 Gray-Iron and Ductile-Iron Fittings, 3 inch through 48 (AWWA C110) inch, for Water and Other Liquids
 - (12) A21.11 Rubber Gasket Joints for Ductile-Iron and Gray-Iron (AWWA C111) Pressure Pipe and Fittings
 - (13) A21.51 Ductile-Iron Pipe, centrifugally cast in Metal Molds or Sand-Lined Molds, for Water and Other Liquids (AWWA C151)
- b. American Water Works Association (AWWA), all standards for: Ductile Iron Pipe and Fitting
 - (1) Steel Water Pipe, 6 inches and Larger Valves and Hydrants
 - (2) Pipe Installation Disinfection of Water Mains Meters
 - (3) Services Lines PVC Pipe
 - (4) Water Tanks
 - c. State of California Department of Health Services -"California Waterworks Standards" "The Purple Book"
 - d. Southern California Chapter American Public Works Association and Southern California District Associated General Contractors of California Joint Cooperative Committee - "Standard Specifications for Public Works Construction".

1.27 DEPOSITS

- A. Plan Checking Deposit
 - 1. Deposits shall be made as indicated in the District's Administrative Code.
- B. Inspection Deposit
 - 1. Upon submission of the Inspection Application for construction Facilities, the District shall collect from the applicant the full cost of field inspection for the proposed construction. The deposit shall be paid as indicated in the District's Administrative Code.
 - 2. The construction will not be allowed until the Applicant has paid all fees and obtained all necessary permits from the Local Agency, Caltrans or other applicable government agencies and after the plan set has been approved by the District.

3. For developer sponsored projects, the inspection deposit must be kept current. When the inspection deposit budget is close to expended, the District will send a notification to the developer requesting additional funds. If additional funds are not received timely, inspection services will be suspended. Any underground work completed without proper inspection will be subject to being required to be re-excavated so the installation can be properly inspected.

END OF SECTION

PART 2 - POTABLE WATER, RECYCLED WATER AND SEWER FACILITIES

2.01 GENERAL

- A. These guidelines have been developed to assist consulting engineers and developers of planned unit development type of projects, as well as any type of developments or improvements, which require the design of water or sewer systems with preparing construction plans that are acceptable to the District and will require the least amount of time for plan checking.
- B. All proposed work shown on plans submitted for District review shall be designed according to these standards. In matters of engineering judgment, the District decision will be final.
- C. While these criteria may not readily adapt to a given situation, the Private Engineer's ultimate aim should be directed toward providing:
 - 1. An adequate water system for both domestic and fire flow purposes.
 - 2. A recycled water system capable of delivering an adequate supply and pressure for irrigation purposes.
 - 3. A sewer system to adequately accommodate the waste flows adhering to all of the following planned criteria to the extent practicable.
 - 4. Design water, recycled water, and sewer systems to minimize the requirements of future system maintenance.
- D. All plans showing Facilities shall be subject to review by the District. The Facility design for the development shall meet the requirements of these Standards and as further clarified by these guidelines.
- E. Design data shall be submitted to the District for review.
- F. The District may grant exceptions to the Standards, providing such exceptions will substantially conform to the intent of these Standards. No exceptions will be granted without the express written consent of the District.
- G. All materials incorporated into the design and construction of facilities to be owned and operated by the District shall be in accordance with the District's Approved Material List.
- H. For design criteria for water booster pump stations, water wells and wellhead facilities, sewage lift stations, force mains or reservoirs, refer to the District's Design Standards, Standard Specifications, Standard Drawings, Approved

Materials List and Design Guidelines. For criteria related to siphons, industrial waste treatment facilities, etc., consult the District for general requirements.

- I. Any deviation from the general design requirements as stated in the paragraphs to follow, shall be discussed in a Pre-Design Plan Preparation meeting attended by the developer and their civil engineering consultant and documented as indicated in Section 1.06 of the General Conditions.

2.02 POTABLE WATER REQUIREMENTS

A. General

- 1. The potable water facility sizing, and design parameters are shown in the paragraphs that follow.

B. Water Consumption

- 1. Potable Water: The water duty factor of 500 gpd/du (dwelling unit) shall be used for single family residential and 300 gpd/du for townhomes and condominium units. The following water duty factors shall be used for all other uses and planning purposes.

Potable Water Consumption	Water Duty Factor (gpd/acre)
Business Park	800
General Commercial	2,300
Limited Industrial	700
Open Space - Recreation/Slopes	2,300
Public Institutional	1,300
Hillside Residential	1,400
Very Low Density Residential (.1-.5 du/ac)	700
Low Density Residential (.5-2 du/ac)	1,200
Low Medium Density Residential (2-4	2,000
Medium Density Residential (4-6 du/ac)	2,200
Medium High Density Residential (6-	2,400
High Density Residential (12-24 du/ac)	2,600
Mixed Use (24 du/ac max)	1,700

- 2. To ensure an adequate system, the guidelines for water consumption are subject to review by the District based on variable factors that influence water consumption rates.

C. Capacity

- 1. The capacity of the potable water distribution system shall deliver the maximum daily demand (MDD) simultaneously with the required fire flow (FF) with a minimum of 20 psi pressure at the hydrant where the fire flow is being taken. The potable water distribution system shall also deliver the

peak hour flow (without fire flow) with a minimum pressure of 60 psi throughout the distribution system.

2. The District may require some potable water mains to be oversized to facilitate future growth.

D. Pipeline Sizing

1. Potable Water. Potable water pipelines shall be sized in conformance with Section 2.02.C. The design will be for max hour or maximum day plus fire flow whichever is greater. In determining the carrying capacity of the mains, a "C" value of 120 is to be applied.
2. Sizing of the water mains shall be designed to deliver water in adequate quantities and pressures for domestic use under peak consumption conditions and fire flow in accordance with the Insurance Service Office (ISO) and special requirement of the local fire department. Design calculations shall be performed by a registered engineer and submitted to the District for review. The minimum main size shall be 8-inch for residential and 12-inch for commercial and industrial. The District must approve variations from this standard, but in no case will the variations be allowed that are in conflict with Section 64628 or Title 22 of the California Administrative Code. It is the District's policy that whenever practical all water mains will be looped. Parallel mains may be required by the District to be installed to avoid connecting services to the water mains >12-inch in diameter. No 10-inch or 14-inch diameter pipe shall be used.

E. Demand Factors

1. Potable Water
 - a. Maximum Daily Demand (MDD) = 1.75 X Average Day Demand
 - b. Peak Hour Demand (PHD) = 3.5 X Average Day Demand
 - c. Fire Flow Demands shall be in accordance with the appropriate Fire Department regulations.

F. Maximum Headloss and Velocity

1. Transmission and Distribution headloss and velocity for potable water shall be determined at peak hour demand:

Maximum Headloss	= 15 ft/1000 ft. (Distribution for PHD)
Maximum Headloss	= 3 ft/1000 ft. (Transmission for PHD)
Maximum Velocity	= 4 fps (Distribution, less than 12inch) = 6 fps (Transmission Pipelines 12-inch dia. and greater) = 10 fps (Existing Pipelines under MDD + fire flow conditions)

G. Maximum/Minimum Pressure

1. The maximum pressure in a potable water distribution main or transmission main, where services may be located, shall not exceed 125 psi. For a new development, when analyzed as a whole, if more than 40 EDUs exceed 125 psi, the developer shall be required to install a pressure regulating station that reduces the pressure below 125 psi. If less than 40 EDUs exceed 125 psi, then pressure regulating valves shall be installed at each service where the static pressure exceeds 125 psi to maintain service system pressures below 125 psi. Minimum pressure shall comply with Section 2.02.C.

H. Blow-off Assembly

1. Blow-off assemblies shall be installed at all low points. Blow-off assemblies shall be as shown on the standard drawing except that the size shall be determined in accordance with accepted practice.

I. Air Release and Air Vacuum Valves

1. Air and vacuum valve (AR/AV) assemblies for potable water shall be installed at all high points, and immediately downstream of line valves (on transmission mains) when required for operation and maintenance purposes. AR/AV valve assemblies shall be as shown on the standard drawing and sized in accordance with standard practice. Calculations for sizing of air and vacuum valves shall be submitted for review by the District. As a guideline, a 1-inch AR/AV shall be used on 8-inch mains, a 2-inch AR/AV shall be used on 12-inch mains and 4-inch AR/AV shall be used on 16-inch and larger pipelines.

J. Valve Placement

1. All water systems shall include valves that conform to the following requirements and Section 15 of the Technical Specifications:
2. Spacing
 - a. 1,000 feet for transmission mains 16 inches and larger, or as determined by the District.
 - b. 750 feet in residential zones or in each intersection, whichever is less.
 - c. 500 feet in all other locations or as determined by the District.
3. Location
 - a. All branches or intersections of mainlines in each direction from such branches or intersections shall be valved, unless otherwise approved by the District. Valves shall be flanged.
 - b. Where a new main is connected to an existing main, valves on both the new and the existing mains shall be installed as required above.

- c. Where the District determines that it is impractical to shut down a “live” main to facilitate a connection, a tapping sleeve with a tapping valve may be used upon written authorization by the District.
- d. A valve shall be installed at the end of a water main if it appears that the water main will be extended in the future. The purpose of this requirement is to minimize the number of times live mains are shut down and to prevent the valve from blowing off during the next phase of construction. Restrained joints may also be required.
- e. Wherever valves are to be installed, the invert slope shall not exceed six percent.
- f. Valves shall be located so that there will be minimum clearance of 6 inches between the top of the valve and the bottom of the valve box cover. Where deemed necessary by the District.
- g. Valves located in non-paved areas shall have a paved area surrounding it in accordance with the Standard Drawings.

4. Working Pressure and Type.

- a. All valves shall be "150 pounds" except where the working pressure exceeds 150 psi. For working pressure of over 150 psi, but less than 250 psi, "250 pound" valves shall be used. The class of valve shall be shown on the plans.
- b. Valves 12-inches in diameter and smaller shall be resilient wedge gate valves.
- c. Valves larger than 12-inches in diameter and larger shall be double offset butterfly valves.
- d. All valves larger than 12-inch in diameter shall be either bevel or spur geared.

K. Dead End Mains

- 1. All active dead end potable water mains shall have a fire hydrant extended directly off the end of the main. All dead end mains shall have provisions for flushing the main and fire hydrant. Air and vacuum valve and or blow off assemblies shall also be constructed in accordance with these standards.
- 2. At the end of a street which may be extended in the future, all water facilities shall be extended across the end of the last parcel in the subdivision or lot split or to a point beyond the permanent street paving. Pavement shall end a minimum of ten feet prior to the nearest sewer manhole or water valve.

L. Pipe Material

- 1. The following requirements relate to pipe material selection:
 - a. All water mains shall be Class 235 AWWA C900 Polyvinyl Chloride or ductile iron (DI) Class 350. Water mains 12-inches and

larger in diameter shall be ductile iron. Joints shall be push-on joint, mechanical joint or flanged joint. Potable PVC water pipe shall be blue.

- b. The District reserves the right to specify the type of pipe, joint, or class of pipe to be used.
- c. The class of water main pipe shall be determined by the maximum pressure to be expected in the line including pressures resulting from surges. Class 235 is the minimum pipe class allowed.
- d. The class of pipe and test pressure shall be shown on the plans.
- e. Where water mains are attached to or suspended from a bridge, or other structures subject to vibration, a minimum requirement of Class 250 ductile iron pipe with restrained joints shall be used.
- f. When pressurized pipe is buried, installation of a copper tracer wire shall be specified on the plans.
- g. All DIP pipe, valves and fittings shall be wrapped in a polyethylene sleeve per the Technical Specifications.

M. Waterline Crossings

- 1. Water mains shall be designed at a higher elevation than the top of any proposed sewer, storm drain or recycled water facility, at crossings or facilities constructed parallel to the potable water mains. When water mains must be installed at a lower elevation than sewer, storm drain, or recycled water facilities the Engineer shall provide all required documentation and the District shall apply for a waiver and obtain written approval from the State Water Resources Control Board Division of Drinking Water. Pipe materials and installation methods (including sleeving) approved by the Division of Drinking Water shall be included in the design.

N. Stream Crossings

- 1. Wherever the potable water main crosses under a stream bed or structure constituting a potential hazard to the main, the water main material shall be PVC or DIP and installed within a steel casing per the Standard Drawings. Necessary measures shall also be taken to protect the stream embankment at the points of crossing. Scour depth calculations may be required to verify the minimum required pipe depth. Stream crossings may require special permits from the Riverside County Flood Control District and the California Department of Fish and Wildlife for streambed alterations.

O. Subdivision Lot Crossing

- 1. When a water main is to be located in an easement over a portion of a lot within a planned unit development, it shall be contained within a steel casing. The casing shall fully extend across all portions of the private

property. The horizontal and vertical design of the water main shall be appropriate for installation within a casing.

P. Cathodic Protection

1. Where the water pipe is likely to be subjected to corrosion especially where corrosive soils are encountered or because of other unfavorable conditions, the District may require special pipe installation procedures or types of pipe. Under such circumstances the District may require that all pipe and fittings be given special protective coatings or wrappings. In such cases the details of the materials and methods to be used shall be as specified by the Private Corrosion Engineer and approved by the District. The District may request that soil boring samples and laboratory analysis be provided as part of the project to make sure whether or not unfavorable soil conditions exist. If cathodic protection is required, it shall be designed by the Private Corrosion Engineer and approved by the District.
2. In all instances where flanged dissimilar metal pipes must be isolated, cathodic protection and insulating flange kits shall be installed per Standard Drawings CP-1 through CP-6.

Q. Water Service Connections

1. Services and connections on potable water mains shall be installed for each property in accordance with the Standard Details and Approved Materials List and comply with the following:

R. Location

1. All property to be serviced must front a public right-of-way or water main easement where an operable water main exists unless otherwise approved by the District. Services at the rear of lots or between lots will not be allowed. Water services shall not cross adjacent private property.
2. Services shall not be located within 5-feet of dry utilities and 10-feet of sewer lines leading into the property to be served, where practicable.
3. All services shall be located at right angles to the distribution main. Where such locations will conflict with a hydrant or other obstruction, the location may be specifically offset with written authorization from the District. Such offsets must be shown on the "as-built" plans. Service locations in Cul-de-Sacs will vary from standard requirement and shall be addressed as part of the Plan Review process.
4. Services shall have a minimum cover of 30 inches within the street pavement area.
5. No services shall be high-lined except on a temporary basis during construction.

6. No water meters or services shall be located in driveways or sidewalks or permitted to be paved around the meter box unless otherwise approved by the District

S. Connections

1. Only one meter shall be connected to a single service lateral.
2. Services to serve more than one meter site are permissible only with the authorization from the District.
3. Services shall not be connected to transmission mains greater than 12-inches in diameter unless specifically permitted by the District. When feasible an 8-inch watermain shall be installed parallel to the transmission main for service connections.
4. For undeveloped lots, all services not used by the new development shall be abandoned. For 2-inch diameter or small services, the service shall be abandoned in-place, corporation stops shall be removed, a full circle repair band shall be installed at the main and all above ground or exposed facilities shall be removed. For services greater than 2-inches, the service shall be abandoned in-place, a minimum of 5-linear feet of main shall be removed and replaced, and all above ground or exposed facilities shall be removed.

T. Sizing

1. The size and location of each service shall be indicated on the Construction Plans.
2. Each residential unit requires a 1”-inch service line.
3. Non-residential water services shall be a minimum 2-inch diameter..
4. Service and meter sizing and calculations shall be in accordance with AWWA M22.
5. Where the District determines that conditions of pressure, flow, and demand are unfavorable, an over-sized service may be installed.
6. Where the potential demand is large, a 4-inch or larger service will be required. In all such instances, design calculations used to size the services shall be submitted to the District for review.
7. Calculations shall be submitted for all residential, commercial, industrial and irrigation services.
8. Services over 2-inches in size will be designed on an individual basis in accordance with District Standards.
9. Services and connections shall be installed with appropriate valves, stops, and fittings, as described under Materials and as shown in the Standard Drawings.

U. Number of Meters

1. Single Family Homes shall have one metered connection per lot.
2. Single Family Homes with Assessor Dwelling Units shall have one metered connection per lot.
3. Townhomes and condominium developments shall have a separate meter for each unit.
4. Apartments shall have one meter per building, one meter per common laundry rooms, and one meter for recreational facilities.
5. Commercial business developments shall have one meter per sub-unit.
6. Industrial buildings shall have one meter per building unless they will be subdivided in which case they shall have one meter per sub-unit.
7. Separate irrigation meters will be required for all multi-family, commercial and industrial developments. This will result in a cost savings to the owner who will not have to pay the normal sewer usage fee for irrigation water used as compared to regular potable water service connections.
8. If recycled water is available within 500 feet of a development, the developer shall connect to it for use in landscape irrigation, park irrigation, and/or open space irrigation rather than use potable water for irrigation purposes.

V. Meter Boxes

1. Individual meter boxes shall not be installed in driveways or sidewalks without prior written authorization from the District. All meter boxes shall be furnished by and installed by the Contractor as shown on the Standard Drawings. Meters for normal meter installation (apartment, condominiums, etc.) shall be in accordance with the Standard Drawings.

W. Backflow Prevention

1. Water for irrigation shall be recycled water unless it is not available. In those instances, potable water may be used on an interim basis. All irrigation meters for multi-family, commercial and industrial users require a reduced pressure principal backflow prevention device. Backflow prevention shall be provided for irrigation meters, commercial/industrial meters, and selected residential meters requiring backflow prevention:
2. Unless otherwise directed by the District the location of the approved assemblies shall conform to the following requirements as are applicable:
 - a. When located near pedestrian walkways, driveways, backflow preventers shall be located in a manner to provide complete accessibility, and in such manner that the possibility of damage from vehicles or injury to pedestrians will be minimized.

- b. Backflow preventers shall be located on the discharge side of the service meters.
- c. On side hills, backflow preventers shall be located on the cut side with maximum clearance of 3 feet in each direction. Block walls around the backflow preventer are required to prevent movement of the slope from damaging the installation.
- d. The maximum distance between a service meter and a backflow preventer shall be 12 feet in commercial areas and 14 feet in residential areas.
- e. The minimum clearance between backflow preventers and electrical circuitry equipment shall be 5 feet or as required by the Electrical Code, whichever is greater. Provide a minimum of 3 feet clearance around the backflow preventer and fence, wall, and etc. unless otherwise directed by the District.
- f. The size of the backflow preventer shall be equal to the size of the service meter or one size larger.

X. Fire Hydrants

- 1. Hydrants shall be located in accordance with these Standards. The appropriate location and spacing of the fire hydrants as well as the required fire flows shall be the responsibility of the appropriate fire department. Under special conditions, the District may require higher fire flows. It shall be the responsibility of the Private Engineer to make sure that all fire hydrants are accessible. Hydrants shall generally be located in a manner to provide complete accessibility, and in such manner that the possibility of damage from vehicles or injury to pedestrians will be minimized. Unless otherwise directed by the District or the fire department, the location of hydrants shall conform to the following requirements:
 - a. When located at street intersections, hydrants shall be 7 feet behind BCR or E.C.R. of curb returns. If this location differs from that required by State, County, or City Street Standards, the District requirements will take precedence unless a written request from the agency who has jurisdiction is submitted to the District.
 - b. Hydrants shall be located in front of a boundary line between lots.
 - c. To the extent practicable, hydrants shall not be installed on curves.
 - d. On side hills, hydrants shall be located on the cut side.
 - e. Hydrants shall be placed on the side of the street closest to the main, where possible.
 - f. On streets not improved with standard curbs, hydrants shall be located 2 feet toward centerline from the property line. For private streets with rolled or wedge curbs, hydrants shall be placed a minimum of 2.5 feet behind the curb and centered with the hydrant

valve. Bollards shall be placed per District Standards. The number of bollards and location shall be at the District's discretion.

- g. The minimum clearance between fire hydrants and utility poles, light standards, and signposts shall be 5-feet.
- h. Fire hydrants shall be used instead of blow-offs whenever practical. All active dead end water mains shall have a fire hydrant extended directly off the end of the main.
- i. All fire hydrant shut off valves will be securely fastened directly to an existing distribution main connecting the valve onto a flanged tee.
- j. Blue reflective markers on the adjacent pavement shall be installed as required by the Fire Department and shown on the water and sewer plans.
- k. Direction of the two outlets whenever possible shall be at a 45-degree angle to the road. Any deviation shall be subject to review and authorization by the District. When commercial hydrants are installed the 4-inch outlet shall be perpendicular to the street. Height of the 4-inch outlet above the ground shall be 20 inches minimum to 36 inches maximum.
- l. Fire hydrant spacing shall be per the Local Agency or County of Riverside Fire Department Standard. For transmission mains, the maximum allowable spacing between fire hydrants is 500 feet.
- m. Hydrant check valves may be required at the District discretion.
- n. Hydrants shall be public unless otherwise approved by the Engineer Manager or Fire Marshall.

Y. Horizontal Alignment

- 1. Potable water mains, other than those installed in easements, or rights-of-way, shall be located in the paved street area, preferably 7 feet from the face of the curb, parallel or concentric to the centerline, unless otherwise required to clear obstructions. Location in paved street shall be in accordance with Standard Drawing No. W-1.
- 2. Pipelines shall be required to be extended across the entire frontage of a property along a public roadway or District easement.
- 3. Potable water mains, wherever permitted within easements, shall be located on the centerline of easements. When both facilities are within the same easement, the minimum separation provided between the two pipelines shall be in accordance with the State Water Resource Control Board requirements.

4. The radius of curved alignments shall not be less than those recommended by manufacturer's whose pipe products are AWWA compliant without written authorization from the District.
5. If curved alignments are authorized by the District that have less than the minimum radius as recommended by the pipe manufacturer, high deflection couplings shall be used to construct the curved radius required.
6. When a roadway has not been completely developed, the District may elect to locate the main in the unpaved portion of the roadway.
7. For extra wide streets, the District may require that two parallel, interconnected mains be installed, one on each side of the street. Sizes and other details in such instances shall be as recommended by applicant's hydraulic analysis and authorized by the District.
8. On side hill streets, the main shall, where possible, be located on the cut side of the center line of the street.
9. Where practicable, mains shall be located on the high side of super-elevated curves.
10. The separation of potable water mains from recycled water mains and sewer lines must comply with the State Water Resources Control Board – Division of Drinking Water (DDW) Guideline and as shown on the District's Standard Drawings W-2 and S-3.
11. No gas, recycled water main, sewage main, electric, telephone, or cable television, or other utility line shall be installed in the same trench with water mains or water services.
12. No pipe length shall be less than three feet between fittings with push-on joints.
Maximum deflection for a ductile iron push-on pipe joint or pipe connection to a ductile iron fitting for design purposes shall be limited to 80-percent of the manufacturer's published maximum deflection.
13. Bending of C900 PVC pipe along its axis will be allowed for horizontal alignments only to a maximum of 80-percent of the manufacturer's maximum allowed deflection.
14. When the pipe curve radius is greater than 241 feet, standard length pipe of 18 feet will pull the curve within the allowable joint deflection angle. When the pipe curve radius is less than 241 feet, the Engineer must calculate the required pipe length to be used with the following equation:

Pipe Length = $R \times 2(\text{TAN } \Delta/2)$ Pipe segments shall be no less than 13 feet in length.

15. Sheets that incorporate curves in pipelines shall include a "Curve Data Table".
16. All bends, tees and dead ends shall utilize ductile iron piping, fittings and restrained joint system in lieu of thrust blocks. Restrained joint calculations

shall be furnished with plans for review. Restrained joint calculation shall be in accordance with the DIPRA program (DIPRA.org for download) and the District's Standard Drawings.

17. A 10-foot clearance of trees and large shrubs shall be provided from all public water facilities (pipe, services, hydrants, air/vacs, etc.).

Z. Vertical Alignment

1. Invert grades of potable water mains shall be such as to provide minimum and maximum cover requirements as specified below and also to assure proper clearance between top of valves and valve box covers as provided in the section on Main Valves:
 - a. Minimum cover for all potable water mains smaller than 12 inches in diameter shall be 3.5 feet to top of the pipe, 12-inch and greater shall have 4 feet of cover.
 - b. Maximum cover for all mains shall be 8 feet unless approved by the District.
 - c. No mains or service laterals shall be installed on the surface except when necessary to keep customers in service during construction. Each case must be approved by the District prior to construction.
 - d. Where the main is to cross storm drains, pipelines, telephone, and electric ducts, or similar installations, a minimum of 1 foot of clearance shall be provided between the water main and other installations.
 - e. Maximum deflection for a ductile iron push-on pipe joint or pipe connection to a ductile iron fitting for design purposes shall be limited to 80-percent of the manufacturer's published maximum deflection.
 - f. No bending of C900 PVC pipe in the vertical plane will be allowed. High deflection couplings shall be used on C900 PVC pipe to obtain vertical deflections. A note shall be placed on the plans where PVC pipe is used that states that high deflection couplings shall be used at all vertical grade breaks.
 - g. Potable water mains shall be designed to be at a higher elevation, with appropriate clearances, than storm drain piping. Failure to consider the design criteria while designing the storm drain system may result in redesigning the storm drain system after County/City approval or reinstallation of new storm drain piping.
 - h. All bends, tees and dead ends shall utilize ductile iron piping, fittings and restrained joint systems in lieu of thrust blocks. Restrained joint calculations shall be furnished with plans for review. Restrained joint calculation shall be in accordance with the DIPRA program (DIPRA.org for download.)

AA. Double Detector Check

1. Double detector check valves shall be of a size, type, and class as noted on the plans and as shown on the District's approved Materials List. All working parts shall be high-grade brass or bronze. The valves shall be tapped on both sides to provide installation of a meter. All double detector checks shall be above ground and installed within public right-of-way or an easement granted to the District in accordance with the Standard Drawings.

BB. Hot Taps

1. Hot taps to an existing water line are generally not allowed. Any hot taps installed will be at the request of the District, see paragraph J.2c, Section 2.02 of the Standard Design Requirements. Diameter of the hot tap shall not exceed 75% of the main line diameter. All hot taps shall include a valve for flow control. Hot taps shall be staggered with a minimum spacing 5-ft between the taps. There shall be a minimum of 2-foot clearance from tap and the bell and spigot. Hot taping of AC pipe shall not be allowed.

CC. Easements

1. Easements for water and recycled water mains shall be submitted in accordance with Section 1.18 of the General Conditions and shall be a minimum of 20 feet in width for each facility. When easements are required to lie along a property line between two adjacent parcels or lots, the easement shall be situated entirely upon only one of those parcels or lots. Easements shall be situated in such a manner so that the District has access to these easements from public rights-of-way or other District easements that are accessible by vehicle.
2. Easements shall be written without using an unrecorded map as the basis of the easement. The easement shall be written based on information recorded at the time the legal description is written. Cross references to such an unrecorded map can be made; example, "such point is also known as the northwest corner of Lot B as shown on Tract Map No. 112".
3. All District easements shall be accessible at all times. Pipeline easements through private property shall be separated from the property by a permanent fence and gate on the street. Easements shall be paved. Gate locks will be maintained by the District. Access shall be unobstructed and no trees, planting, structures, or building overhangs shall be located within an easement.

DD. Pipe Cleaning

1. Before each new length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. At all times when the work of installing pipe is not in progress, all openings into the pipe and the ends of the pipe in the trench shall be tightly closed to prevent entrance of animals and foreign materials. The Contractor shall take all necessary

precautions to prevent the pipe from floating due to water entering the trench from any source. The Contractor shall assume full responsibility for any damage due to this cause and shall at their own expense restore and replace the pipe to its specified condition and grade if it is displaced due to floating.

EE. Testing

1. All watermains shall be hydrostatic pressure tested and bacteriological tested.
 - a. Hydrostatic Pressure Test
 - (1) The hydrostatic pressure test shall be performed in the presence of the District.
 - (2) Test Accepted: Hydrostatic pressure test for standard domestic waterline & appurtenances: 200psi for 4hr minimum. Pressure gauges installed throughout the site, as directed by the District. +/- 5psi tolerance. The pump shall be removed for the duration of the test.
 - (3) Test Accepted: Hydrostatic pressure test for others: pressure shall be 1.5 times the operating pressure, for a 4hr minimum. Pressure gauges throughout site, as directed by the District. +/- 5psi tolerance. The pump shall be removed for the duration of the test
 - (4) Test Failure: If the pressure gauge change is greater than +/-5psi the contractor shall locate the source of the leak/pressure increase and make corrections as necessary. Methods to resolve these items must be accepted by the District prior to performing the work. Any work performed to resolve the issues must be in the presence of the District. Once issues have been resolved, the hydrostatic pressure test shall be repeated for the full duration.
 - b. Bacteriological Testing
 - (1) Preparation
 - (a) An appropriate water source will be determined by the EVMWD District representative based on proximity to work location and available flow. Adequacy of flow will be confirmed by water operations staff. Typically, a fire hydrant or wharf head.
 - (b) A dedicated meter and backflow will be set at the source location prior to any source connections to the water main being tested. The District will set the meter and the contractor will set and test an RP type backflow device that is the same size as the meter, or larger than the meter. This source will only be used for water main testing and no construction purposes for the duration of water main testing.

- (c) A 2.5" construction meter is only suitable for up to 12" diameter water main. Larger pipe will require at least a 4" meter/backflow.
 - (d) Clean water hose will be provided by the contractor to convey water from the water source to the water main. This hose should be at least 2.5" in diameter, NSF 61 approved for potable water use (cloth fire hose is not acceptable), and the hose should be disinfected and flushed. Care should be taken to ensure the backflow assembly is clean prior to introducing water to the new main.
 - (e) The main being tested should not be connected hydraulically to the existing District water system except for the backflow protected source. Physical separations or test plates must be used at all future tie-in points. The presence of a physical separation or test plate will be confirmed by the inspector. Testing against a closed valve is not acceptable.
 - (f) Sample points will be selected by the inspector. The same sample points should be used for chlorine disinfection testing as well as bacteriological samples. Sets of samples shall be collected every 1,200 ft, plus one set from the end of the line, and at least one from each branch greater than one full pipe length. Samples should not be drawn from hydrants if possible.
 - (g) A District provided form will be used by the inspector to document a diagram of the water main being tested, location and type of all designated sample points, date and field result of chlorine confirmation tests, and date and field results of all bacteriological samples taken.
- (2) Chlorination
- (a) Prior to chlorinated water being introduced into the new water main, the main will be thoroughly flushed to remove any sediments, construction debris, or stagnant water.
 - (b) The continuous feed method of chlorination, as defined in AWWA C651-14, is the only acceptable method of chlorination. Tablet chlorination and slug chlorination are not acceptable.
 - (c) Chlorine used for the continuous feed method can be liquid sodium hypochlorite that is NSF 60 approved for use in potable water, or gas chlorine using a vacuum operated chlorinator.
 - (d) Chlorine will be introduced downstream of the RP backflow device. This could be the #4 test port on the backflow.
 - (e) The water main will be filled with chlorinated water dosed at 25-150 mg/L of free chlorine residual. Care shall be taken to push the water to all dead ends of the new main and through all services.

- (f) The inspector will confirm that 25-150 mg/L of free chlorine is present at all designated sample points on the main. This will be accomplished using a Hach high chlorine titration kit.
 - (g) The District inspector will witness the contractor operate all isolation valves on the water main segment being tested. All valves will be closed then completely reopened. Valves will remain completely open for the remainder of the test.
 - (h) The water main will be isolated with static pressure until the following day. The source hose should stay connected if possible.
 - (i) At 24 hours after the chlorine dosed and tested, the inspector will test each designated sample point to ensure the water main has at least 10 mg/L free chlorine residual at all points.
- (3) If 10 mg/L is present at all designated points, the chlorine can be flushed to commence bacteriological testing. If 10 mg/L is not present at all designated points, the water main must be chlorinated again.

2. Testing

- (a) A third-party State Water Resource Control Board accredited laboratory approved by the District shall conduct the bacteriological samples unless otherwise approved by the District. The accredited laboratory shall provide to the District a report with the bacteriological sample results. Results provided by the Contractor will not be accepted.
- (b) Two consecutively passing sets of bacteriological samples are required for the water main to be accepted for tie-in to the EVMWD water system. Samples will be analyzed for coliform (presence/absence) and heterotrophic plate count (HPC). Passing samples shall be absent for coliform and have an HPC of less than 500 colony forming units (CFU) or less than 500 most probable number (MPN). If deemed applicable based on project size and conditions, it is recommended that samples be tested for acceptable aesthetic quality (e.g., pH, alkalinity, specific conductance, turbidity).
- (c) During flushing, the District inspector will use a chlorine residual analyzer to confirm that all highly concentrated chlorine has been flushed from the main. The chlorine residual should be no more than 4 mg/L prior to bacteriological sampling.
- (d) The water main will be thoroughly flushed then shut off for a 16 hour period. During this period, the main should remain under static pressure with a valve on the source off (a backflow device valve). The inspector will read the construction meter. No water is allowed to pass through this meter prior to the arrival of the inspector for the bacteriological samples the following day.

- (e) After at least 16 hours have passed, the District inspector will confirm no water has passed through the meter. Bacteriological samples will be taken at each designated point. Two samples from each sample point will be taken a minimum of 15 minutes apart with the sample taps left running between samples, in accordance with “Bacteriological Tests, Option B”. The source water will only be turned on to provide pressure for samples if needed. Flushing of the water main is not permitted on the day samples are being drawn.
- (f) The water source will be turned on after sampling is complete to provide continuous positive pressure on the tested main. The main must remain connected to the metered and backflow protected source and pressurized until all samples have been accepted by EVMWD and the tie-in work starts. The main will be depressurized only by District Water Operations staff on the date of the scheduled tie-in.
- (g) Once bacteriological samples have been taken, the contractor cannot depressurize or otherwise tamper with the tested water main. Any unauthorized depressurization or tampering witness by District staff will require bacteriological testing to start again. After sample results are sent to the inspector from the lab, work shall proceed based on the following table:

Total Coliform Bacteria	E. Coli Bacteria	HPC (CFU or MPN)	Follow-Up Actions
Absent (all samples)	-	< 500 (all samples)	Water Main can be accepted for tie-in
		=/> 500	Flush and repeat testing at elevated HPC sites. Repeat disinfection Optional.
Present (1st Round <= 25% samples)	Absent	Regardless	Flush and repeat testing of all sample sites. Repeat disinfection Optional.
Present (>25% samples)	Absent	Regardless	Flush and repeat testing of all sample sites. Repeat disinfection REQUIRED.
Present (>1st Round)	Absent	Regardless	Flush and repeat testing of all sample sites. Repeat disinfection REQUIRED.
Present	Absent (any sample)	Regardless	Flush and repeat testing of all sample sites. Repeat disinfection REQUIRED.

- (1) Tie-In
 - (a) The final tie-in of the tested water main will occur no sooner than five calendar days after the passing bacteriological

results, and not later than 14 calendar days after passing bacteriological results. If job progress is dependent on an immediate shutdown and tie-in, District inspectors and Operations staff will work together to complete the work in less than five days.

2.03 RECYCLED WATER REQUIREMENTS

- A. General
 - 1. The recycled water design requirements are governed by the State Water Resources Control Board – Division of Drinking Water (DDW) California Health Laws. The majority of this guidance can be found in the “Purple Book” compiled by DDW.
- B. Recycled Water Demands
 - 1. Irrigation demands for recycled water use shall be furnished by the Engineer or landscape architect.
- C. Capacity
 - 1. The capacity of the recycled water distribution system shall deliver the maximum flow required by the irrigation demands.
 - 2. The District may require some recycled water mains to be oversized to facilitate future growth.
- D. Pipeline Sizing
 - 1. Recycled water pipelines shall be sized to provide the maximum demand projected with a minimum pressure that will allow the irrigation system to function properly, but no less than 60 psi, and a maximum pressure of 80 psi. A “C” value of 120 shall be used for sizing pipelines. The minimum recycled water main diameter shall be 6-inches unless a smaller size is approved by the District Engineer.
- E. Demand Factors
 - 1. Maximum daily demand information shall be determined by the Engineer or landscape architect.
- F. Maximum Headloss and Velocity
 - 1. The maximum headloss criteria for recycled water main shall be the same as for potable water but calculated at maximum demand flows.
- G. Maximum/Minimum Pressure
 - 1. The maximum pressure in a recycled water distribution main, where services may be located, shall not exceed 80 psi. Pressure reducing stations

shall be installed on water mains as needed to maintain system pressures below 80 psi. Minimum pressure shall not be less than 60 psi.

H. Blow-Off Assembly

1. Blow-off assemblies shall be installed at all low points. Blow-off assemblies shall be as shown on the standard drawing for a recycled water blow-off assembly.

I. Air Release and Air Vacuum Valves

1. Air and vacuum valve assemblies for recycled water shall follow the same design requirements as for potable water. Valve enclosure shall be identified with purple coloring per standard details.

J. Valve Placement

1. All recycled water systems shall include valves that conform to the requirements of Section 2.02 J of the General Design Requirements with regard to spacing, location, working pressure, valve type, and Section 15 of the Technical Specifications:

K. Dead End Mains

1. Recycled water mains shall have a blow-off installed at active dead ends. Air and vacuum valve and or blow off assemblies shall also be constructed in accordance with these standards.
2. At the end of a street which may be extended in the future, the recycled water main shall be extended across the end of the last parcel in the subdivision or lot split or to a point beyond the permanent street paving. Pavement shall end a minimum of ten feet prior to the nearest water valve.

L. Pipe Material

1. The following requirements relate to pipe material selection:
2. Recycled water mains, 12-inches or less in diameter, shall be minimum Class 235 AWWA PVC C900 Polyvinyl Chloride or minimum Class 250 ductile iron (DI). Joints shall be push-on joint, mechanical joint or flanged joint (DI). PVC water pipe and polyethylene sleeves for ductile iron pipe relating to recycled water shall be purple. Recycled water pipelines greater than 12-inches in diameter shall be ductile iron.
3. The requirements of Section 2.02 (L) Items 2 through 6 shall apply to recycled water.

M. Waterline Crossings

1. Recycled water mains shall be designed at a lower elevation than the top of any proposed potable water facility, at crossings or facilities constructed

parallel to the potable water mains. Recycled water main shall be designed at a higher elevation than the top of any proposed sewer or storm drain.

2. Depending on the separation between the proposed water and recycled water at a crossing, the District may require the recycled water main to be inserted into a casing.

N. Stream Crossings

1. Wherever the recycled water main crosses under a stream bed or structure constituting a potential hazard to the main, the recycled water main material shall be PVC or DI and shall be encased in a steel casing per Standard Drawing. Necessary measures shall also be taken to protect the stream embankment at the points of crossing. Scour depth calculations may be required to verify the minimum required pipe depth. Stream crossings will require special permits from the Riverside County Flood Control District and the State Game and Fish Department for streambed alterations.

O. Subdivision Lot Crossing

1. When a recycled water main is to be located in an easement over a portion of a lot within a planned unit development, it shall be contained inside of steel casing. The casing shall fully extend across all portions of the private property. The horizontal and vertical design of the water main shall be appropriate for installation within a casing.

P. Corrosive Soils

1. See requirements of Section 2.02.

Q. Water Service Connections

1. Services and connections on recycled water mains shall be installed for each property in accordance with the Standard Details and Approved Materials List and comply with Section 2.2 Q.

R. Meter Boxes

1. See requirements of Section 2.2 R.

S. Backflow Prevention

1. See requirements listed in Section 2.2 S.

T. Horizontal Alignment

1. Recycled water mains, when installed in streets where sewer and potable water will also be present, shall be located in accordance with Standard Drawing No. W-1. Where street width does not allow the recycled water main to be located per the Standard Drawing, it shall be located a minimum of 5 feet from the face of the curb, parallel or concentric to the centerline on the opposite side of the street from the potable water main.

2. Pipelines shall be required to be extended across the entire frontage of a property along a public roadway or District easement. The requirements of Section 2.2 U, Item 2 through 14 shall apply to recycled water.
3. A 10-foot clearance of trees and large shrubs shall be provided from all public recycled water facilities (pipe, services, hydrants, air/vacs, etc.).

U. Vertical Alignment

1. Invert elevations of recycled water mains shall be such as to provide minimum and maximum cover requirements as specified below and also to assure proper clearance between top of valves and valve box covers as provided in the section on Main Valves. The requirements of Section 2.2 V, Items 1 through 8 shall apply to recycled water in addition to the following:
 - a. Recycled water mains shall have an invert elevation such that the top of the recycled water pipe is 1-foot lower than the bottom of the potable water main when installed parallel to each other.
 - b. Recycled water mains shall be designed to a 1-foot clearance below the outside of potable water main pipe where crossings occur. All other design criteria shall conform to the requirements for potable water mains except as noted in the Standard Specifications and Drawings. A casing around the recycled water main will be required at crossings with a potable water main if the recycled water main is above the potable water main unless the District determines otherwise.
 - c. Recycled pipe sections that cross under storm drain, sewer or potable water should be avoided whenever possible. When it has been determined that the undercrossing cannot be avoided, it shall be designed and constructed using a ductile iron bend restrained joint pipe with polyethylene encasement.
 - d. Recycled water mains shall be designed to be at a higher elevation, with appropriate clearances, than storm drain piping. Failure to consider the design criteria while designing the storm drain system may result in redesigning the storm drain system after County/City approval or reinstallation of new storm drain piping.

V. Double Detector Check

1. The requirements of Section 2.2 W will be applicable.

W. Hot Taps

1. The requirements of Section 2.2 X will be applicable.

X. Easements

1. The requirements of Section 2.2 Y will be applicable.

Y. Cathodic Protection

1. Cathodic protection requirements for recycled water shall follow the same design requirements as for potable water.

2.04 SEWER REQUIREMENTS

A. Mainline Size

1. No public collection sewer shall be smaller than 8 inches in diameter, except as authorized by the District.
2. The wastewater duty factor of 250 gpd/du shall be used for single family residential and 150 gpd/du for townhomes and condominium units. The following criteria shall be used in determining the size of pipes for all other uses:
 - a. Flow (based on Wastewater Duty Factors)

Potable Water Consumption	Wastewater Duty Factor (gpd/ acre)
Business Park	500
General Commercial	1,400
Limited Industrial	500
Open Space - Recreation/Slopes	100
Public Institutional	500
Hillside Residential	500
Very Low Density Residential (.1-.5 du/ac)	300
Low Density Residential (.5-2 du/ac)	600
Low Medium Density Residential (2-4 du/ac)	900
Medium Density Residential (4- 6 du/ac)	1,000
Medium High Density Residential (6-12du/ac)	1,100
High Density Residential (12-24 du/ac)	2,100
Mixed Use (24 du/ac max)	8,400

3. Consult with the District for criteria to be used for other types of development.
4. For collector sewers up to 18 inches in diameter, the design peak flow should be equal to 3 times the average dry weather flow; for trunk sewers greater than or equal to 18 inches in diameter, the design peak flow should be equal to 2.5 times the average dry weather flow.
5. Sewers greater than or equal to 18 inches in diameter shall be designed to maximum d/D ratio of 0.75 during the peak flow. Sewers less than 18 inches in diameter shall be designed to maximum d/D ratio of 0.5 during the peak dry weather flow.
6. For other sewer flow factors, use the water requirement table (Section 2.2 A). For average daily sewer flow factors, divide the water demand factors by two.

B. Design Criteria

1. The value of 0.013 shall be used as a coefficient of roughness equivalent to Manning's "n".
2. All sewers shall be designed and constructed with hydraulic slopes sufficient to give mean velocities at design peak flow of not less than 2.0 feet per second. Maximum allowable velocity in the sewer shall not be greater than 10.0 feet per second.
3. Following are minimum slopes and pipe material that should be provided under normal depth conditions:

Sewer Size, inches	Minimum Percent Grade	Pipe Material
4	2.0	SDR-35 PVC
6	1.0	SDR-35 PVC
8	0.4	SDR-35 PVC
12	0.24	SDR-26 PVC
15	0.15	SDR-26 PVC
18	0.12	PS115 PVC
21	0.09	PS115 PVC
24	0.08	PS115 PVC
Greater than 24		District Approval Required

4. For pipes 4 inches through 24 inches in diameter with depths of cover ≥ 15 feet over the top of the sewer, the pipe material shall be C900 PVC Class 165 (DR 25).
5. Manholes shall be installed on sewer mains at all changes in slope, size of pipe, alignment and at all intersections of main line sewers.
6. The maximum allowable spacing between manholes is 500 feet.
7. A minimum drop 0.10 foot shall be used for sewer with slopes less than 7.5 percent. For sewer greater than 7.5 percent the slope shall be carried through the manhole.
8. Where the inlet pipe size is of a smaller diameter that the outlet pipe, the inlet pipe shall be designed to be at the same soffit elevation as the outlet pipe.
9. For a 90-degree bend through the manhole, a minimum of 0.20-foot drop shall be maintained.
10. For sizes over 15 inches, obtain authorization of drop across manhole from District.
11. Minimum inside dimension of manholes shall be 60 inches. When connecting to an existing 48-inch diameter manhole, the existing manhole shall be replaced with a 60-inch diameter manhole.
 - a. The interior of all manholes shall be coated with an approved coating system per the Approved Materials List.

12. Manholes located within an intersection inlet channels and a stub-out shall be provided in all directions for each intersecting roadway or easement, in addition to the main inlet and outlet pipe. This requirement will apply to locations where the roadway could be extended, at a future time, but is currently undeveloped.
13. Manholes shall be located at the end of sewers mains. Where it is anticipated that the roadway or the sewer may be extended in the future, a minimum stub of 5 feet from the flexible joint shall be provided in the direction of the future extension and capped. End of line cleanouts shall not be allowed.
14. Manholes located in non-paved areas shall have a 10-foot by 10-foot paved area surrounding it in accordance with Standard Drawings S-10.
15. Where a proposed sewer connects to an existing manhole, the elevation of the inlets and outlets shall be shown in profile as determined by actual survey. If an existing sewer is straddled by a new manhole, the elevations of the proposed manhole shall be determined by actual survey. The applicant's private engineer shall submit the field notes.
16. The minimum vertical distance between sewers and other utilities shall be one (1) foot, outside of pipe to outside of pipe.
17. When an existing "live" sewer exists in an easement or unpaved roadway, and construction is proposed adjacent to the sewer (and the street will be paved), the existing manholes shall be covered and protected as follows:
 - a. Prior to construction, cover existing manhole with 2 layers of 20 mil visqueen.
 - b. Cover visqueen with ¾-inch plywood cut to a diameter 2 inches larger than manhole diameter.
 - c. Place sandbags (6 minimum) over plywood to weight down.
 - d. Remove sandbags, plywood and visqueen after road is paved. For easements, remove after grading and construction has been completed.

C. Horizontal Alignment

1. Sewers shall be located as follows:
 - a. In public streets parallel to and 6 feet north or east of the street centerline. When located in narrow streets where potable water and recycled water are present, the sewer alignment may differ from the 6-foot requirement (alignment to be reviewed by the District under these conditions).
 - b. In local residential and industrial streets, pipe is to be located six (6) feet off the street centerline in the middle of the driving lane. In major, primary, and secondary highways, pipe will be located in the center of the driving lane nearest to the center of the street. Pipe will not be located in median strips or parking lanes.

- c. On curvilinear streets, the pipe shall be concentric or parallel to the street centerline. All sewer pipe alignment shall be straight with no bends or deflections between manholes. Curvilinear sewers are strictly prohibited by the District.
- d. The standard minimum distance between the sewer and other utilities is five (5) feet outside of pipe to outside of pipe, except for potable water and recycled water lines, which shall be ten (10) feet outside of pipe to outside of pipe.
- e. Pipelines shall be required to be extended across the entire frontage of a property along a public roadway or District easement. For corner lots, the extension is only required along the service side.

D. Sewer Depth

- 1. The minimum cover to the top of sewers is seven (7) feet. However, in some instances, if the existing outlet sewers are too shallow to obtain such a depth, a shallower depth may be approved. Shallow sewers are subject to specific review and authorization by the District and may require additional protection. The District may require greater depths where it is necessary to extend sewers to serve other areas.

E. Service Laterals

- 1. The following criteria apply to the design of sewer laterals:
 - a. A 4-inch sewer service lateral shall be installed for each residential property occupied by a single-family dwelling.
 - b. A minimum 6-inch sewer service lateral shall be installed for each parcel for an apartment development.
 - c. A minimum 6-inch sewer service lateral shall be installed for each parcel on a non-residential development.
 - d. Sewer lateral connections to the main cannot be made within 3 feet of each other nor closer than 3 feet from the outside of a manhole.
 - e. For single family residential developments, the sewer laterals shall be installed on the frontage of the property on the property's addressed side of the street or otherwise approved by the District. Sewer laterals shall not cross adjacent private property.
 - f. Any sewer laterals installed within driveways will be required to be removed and relocated away from the driveway.
 - g. All service laterals shall be constructed perpendicular to the sewer main. If impractical or impossible to do so, the service lateral may enter the main sewer at any angle up to 45 degrees measured from the upstream side of the lateral, subject to District review.

- h. A service lateral shall be installed for each property along a main line extension.
- i. A cleanout one foot inside of the property line or inside the public utility easement must be installed as shown on Drawing S-12.
- j. Sewer laterals shall not be connected to trunk sewers greater than or equal to 18 inches in diameter unless specifically permitted by the District. When feasible an 8-inch sewer main shall be installed parallel to the trunk sewer for lateral connections
- k. For multiple-family dwellings, commercial lots, schools, etc., calculations shall be submitted to determine the proper size of the lateral but shall be no less than 6 inches in diameter.
- l. If sewer laterals appear to have less than 1 feet of vertical clearance while crossing under the water main, profiles of sewer laterals may be required to be plotted at the District's discretion. Minimum clearances shall be in accordance with State Water Resource Control Board requirements and the Standard Drawings.
- m. Deep cut laterals shall be used only upon written District authorization.
- n. All shallow sewer laterals (<15-feet deep) shall be constructed of SDR 35 PVC pipe, deep lateral connections (>15-feet) shall be designed with C900 DR 25 pipe and special lateral wyes fitted to match the outside diameter and provide a watertight seal.
- o. All sewer laterals must be shown in a laterals table and include the stations, length, and depth at property line, slope, and remarks.
- p. Provide a backwater valve in accordance with the Standard Drawings for sewer laterals to properties where the house slab elevation is below the nearest upstream manhole rim elevation.
- q. For undeveloped lots, all services not used by the new development shall be abandoned. The service shall be abandoned in-place, the wye fitting shall be removed, and a minimum of 5-linear feet of main shall be removed and replaced.
- r. A 10-foot clearance of trees and large shrubs shall be provided from all public sewer facilities (pipe, laterals, manholes, etc.).

F. Inverted Siphons

- 1. Inverted siphons shall be avoided wherever possible. Where required, at least two barrels should be designed with a minimum pipe diameter of 6 inches and a minimum velocity of 3 fps in each barrel.

G. Easements

- 1. Sewer easements shall comply with the requirements set forth in paragraph Y, Section 2.2 of the Standard Design Requirements, except that the final

width for a sewer easement will depend upon the depth of the sewer, the soil conditions encountered and easement location.

H. Pipe Cleaning

1. Before each new length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. At all times when the work of installing pipe is not in progress, all openings into the pipe and the ends of the pipe in the trench shall be tightly closed to prevent entrance of animals and foreign materials. The Contractor shall take all necessary precautions to prevent the pipe from floating due to water entering the trench from any source, shall assume full responsibility for any damage due to this cause and shall at their own expense restore and replace the pipe to its specified condition and grade if it is displaced due to floating.

I. Testing

1. All sewers shall be cleaned with a hydro-jet/vacuum combination truck, air tested, mandrel tested, and CCTV inspected prior to acceptance by the District. The air test, mandrel test, and the Closed-Circuit Television inspection shall be per the most current District Standards.
2. Sags or Standing Water in Pipe
 - a. Complies: Sags shall be ½” or less.
 - b. Does not Comply: Sags ½” or greater shall not be permitted.
 - c. It shall be the Contractor's responsibility to prove to the Engineer's satisfaction that sags do not exceed the limits stated. Due to unacceptably high operation and maintenance costs and poor system reliability, pipelines with sag depths exceeding those listed will be rejected. Reconstruction of the entire length of standing water plus 20 feet on each side of the standing water will be required. Damaged pipe must be removed and not reused. Reconstruction shall have no standing water.
3. Sewer Air Test Procedure
 - a. All new install or repaired sewer lines shall be pressure tested after construction of the sewer is complete, hydro-jet/vacuumed, and all work adjacent to and over the pipeline has been completed. Backfilling, placement of fill, grading, initial/base layer of paving, concrete work, dry utility crossings, and any other superimposed loads shall be in place and completed prior to testing. The Contractor may conduct an initial air test of the sewer system at the contractor's convenience and need not be performed in the presence of the District. The final/acceptance air test of the sewer mainlines, and branching connections shall be conducted in the presence of the District.
 - b. Each section of sewer shall be tested between successive manholes and all branch laterals by plugging and bracing all openings in the

sewer mainline and ends of all branches/laterals. Prior to any air pressure testing, pipe plugs shall be checked for any air leakage, if any leaks are found, the air pressure shall be released, the leak eliminated, and the test procedure started over again. The contractor may, at its option, wet the interior of the pipe prior to the test.

- c. **Acceptance Test:** Connect the air hose to the inlet tap. Add air slowly to the test section until the pressure inside the pipe reaches 4.0 psig. Allow the pressure to stabilize for at least two (2) minutes, then adjust the pressure to 4.0 psig if necessary. Disconnect the air supply before starting the test, the test pressure shall remain at 4.0 psig for a minimum of four (4) minutes for the section of sewer mainline and branches/laterals to be found acceptable.
- d. **Test Failure:** Should a section of line between successive manholes and/or branch laterals fail to pass the acceptance test outlined, the contractor shall, at their expense, determine the source of the failure, make any necessary repairs, and re-test the section of sewer in question at no cost to the District.

4. Mandrel Test Procedure

- a. All new install or repaired sewer mainlines shall be mandrel tested after construction of the sewer is complete and all work adjacent to and over the pipeline has been completed. Backfilling, placement of fill, grading, initial/base layer of paving, concrete work, dry utility crossings, and any other superimposed loads shall be in place and complete prior to testing. The contractor may conduct an initial mandrel test of the sewer mainline at the contractor's convenience and need not be performed in the presence of the District. The final/acceptance mandrel test of the sewer mainlines shall be conducted in the presence of the District.
- b. The pipe and fittings shall be tested after construction to ensure deflections and measured diameter does not exceed the allowable percentage of the nominal pipe interior diameter.

PVC/SDR35 – 0” through 12” = 5.0%

PVC/SDR35 – 12” through 18” = 4.0%

- c. Any other District specified sewer pipe shall follow the latest edition of the Standard Specifications for Public Works Construction (Green Book). The mandrel, ropes, confined space entry equipment and any other equipment, labor and materials necessary for performing the mandrel test shall be furnished by the contractor at the contractor's expense. The mandrel shall be:
 - (1) A rigid, nonadjustable, odd-numbered-leg (9 legs minimum) mandrel having an effective length not less than it's nominal diameter.
 - (2) Fabricated from steel and be fitted with pulling rings at each end.

Any work performed to resolve the items must be in the presence of the District. A final sewer video is required once repairs have been made and must be found acceptable by the District.

END OF SECTION

PART 3 - RESERVOIRS

3.01 RESERVOIR SIZING REQUIREMENTS

- A. Reservoirs shall be required for each pressure zone where feasible.
- B. A reservoir sizing analysis shall be submitted to the District for review and verification.
- C. Total storage requirements shall be 130% of maximum day demand plus fire flow for each pressure zone.
 - 1. Maximum day demand shall be calculated utilizing the District's current Potable Water Master plan.
 - 2. Fire and emergency storage shall be calculated for a fire flow with a 4-hour duration. The fire flow rate shall be as specified by Riverside County Fire Protection Ordinance-787.
- D. An extended time period hydraulic analysis shall be required for systems with two or more pressure zones.

3.02 SITE REQUIREMENTS

- A. All water reservoir sites require the parcel to be deeded to the District.
 - 1. Prior to any construction, a Grant Deed with legal description and plat map must be prepared, approved, and recorded by the District.
 - 2. The Engineer of Work shall obtain an address for the site through the City or County.
- B. All reservoirs shall be designed such that the ring wall to be constructed is in an all cut section or on 100% engineered fill according to the requirements of a registered geotechnical engineer licensed in the State of California.
- C. A minimum of a 16-foot paved section shall be designed around the reservoir, plus an 8-foot minimum clear distance of unpaved surface to the nearest toe of slope. This 16-foot roadway shall be from the exterior edge of any above ground improvements including bollards, piping, and vaults to the edge of the proposed pavement.
 - 1. The paving shall be a minimum of 6-inches of C-2 PG 64-10 asphalt over 8-inches of class 2 aggregate base compacted to 95% relative compaction per the Standard Specifications for Public Works Construction (greenbook) or per geotechnical recommendations.
 - 2. The base section shall be 6-inch minimum of Class 2 base material.
 - 3. The paved section's drainage shall be directed to a concrete swale on the outside of the 16-foot section. The cross section of the paved road shall have

a minimum 2% cross fall to the swale, the swale shall have a 1% minimum grade, and it shall be a concrete ribbon drain.

4. The finished surface of the paving adjacent to the ring wall shall be a minimum of 12-inches below the top of the ring wall.
5. The paved section around the tank shall also have a minimum 8-foot graded shoulder around the edge of the paving. The graded shoulder section shall have a minimum 2% cross fall directed to the concrete ribbon drain.
6. All asphalt paved sections shall be slurry sealed.
7. Pavement under manifold piping and valves shall be concrete.

D. All reservoirs shall be designed with a 12-foot minimum width paved access road.

1. The maximum grade of the access road shall be 15%. Slopes up to 10% shall be paved with asphalt, slopes greater than 10% shall be concrete with welded wire mesh reinforcement.
2. The paved section's drainage shall be either directed to an inverted crown section with the concrete swale in the middle of the 12-foot section or directed to a concrete swale on the outside of the paved road. The cross section of the paved road shall have a minimum 2% cross fall to the swale, the swale shall have a 1% minimum grade, and it shall be a concrete lined drain.
3. The paved access road to the tank shall also have a minimum 2-foot graded shoulder along the edge of the paving. The graded shoulder section shall have a minimum 2% cross fall directed to the edge of paving (or the concrete swale).
4. Discharge of all drainage shall be into a storm drain system or into an approved drainage course through an energy dissipater per County of Riverside requirements.
5. Cross sections of the access road showing all utility locations shall be provided on the plans.

E. All reservoir sites shall be designed with a 30-foot-long minimum paved approach with a turnaround area.

1. The maximum grade of the approach shall be 5%.
2. The approach shall be located at the entrance to tank site.
3. A truck turning analysis shall be provided for each reservoir site. All reservoir driveways, approaches, and circumferential roadways shall be designed to provide complete access for a 17-ton crane truck.

F. All reservoir sites shall be designed with planting and irrigation plans created by a registered landscape architect and shall be installed by a licensed landscape contractor.

- G. All reservoirs shall have perimeter fencing and gates.
1. All fencing shall be made from welded and painted wrought iron with curved and pointed top for security and shall be designed to fit the aesthetic of the local community.
 2. All fencing shall be designed to be located at the top of all cut slopes and at the toe of all fill slopes.
 3. Double leaf swing gates with electric operators shall be provided for all reservoir sites. Prior to design, the Developer shall coordinate with the District for the current operator and access system utilized by the District. All reservoir sites shall be provided with both vehicle access gates and man gates for individual access. Card readers shall be provided on the interior and exterior of all gates.
 4. The wrought iron material shall be square tubular sections of hot rolled mild steel, conforming to ASTM A 501 with a minimum thickness of 0.083 for 2 inch and 0.049 for 5/8 inch.
 5. All reservoirs shall be designed with a separate Edison transformer and meter area with a separate access way. The Edison transformer and meter area shall not have access to any other area within the reservoir site.
 6. The Edison access gates shall be of the same wrought iron material and style as used on the reservoir site access gates with double locks for two padlocks.
- H. All cut and fill slopes shall be at 2:1 or flatter and shall have a slope stability analysis performed and submitted to the District.
- I. All grading shall be in conformance to the requirements of the local jurisdiction's building codes.
- J. All bench drains, slope drains, tank drains, and swales shall dispose of runoff into an approved drainage course. The Engineer shall obtain a permit from local jurisdiction for connection to storm drain system on channel. All drains shall be concrete.
1. A hydrology study and calculations shall be submitted to the District for review.
 2. The discharge of all drainage shall be into an energy dissipater per County of Riverside requirements.
- K. All reservoir sites shall have a comprehensive geotechnical investigation which includes:
1. Seismic spectra response analysis and recommendations shall be made in the report. Borings or trenching may be required to determine if any faults project across the proposed tank site.
 2. Specific size recommendations shall be made for the ring wall.
 3. Paving recommendations shall be delineated.
 4. Over excavation requirements shall be identified.

5. A recommendation from geotechnical engineer that the site is suitable from a geotechnical standpoint for construction of a tank.
- L. All sites shall be provided with power service where feasible. All sites shall be provided with a 480 volt 3-phase service. For powered sites, provide a separately enclosed area for SCE service equipment with a separate secured access gate located as close to the reservoir as possible.
- M. Lighting shall be provided for all sites. The number and location of light poles will be identified by the District and will be site specific. Operation of site lighting shall be connected to the site SCADA system for remote monitoring. Lighting shall be programmed to activate when any of the access gates are opened.

3.03 YARD PIPING REQUIREMENTS

- A. All reservoirs shall have a double ball seismic deflection type coupling on the combined inlet/outlet piping. There shall be no pipe support between the Flex-Tend coupling and the steel tank shell in accordance with manufacturer's recommendations.
- B. All Reservoirs shall be provided with an electrically actuated control valve when required by the District. The valve shall be provided with the appropriate wiring and programming to allow for a percentage open setpoint to be controlled and monitored by the District through the SCADA system
- C. Reservoirs shall be provided with a Cla-Val altitude valve when required by the District and at a minimum shall be provided when a reservoir is connected to a zone which includes another reservoir on an independent site.
 1. The valve position indicator shall be connected to the telemetry system to indicate whether valve is closed.
 2. The copper tubing sensor line from the Cla-Val to the tank shall be supported and insulated. The sensing line shall have positive grade from the valve to tank.
- D. All reservoirs shall have low head loss check valves and shall be equipped with interior corrosion resistant piping and valving to enhance the circulation of the water within the reservoir. Calculations for distribution and intake valving related to enhancing water circulation shall be provided.
- E. All yard piping, exclusive of altitude valve and check valve, shall be designed with a maximum velocity of 3 feet per second under peak hour, maximum day plus fire and minimum demand hour (reservoir filling) conditions.
- F. The inlet and outlet shall be aligned radially from its interface at the tank wall to the point where the piping is below-ground.
- G. Bollards shall be installed to protect all inlet and outlet piping.

- H. A minimum of four (4) sampling ports shall be provided on each reservoir including on the inlet piping prior to the check valve and spaced radially around the exterior of the reservoir equidistant from the inlet piping and each other. Sampling ports shall be installed onto the reservoir using welded couplings with dielectric isolation, a locking stainless steel ball valve, and ¼-inch stainless steel sample tubing with a rubber cap and lanyard.
- I. Inlet/outlet piping material shall be ductile iron unless authorized by the District.

3.04 RESERVOIR FEATURES AND APPURTENANCES

- A. All reservoirs shall be designed per AWWA Standards for wall thickness and seismic design.
- B. All reservoirs shall have a transducer to indicate water level that is equipped with a digital readout at the site. Transducer assembly shall be equipped with an isolation and "bleed" valve to assist in calibration. The transducer assembly shall be enclosed to prevent vandalism.
- C. All reservoirs shall have a spiral staircase with a minimum of one landing platform at the midpoint of the tank's height. The bottom 10-feet of the staircase shall be protected by a fenced enclosure which prevents unauthorized access and climbing. All stairs and railing systems shall be compliant with the most recent version of the OSHA standards.
- D. All reservoirs shall have a corrosion resistant fiber reinforced plastic interior ladder with a Type 316 stainless steel guide rail safety climb system.
- E. All reservoirs shall be designed with an overflow located at the maximum water level of the reservoir and sized to drain a minimum of 150% of the maximum anticipated reservoir filling rate without overtopping the reservoir.
- F. The reservoir overflow shall discharge a minimum of two times the diameter of the overflow pipe above the ground and include a self-closing rubber check valve (the pipe shall not be connected to the ground or ground support) and drain to a catch basin or approved drainage course. This drainage facility shall be directed away from the site through approved drainage courses and designed to handle a minimum flowrate of 150% of the maximum anticipated reservoir filling rate.
- G. A removable roof vent with vent screen shall be provided for all reservoirs and sized for anticipated air movement of 150% the maximum anticipated reservoir filling rate. All screens shall be made from 316 stainless steel fine mesh.
- H. Two (2) 36-inch square aluminum roof hatches with fall protection grating and a hold open arm shall be provided for all reservoirs near the top of the access stairs and near the center of the tank. All hatches shall be provided with individual 5,000-pound capacity static line anchor points for safety tie-off when the hatch is opened.

- I. All reservoirs shall be provided with a SCADA system. All reservoir telemetry shall be designed in accordance with Division 17 of the District's Standards. Brackets and braces for the remote telemetry unit and antenna must be shown. At a minimum, reservoirs shall have the following telemetry features:
 - 1. Reservoirs shall have intrusion detection on the main gate, the man gate, any control panels, reservoir hatches, staircase door, and access doors for any buildings onsite. A card reader shall be provided at the door of the MCC if the site includes a control building. All security systems shall be inaccessible when doors are closed. All security systems shall be connected to the telemetry system for remote monitoring.
 - 2. Provide capacitance style switch in overflow pipe to sense tank overflow. A 2" FNPT coupling welded on the side of the vertical overflow pipe 10' above floor shall be provided for the flow switch. The switch shall be connected to the radio telemetry alarm/monitor unit.
 - 3. A limit switch shall be provided on the altitude valve for closed indication. This limit switch and the excessive flow feature shall be connected to the radio telemetry alarm/monitor unit.
 - 4. All control panels shall either be located indoors or installed with a shade structure to ensure protection from the elements.
- J. Reservoirs shall be provided with perimeter safety railing along the entire circumference of the roof. If the reservoir is provided with a knuckle the railing shall be installed 6-feet interior of the vertical edge. Railings shall be designed and installed to meet the current California OSHA requirements.
- K. The reservoir roof pitch shall be as flat as feasible while still ensuring positive drainage of water.
- L. Provide 1-inch diameter thread half coupling with a 1-inch diameter corp stop for transducer installation, located 6" from bottom of tank. Provide a 1-inch diameter half coupling with lockable ball valve for chemical injection point.
- M. All reservoirs shall have a chlorine analyzer for the purpose of measuring total chlorine.

3.05 FEATURES FOR WELDED STEEL RESERVOIRS (AWWA D100)

- A. All welded steel reservoirs shall be designed to match floor and overflow elevations of existing reservoirs within the proposed zone. Reservoirs to be installed within new pressure zones with no other reservoirs shall be designed with industry standard dimensions similar to existing District reservoirs. All reservoir design aspects will be subject to modification at the District's discretion.
- B. All welded steel reservoirs shall have a 36-inch flush mounted hinged "doghouse" style cleanout installed flush with the floor of the reservoir with an 8-inch minimum drain line and valve through the door of the cleanout. Additional details are provided as part of the District's current Design Guidelines.

- C. All welded steel reservoirs shall be equipped with two 36-inch mono-bolt manways with entry and exit handles located 180 degrees apart located 36-inches above the reservoir floor.

3.06 CATHODIC PROTECTION

- A. A cathodic protection study completed by a licensed Corrosion Engineer and approved by the District shall be provided for all reservoirs which includes any surrounding piping. A sacrificial anode cathodic protection system designed by a registered Corrosion Engineer shall be provided on all reservoirs. Per industry standards, the system shall be installed and tested prior to approval of the completed reservoir. Once approved the system shall be turned off for the first year of operation for coatings inspections purposes. After coating inspections are completed the system shall be re-inspected and re-commissioned. For Developer projects, it shall be the responsibility of the Developer's Corrosion Engineer to re-commission the system after the one-year warranty period.
- B. All welded steel reservoirs shall have an impressed current sacrificial anode style cathodic protection. All reservoirs shall have a minimum of two cathodic reference cells, one at the center of the reservoir and the other near the edge.
- C. All welded steel reservoirs shall have 6-inch diameter anode handways with lockable lid and sealing gasket.

3.07 TYPICAL PLAN SET LISTING

- A. The following is a typical plan listing for a reservoir project with an access road. For projects on pre-graded sites some of the plan sheets listed below may not be necessary. This list below assumes a rough grading plan is submitted prior to and separate from the plans listed below.
 - 1. Title Sheet with Vicinity and Location Map
 - 2. General Notes, Legend, Basis of Bearings, Benchmark and List of Drawings
 - 3. Construction Notes and Abbreviations
 - 4. Overall Access Road Grading Plan
 - 5. Access Road Paving and Pipeline Plan and Profile (may be more than one sheet)
 - 6. Reservoir Site Grading and Drainage Plan
 - 7. Site Improvement Plan
 - 8. Gate Details
 - 9. Architectural Cover Sheet, General Notes
 - 10. Architectural Plan, Exterior Elevations, Details
 - 11. Architectural Details
 - 12. Site Cross Sections (2 sections minimum)

13. Yard Piping Plan (may be more than one sheet)
14. Yard Piping Profiles (may be more than one sheet)
15. Miscellaneous Details
16. Tank Orientation and Appurtenances
17. Tank Piping
18. Tank Sections
19. Tank Access and Safety Plan and Details
20. Mixing System Manifold Plan, Section and Details
21. Chemical Room Layout
22. Chemical Storage and Injection Systems Layout and Details
23. Miscellaneous Tank Piping Sections and Details (may be more than one sheet)
24. Structural Symbols Notes and Abbreviations
25. Structural Plan
26. Structural Sections
27. Structural Foundation and Wall Details
28. Structural Miscellaneous Concrete Details
29. Single Line Diagram and Panel Board Schedule
30. Electrical Site Plan
31. Lighting Plan – Light Fixture Schedule
32. Power Plan
33. Details, Sections and Elevations
34. Conduit Schedule
35. Logic Control Diagram
36. Process and Information Diagram
37. RTU Connection Diagram
38. RTU Radio and Tower Details

END OF SECTION

PART 4 - WATER BOOSTER PUMP STATIONS

4.01 SIZING REQUIREMENTS

- A. A booster pump station is required for each pressure zone.
- B. All booster pump stations which are designed to fill reservoirs shall be designed to meet the greater of the following flow requirements:
 - 1. Maximum day demand for the zone with an operating time of 16 hours and with one pump out of service, or
 - 2. One half of the fire flow requirement for the worst-case fire flow demand.
 - 3. Discharge head shall be sufficient to discharge pump station design flows during minimum system demands with the reservoir levels, one foot below maximum design high water level (HWL).
- C. All booster pump stations shall be a minimum of 2 pump configuration which includes one standby pump. The pump configuration shall have equally sized pumps and motors with the pumps and motors meeting 100% of the pumping requirements and one standby pump equally sized.
- D. Operational storage shall refill under minimum hour demand during a 12-hour period.
- E. Pump motors shall be designed to be capable of ten starts per hour, as a normal operating condition. However, the design of the pump station shall limit the starts to five per hour per pump, or per NEMA requirements, at the discretion of the District.
- F. Booster stations designed to serve zones without storage reservoirs shall be approved by the District prior to design and shall meet pumping requirements as established by the District.
 - 1. When approved, booster stations serving zones without reservoirs shall be provided with skid mounted continuously variable speed pumps capable of supplying flows ranging from zero gallons per minute to fire flow requirements. A sufficient number of pumps with appropriate flow ranges shall be provided to meet these demands following the general guidelines provided earlier in this section.
 - 2. A bladder style surge tank shall be provided on the discharge header of all booster stations serving zones without reservoirs to combat surge and provide a water supply during low demand to limit pump starts and stops.

4.02 SITE REQUIREMENTS

- A. All booster pump station sites require the parcel to be deeded to the District.
 - 1. Prior to any construction, a Grant Deed with legal description and plat map must be prepared, approved, and recorded by the District.
 - 2. The Engineer of Work shall obtain an address for the site through the City or County.

- B. All booster pump stations shall have a concrete foundation, concrete approaches, and a concrete pad beneath all site equipment. AC pavement is required for the remainder of the site as specified by the District.
 - 1. Asphalt shall be as required by geotechnical recommendations, but a minimum of 4-inches C2 - PG 64-10 A.C. over 6-inches of Class 2 base material.
 - 2. Concrete pavement shall be as required by geotechnical recommendations, but a minimum of 6-inches of reinforced concrete placed over 8-inches of Class 2 base material. The minimum required reinforcement shall be 6-inch x 6-inch 10-gauge welded wire mesh located in the middle of the 6-inch concrete sections. All sections of paving shall be designed to withstand heavy equipment traffic.
 - 3. All asphalt paved sections shall be slurry sealed heavy sand Caltrans Specification 37-2.
 - 4. The paved access road width shall be a minimum of 12-feet.
 - 5. A turning analysis shall be provided for the site demonstrating a 874 knuckle boom crane truck can access all portions of the site without backing up.

- C. All booster pump stations shall be designed with appropriate drainage systems.
 - 1. All drainage from the surface of the station shall be directed to a storm drain or toward the street through the main access gate and access road.
 - 2. Surface drainage shall be directed down the access road to the street. The access road's drainage shall be either 1) directed to an inverted crown section with the concrete swale in the middle or 2) directed to a concrete swale on the outside of the paved road. The cross section of the access road shall have a minimum 2% cross fall to the swale, the swale shall have a 1% minimum grade, and it shall be a concrete ribbon drain. Drainage from pump control valves, pump seals and pump can air release valves shall be disposed of through PVC piping in pipe trench and then into subsurface SDR-35 drains.
 - 3. All drainage from surge relief or floor drains shall be conveyed to an on-site SDR-35 drain line directed to the local sewer and appropriately sized to carry the maximum anticipated flow.

- D. If a chlorine residual analyzer requires a reagent or an ammonia analyzer, a sewer connection shall be provided.

- E. All stations shall have a minimum 8-foot-high split face stone exterior block wall. Color to be approved by the District.
- F. All stations shall have legal address and identification named displayed by signage affixed to the block wall at the front of the station. See Volume 4 – Design Guidelines.
- G. Restroom facilities shall be provided for the site if required by the District.
- H. Double leaf swing gates with electric operators shall be provided for all booster station sites. The gates and operators shall be protected from vandalism and theft to the satisfaction of the District. Prior to design, the Developer shall coordinate with the District for the current operator and access system utilized by the District. All booster station sites shall be provided with both vehicle access gates and man gates for individual access. Card readers shall be provided on the interior and exterior of all gates.
 - 1. The wrought iron material shall be square tubular sections of hot rolled mild steel, conforming to ASTM A 501 with a minimum thickness of 0.083 for 2 inch and 0.049 for 5/8 inch.
 - 2. All portions of the gate shall be powder coated after all welding is completed to protect the metal from corrosion.
- I. All stations shall be designed with a separate Edison transformer and meter area with a separate access way. The Edison transformer and meter area shall not have access to any other area within the pump station site.
 - 1. The Edison access gates shall be of the same wrought iron material and style as used on the pump station's access gates with a double lock for two padlocks.
- J. All stations shall be designed with a low-level LED lighting system. The low-level lighting system shall have a ON/OFF switch located near the man gate. The lighting system shall be designed and directed to minimize off-site impact.

4.03 FEATURES AND APPURTENANCES

- A. Booster stations serving zones without reservoirs shall be provided with above ground skid mounted pumps where feasible. Suction and discharge headers shall be connected to pipelines which penetrate through the wall of the station instead of the floor to facilitate access and replacement.
- B. A vibration analysis conforming to the requirements and limits of the Hydraulic Institute standard section 9.6.4 shall be performed for all pumps and pumping systems. The results of this analysis shall be approved by the District prior to final design acceptance.
- C. All suction headers for vertical turbine style pump stations shall be below ground and located on the access side of the pump station to facilitate easy access and maintenance of the pumps and motors. Suction headers can also be placed in a

grated concrete pipe trench inside the station. All discharge headers for vertical turbine style pump stations shall be above ground in locations with no sewer or storm drain is available. Discharge headers in a grated concrete trench will be permitted to be located inside the booster station for site locations with storm drain and sewer availability.

1. A 1-inch bronze corp stop is required on each discharge header leg (Edison pump test purposes). Location of corp stop shall consider Edison requirements.
 2. Provide couplings or fittings as required to provide easy removal and replacement of all valves and equipment. Flexible type couplings shall have tie rods.
- D. Provide above ground telemetry transducer connections and pressure switches. Pressure transducers shall be installed on the suction and discharge side of the pump station, location to be reviewed by District.
1. A 1-inch tap is required for an above ground connection or the telemetry transducer on the main discharge header and a pressure switch on each pump header discharge preceding the pump control valves on all vertical turbine pumps.
- E. A totalizing and instantaneous read meter is required on the main discharge header.
1. The meter shall be connected to the districts automated meter reading system per the requirements of the specification section 13422.
 2. All meters are to be above ground. For stations with interior concrete pipe trenches, meters shall be furnished with remote read indicator which shall be mounted to the station wall.
 3. The meter shall be located in accordance with manufacturer's guidelines from points of turbulence.
 4. The ultrasonic or magnetic meter shall read in gallons per minute and total in 10,000 gallons. The meter shall be "tube type" probe "mag meter".
 5. The meter shall send a 4-20 ma signal of the flow rate to the telemetry system.
 6. The meter totalizer shall send a 24 VDC pulse to a relay or be a dry contact style. The relay shall provide contact closure for connection to remote telemetry.
- F. Vertical Turbine Pumps:
1. The separation between the bottom of the bowls and the bottom of the pump can shall be 24-inch minimum unless otherwise specified by Hydraulic Institute Standards.
 2. All pump cans shall be a minimum of 1/4 inch thick steel and/or as specified by the manufacturer. The configuration and dimensions of the pump barrel shall be shown on the plans per the manufacturer's recommendations. Pump cans shall be encased in at least 6 inches of steel reinforced concrete. Each

- suction can shall have an isolation valve on the suction side and an air valve at the top of the can.
3. The manufacturer of pumps shall be as listed in approved materials list.
- G. Each vertical turbine pump shall be equipped with a Cla-Val pump control valve with a check valve feature and dual limit switches for upper and lower limits.
1. The discharge piping downstream of the pump control valve shall be furnished with the following:
 - a. Combination air release and vacuum relief valve.
 - b. Pressure/transducer gauge connection.
 - c. Sample point.
 - d. Isolation valve.
- H. All booster pump stations shall be equipped with a Cla-Val pressure and surge relief valve to bypass back to the suction header.
1. The Cla-Val shall have the same features as above. In addition, it shall also have a limit switch and a rising stem.
 2. A high-pressure cut-off switch shall be installed preceding the pump control valve on each pump discharge. Provide a rising stem limit switch whenever available to sense pressure relief valve operation.
- I. The surge relief valve shall have isolation valves both upstream and downstream of valve.
- J. A surge analysis shall be required for the suction and discharge sides of the water booster station. Bladder style surge tanks shall be provided on the suction and discharge sides of the booster station as required by the surge analysis.
- K. All booster pump stations shall be equipped with Chloramination facilities as directed by the District.
1. The salt storage tank shall be enclosed in a room separate from the chemical room.
 2. All chemical equipment (chloramination system) shall be sized for the specific flow rates of the station. The dosage rate for sizing the chloramination equipment shall be 4mg/l.
- L. All booster pump stations shall be equipped with radio telemetry equipment. See Instrumentation specifications.
- M. The motor control center cabinet shall be elevated 6 inches above the finish floor on a concrete slab.

- N. All motors greater than 50 HP shall be equipped with soft start solid state electronic type electrical motor starting equipment with a start rated bypass contactor if not equipped with a VFD.
- O. All motors shall be premium efficiency motors, and VFD rated.
- P. Heat calculations shall be provided for the motor control center and for the motors. A cycle time requirement based upon motor heating and cooling characteristics shall be obtained from the manufacturer.
- Q. All motors, motor control centers, chemical feed systems and other electrical panels shall be placed inside of a building provided with heating and air conditioning which is thermostatically controlled. All other rooms shall have thermostatically controlled exhaust fans in lieu of air conditioning.
- R. The building shall have a restroom designed per ADA requirements.
- S. Coatings for piping, fittings and equipment shall be in accordance with Section 9 of the standard specifications, and coatings for architectural components shall be in accordance with the project-specific specifications which were reviewed during the Preliminary Design Report phase.

4.04 BOOSTER PUMPING STATION ELECTRICAL REQUIREMENTS

- A. Drawing Preparation:
 - 1. Site-adapt the District’s design guideline electrical drawings. Obtain District approval prior to adding/deleting any features.
 - 2. The electronic copy of design guideline drawings are available on the District’s website.
- B. The Engineer shall edit the District’s master specifications to site adapt for specific project and prepare specifications from District electronic files showing edit feature for all changes.
- C. Service voltage shall be 480/277 volts, 3 phase, 4 wire. Equipment voltage characteristics shall be as follows:

Equipment	Rating	Voltage	Phase
Motors	½ hp and below	115 volts	Single phase
Motors	Above ½ hp	460 volts	3 phase
Lighting		115 volts	Single phase

- D. All necessary interfacing with Southern California Edison shall be completed by the Engineer from the start of the project.
- E. Power Distribution:

1. Size service for operation of total connected load (all pumps, including standby).
- F. Exterior building lighting fixtures shall be wall-mounted LED, vandal resistant, and UL listed for wet location. Provide additional pole-mounted luminaries per District's standard drawing to illuminate station site to an average maintained illumination level of 1.0 foot-candle with an average to minimum uniformity ratio of 4:1. Locate one pole-mounted luminaire over the wet well. Control exterior building and pole-mounted luminaries with a manual override switch located near the man-gate. Exterior lighting system shall be designed to minimize offsite impact.
 - G. Interior lighting levels shall be designed to 50 foot-candles for electrical room and 30 foot-candles for all other rooms. Lighting fixtures shall be located so as to facilitate relamping and maintenance. Fixtures shall be of the types scheduled in the District's standards.
 - H. Provide a permanent on-site generator with automatic transfer switch. Size generator to power all pumps and auxiliary loads including the standby pump. A load bank shall be furnished for the generator. A Tristar docking station will be required at the site.
 - I. Provide solid-state starters for all pump motors 40 hp and larger and full-voltage, non-reversing starters for pump motors less than 40 hp. However, if utility power source voltage unbalance in area is known to exceed 1 percent, provide solid-state starters for all pump motor sizes.
 - J. An arc flash and breaker coordination study shall be completed for all stations. Appropriate breaker settings and arc flash labels shall be applied to all electrical equipment prior to start up.
 - K. Provide telemetry equipment per section 17300 of the standard specifications and as detailed within the District's plan review.
 - L. The District's system integrator consultant shall prepare the radio frequency propagation analysis described in specification Section 16. This analysis must be completed during design so that equipment manufacturers know the type of antenna and mounting to provide.
 - M. Noise Control:
 1. The motors and generator shall be so designed that the noise levels at the property line do not exceed the limits set by the local agencies codes.
 2. Submit calculations and noise worksheets for review documenting noise control design.
 - N. If VFDs are provided, submit harmonic analysis to District per specification Section 16. Perform analysis both with utility and generator as power source.

- O. All electrical equipment shall be domestically manufactured, see Approved Materials List.
- P. The design shall include a VFD bypass with a soft starter allowing each pump to be operated at full speed under PLC control while the VFD is offline.

4.05 CATHODIC PROTECTION

- A. Where the water booster pump station, piping, and/or appurtenances are likely to be subjected to corrosion especially where corrosive soils are encountered or because of other unfavorable conditions, the District may require special protective coatings and/or wrappings. In such cases the details of the materials and methods to be used shall be as specified by the Private Corrosion Engineer and approved by the District. The District may request that soil boring samples and laboratory analysis be provided as part of the project to make sure whether or not unfavorable soil conditions exist. If corrosion protection is required, it shall be designed by the Private Corrosion Engineer and approved by the District.

4.06 TYPICAL PLAN SET LISTING

- A. The following is a typical plan sheet list for a water booster pump station:
 - 1. Title Sheet
 - 2. General Notes, Legend, Benchmark and Basis of Bearings
 - 3. Location Map, Vicinity Map, List of Drawings
 - 4. Construction Notes
 - 5. Abbreviations, Pump Design Condition
 - 6. Paving/Site Plan
 - 7. Access Road Paving and Section
 - 8. Yard Piping
 - 9. Yard Piping Profiles (may be more than one sheet)
 - 10. Miscellaneous Details (may be more than one sheet)
 - 11. Pump Room Layout
 - 12. Pump Room Sections (may be more than one sheet)
 - 13. Water, Drain and Sample Line Plan
 - 14. Generator Plan and Details
 - 15. Chemical Room Layout
 - 16. Chemical Conduit Layout and Details
 - 17. Ventilation Plan
 - 18. Schedules and Details

19. Miscellaneous Mechanical Details (may be more than one sheet)
20. Diesel Fuel System and Standby Generator Details
21. Surge Tank Details
22. Gate Details
23. Architectural Cover Sheet, General Notes
24. Architectural Floor Plan, Roof Plan, Exterior Elevations, Details
25. Architectural Schedules – Door and Opening Types
26. Architectural Details
27. Structural Foundation and Floor Plan
28. Structural Roof Framing Plan
29. Structural Longitudinal Section
30. Structural Transverse Sections
31. Structural Roof Framing Sections and Details
32. Structural Foundation and Wall Details
33. Miscellaneous Structural Concrete Details
34. Electrical Symbols Notes and Abbreviations
35. Single Line Diagram and Panel Board Schedule
36. Electrical Site Plan
37. Pump Station Lighting Plan
38. Power Plan
39. Details, Sections and Elevations
40. Conduit Schedule
41. Connection Diagram
42. RTU Connection Diagram
43. Network Architecture Diagram
44. Radio Communication Plan and Details
45. P&ID Notes and Abbreviations Sheet
46. P&ID

END OF SECTION

PART 5 - WELL FACILITIES

5.01 GENERAL REQUIREMENTS

- A. All wells shall be designed and constructed in accordance with the State of California Department of Water Resources California Well Standard Bulletin 74-90 and Bulletin 74-81 and the County of Riverside Department of Environmental Health Ordinance No 682.
- B. All well facilities shall be designed to pump the maximum predicted yield against the projected system head.
- C. The well shall be thoroughly disinfected prior to any permanent pump equipment being inserted into the well following AWWA Standards. After instillation of the permanent pump equipment, the well shall be sampled by a certified operator for microbiological water quality. Analyses shall be performed by a California ELAP certified laboratory. The well shall be re-disinfected following AWWA Standards and re-tested as necessary, and as Directed by the District. The Design Engineer or Hydrogeologist for the project shall confirm whether sampling for each well is required to meet State of California Water Resources Control Board Title 22 requirements.
- D. All parts and coatings in contact with water shall be NSF/ANSI 61 approved.
- E. All pipelines, closures, and connecting materials shall be disinfected per the requirements of AWWA section C-651. The well facilities shall be constructed per the requirements of AWWA section A-100.

5.02 SITE REQUIREMENTS

- A. All well facilities require the parcel to be deeded to the District.
 - 1. Prior to any construction, a Grant Deed with legal description and plat map must be prepared, approved, and recorded by the District.
 - 2. The Engineer of Work shall obtain an address for the site through the City or County.
- B. All well facilities shall have a concrete surface within the station. AC pavement may be used for driveway or access road only. Concrete and AC pavement shall be in accordance with Section 3.02 (B).
- C. A sewer connection shall be provided if a chlorine residual analyzer requires a reagent or an ammonia analyzer.
- D. All facilities shall have a minimum 8-foot-high split face stone (tan) exterior block wall.

- E. All facilities shall have legal address and identification named displayed by signage affixed to the block wall at the front of the facility. See Supplemental Drawings.
- F. Double leaf swing gates with electric operators shall be provided for all booster station sites. The gates and operators shall be protected from vandalism and theft to the satisfaction of the District. Prior to design, the Developer shall coordinate with the District for the current operator and access system utilized by the District. All well sites shall be provided with both vehicle access gates and man gates for individual access. Card readers shall be provided on the interior and exterior of all gates.
 - 1. The wrought iron material shall be square tubular sections of hot rolled mild steel, conforming to ASTM A 501 with a minimum thickness of 0.083 for 2 inch and 0.049 for 5/8 inch.
 - 2. All portions of the gate shall be hot dipped galvanized after all welding is completed.
- G. All well site facilities shall be designed with a separate Edison transformer and meter area with a separate access way. The Edison transformer and meter area shall not have access to any other area within the well facility site.
 - 1. The Edison access gates shall be of the same wrought iron material and style as used on the well facility's access gates with a double lock for two padlocks.
- H. All facilities shall be designed with a low-level LED lighting system. The low-level LED lighting system shall have a manual override switch located near the man gate and shall be controlled by SCADA. The lighting system shall be designed and directed to minimize off-site impact.
- I. All motors, motor control centers, chemical feed systems and other electrical panels shall be placed inside of a building provided with heating and air conditioning which is thermostatically controlled.

5.03 FEATURES AND APPURTENANCES

- A. All pump discharge headers shall be above ground up to and including the valve immediately downstream of the static mixer and shall generally be equipped as shown in the design guidelines for a typical wellhead facility, as well as the following items:
 - 1. A 1-inch bronze corp stop is required on each discharge header leg (Edison pump test purposes). Location of corp stop shall consider Edison requirements.
 - 2. Provide couplings or fittings as required to provide easy removal and replacement of all valves and equipment. Flexible type couplings shall have tie rods.
- B. Provide above ground telemetry transducer connections and pressure switches on discharge piping, location to be reviewed by District.

1. A 1/2 inch tap is required for an above ground connection or the telemetry transducer on the pump discharge header.
- C. A totaling and instantaneous magnetic flow meter is required on the main discharge piping.
1. The meter shall be connected to the districts automated meter reading system per the requirements of the specification section 13422.
 2. All meters are to be above ground unless otherwise authorized by the District. Meters shall be furnished with a read indicator which shall be mounted to the station wall, or on a support strut adjacent to piping for specific District- authorized configurations.
 3. The meter shall be located in accordance with manufacturer's guidelines from points of turbulence.
 4. The magnetic meter shall read in gallons per minute and total in 10,000 gallons. The meter shall be "tube type" probe "mag meter".
 5. The meter shall send a 4-20 ma signal of the flow rate to the telemetry system.
 6. The meter totalizer shall send a 24 VDC pulse to a relay or be a dry contact style. The relay shall provide contact closure for connection to remote telemetry.
- D. All potable water well pumps shall be deep well vertical turbine type. See specifications in Division 11.
1. The separation between the bottom of the strainer and the bottom of the well shall be 15-foot minimum.
 2. The manufacturer of pumps shall be as listed in approved materials list.
- E. Each pump shall be equipped with a Cla-Val pump control valve.
- F. All well facilities shall be equipped with microbiological disinfection treatment, using chlorination and chloramination as directed by the District. Dedicated labeled water sampling taps shall be provided for raw water, process control, and treated water at locations approved by the District. Dedicated continuous analyzer sample water feed lines shall be provided at locations approved by the District.
- G. A surge analysis shall be required.
- H. A sand separator may be required dependent on sand production from the well.
- I. All well facilities shall be equipped with radio telemetry equipment. See Instrumentation specifications.
- J. All electrical equipment shall be domestically manufactured, see Approved Materials List.

- K. The motor control center cabinet shall be elevated 6 inches above the finish floor on a concrete slab.
- L. All motors greater than 50 HP shall be equipped with soft start solid state electronic type electrical motor starting equipment with a start rated bypass contactor.
- M. The starters shall be from manufacturers indicated in the Approved Materials List. All motors shall be in accordance with Division 16 of the Standard Specifications.
- N. Heat calculations shall be provided for the motor control center and for the motors. A cycle time requirement based upon motor heating and cooling characteristics shall be obtained from the manufacturer.
- O. Provide connections for a standby generator that is sized to handle the operational electrical load for the facility.
- P. Coatings for wellhead facility piping, fittings and equipment shall be in accordance with Section 9 of the Standard Specifications.

5.04 CATHODIC PROTECTION

- A. Where the well facilities, piping, and/or appurtenances are likely to be subjected to corrosion especially where corrosive soils are encountered or because of other unfavorable conditions, the District may require special protective coatings and/or wrappings. In such cases the details of the materials and methods to be used shall be as specified by the Private Corrosion Engineer and approved by the District. The District may request that soil boring samples and laboratory analysis be provided as part of the project to make sure whether or not unfavorable soil conditions exist. If corrosion protection is required, it shall be designed by the Private Corrosion Engineer and approved by the District.

5.05 TYPICAL PLAN SET LISTING

- A. The following is a typical plan sheet list for a well head facilities project, at a minimum all identified sheets shall be included:
 - 1. Title Sheet (includes vicinity and location maps)
 - 2. General Notes, Legend, Basis of Bearings, Benchmark List of Drawings
 - 3. Construction Notes and Abbreviations
 - 4. Site and Grading Plan
 - 5. Horizontal Control and Paving
 - 6. Site Piping Plan
 - 7. Site Piping Profiles
 - 8. Offsite Transmission Main Pipeline Plan and Profile (may be more than one sheet)

9. Mechanical Site Plan
10. Mechanical Sections and Details (may be more than one sheet)
11. Architectural Cover Sheet, General Notes
12. Architectural Floor Plan, Roof Plan, Exterior Elevations, Details
13. Architectural Schedules – Door and Opening Types
14. Architectural Details
15. Structural Foundation and Floor Plan
16. Structural Roof Framing Plan
17. Structural Longitudinal Section
18. Structural Transverse Sections
19. Structural Roof Framing Sections and Details
20. Structural Foundation and Wall Details
21. Structural Wetwell Plan and Section
22. Structural Miscellaneous Concrete Details
23. Structural Symbols Notes and Abbreviations
24. Chemical Room Layout
25. Chemical Storage and Injection Systems Layout and Details
26. Electrical Symbols Notes and Abbreviations
27. Electrical Site Plan and Notes
28. Single Line Drawing
29. Lighting, Power and Signal Plan
30. Well Site Schematic
31. Instrumentation Legend and Details
32. RTU Connection Diagram
33. RTU Radio and Tower Details
34. P&ID for Well, Chemical Feed Systems, and Miscellaneous Equipment
35. SCADA Block Diagram

END OF SECTION

PART 6 - SEWAGE LIFT STATIONS

6.01 PUMP AND MOTOR SIZING REQUIREMENTS

- A. Pump motors shall be designed to be capable of ten starts per hour, as a normal operating condition. However, the design of the pump station shall limit the starts to five per hour.
- B. All lift stations with a firm capacity of 500 gallons per minute or less shall utilize submersible pumps in a wet well. All lift stations with a firm capacity of 501 gallons per minute or more shall utilize dry pit submersible pumps installed within a drywell with a separated wetwell. Design of dry pit/wetwell lift station configurations will be at the discretion and direction of the District during the preliminary design phase. The design of dry pits shall include sufficient ventilation and air quality monitoring to where a confined space entry permit is not required for daily operation. An access staircase shall be provided for all drywells.
- C. All lift stations with an average day demand of less than 100 gallons per minute shall be provided with one duty and one standby pump. Both pumps shall match and the combination of wetwell capacity and pump capacity shall be designed to maintain required wetwell velocities while limiting pump starts per hour during low flow demand. At a minimum, each pump cycle shall discharge the total volume of water in the forcemain.
- D. All lift stations with an average day demand of greater than 100 gallons per minute shall be provided with a minimum of two duty pumps and one standby pump. All duty pumps shall be identical. The combination of wetwell capacity and single duty pump capacity shall be designed to maintain required wetwell velocities while limiting pump starts per hour during low flow demand. The combination of duty pumps shall be sized to meet maximum day demand. The design engineer shall provide an evaluation for all proposed lift stations to determine the suitability of variable frequency drives on pump motor to meet minimum and maximum flowrates.
- E. The submersible pumps shall be designed with an approved 316 stainless steel guide rail system with all 316 stainless steel cable, lift rings (at 10-foot max. spacing) and lift bail on each motor. Dry pit pumps shall be designed with a bridge or davit crane with appropriate hatches to remove the pumps as required for maintenance. Waterproof electrical disconnect plugs shall be provided within the drywell or above ground to facilitate removal of the dry pit pumps. All valving shall be designed to be above ground or in a separate dry vault.

6.02 WET WELL SIZING REQUIREMENTS

- A. All lift stations shall be designed with two-hours of emergency storage using peak flow. Additional time may be required depending on location of lift station and anticipated response time.

- B. The Hydraulic Institute standards for wet well design shall be used to guide design. Engineer shall consider using a self-cleaning type wet well in accordance with the Hydraulic Institute Standards.
- C. Minimum horizontal dimensions of any side of a rectangular wet well shall be at least eight feet (interior length). Circular wet wells shall have a minimum internal diameter of eight feet.

6.03 FORCE MAIN DESIGN REQUIREMENTS

- A. Force mains shall be sized to provide a design velocity no less than 4 feet per second with all pumps running and 2.5 feet per second during normal operations. Maximum velocity in forcemains shall be 7 feet per second.
- B. A Hazen Williams coefficient of 130 shall be used for pump and force main design calculations.
- C. Provide check valves as needed to prevent backflow into the wet well or pumping recirculation.
- D. Provide plug valves to isolate check valves and a single plug valve shall be provided to isolate the discharge header from the forcemain.
- E. Discharge piping to be installed above ground or below ground in a vault. Valves shall be designed to be operated above ground to avoid man entry requirements for normal pump station operation.
- F. Sewage air release and vacuum relief valves shall be provided at all high points and all valves shall be per the Approved Materials List. Air release valves shall be installed upstream of check valves to prevent air binding of pumps.
- G. A transient surge analysis will be required for all lift stations to determine the required surge protection equipment.
- H. A magnetic flow meter with a totalizer will be required on all discharge headers and spaced with upstream and downstream clearances per the manufacturer's requirements.
- I. All above ground piping, wetwell piping, and piping within a valve vault shall be constructed of epoxy lined and coated ductile iron. All force mains shall be constructed of ductile iron pipe with fusion bonded epoxy or ceramic lining.
- J. Dedicated and permanent bypass suction and discharge lines shall be provided at all lift stations. The suction line shall be installed at the low water level within the wetwell, continue above ground, and capped with a blind flange to facilitate connection. A permanent bypass discharge connection shall be provided onto the forcemain downstream of the lift station control valves. This connection shall be within 10-feet of the suction connection point to facilitate plumbing of the bypass

pump. The forcemain connection shall be provided with a plug valve and capped with a blind flange.

6.04 SEWAGE LIFT STATION SITE REQUIREMENTS

- A. All sewage lift station sites require the parcel to be deeded to the District.
 - 1. Before construction, a Grant Deed with legal description and plat map must be prepared, approved, and recorded by the District.
 - 2. The Engineer of Record shall obtain an address for the site through the City or County.
- B. All sewage lift stations shall be provided with a concrete driveway constructed of 560-C-3250 concrete minimum per greenbook, concrete access pad 10-feet beyond all edges of the wetwell, and a concrete pad beneath any above grade piping. A turning radius analysis shall be provided for all lift stations to ensure sufficient access is provided for District maintenance equipment. This analysis shall be provided in the PDR for the lift station and shall be reviewed and approved by the District.
- C. All sewage lift stations shall be designed to contain any spilled wastewater onsite and directed into the wetwell.
- D. All stations shall have a minimum 8-foot-high split face stone (tan) exterior block wall topped with razor wire.
- E. All stations shall have the legal address and identification name displayed by signage affixed to the block wall at the front of the station. Signage shall comply with local ordinances.
- F. Double leaf swing gates with electric operators shall be provided for all booster station sites. The gates and operators shall be protected from vandalism and theft to the satisfaction of the District. The gates and operators shall be protected from vandalism and theft to the satisfaction of the District. Prior to design, the Developer shall coordinate with the District for the current operator and access system utilized by the District. All lift station sites shall be provided with both vehicle access gates and man gates for individual access. Card readers shall be provided on the interior and exterior of all gates. All gates shall be provided so they can be locked and unlocked from both sides.
 - 1. The wrought iron material shall be square tubular sections of hot rolled mild steel, conforming to ASTM A 501 with a minimum thickness of 0.083 for 2 inch and 0.049 for 5/8 inch.
 - 2. All portions of the gate shall be powder coated after all welding is completed to protect the metal from corrosion.
- G. All stations shall be designed with a separate Edison transformer and meter area with a separate access way. The Edison transformer and meter area shall not have access to any other area within the pump station site.

1. The Edison access gates shall be of the same wrought iron material and style as used on the pump station's access gates with double locks for two padlocks.
 2. A separate enclosure shall be provided for switchgear.
- H. All stations shall be designed with an exterior lighting system. The lighting system shall have a on/off switch located near the mangate. The lighting system shall be designed and directed to minimize off site impact. The lighting control shall be tied into the telemetry system.
- I. All stations shall be designed with a masonry block building to house the motor control center, emergency generator, chemical treatment system and air compressors.
1. The building shall be designed using split face stone (tan) block with a Spanish tile roof and Spanish tile roof trim unless otherwise directed by the District.
 2. The building shall be designed with the following rooms:
 - a. One room shall be designed to be a motor control center room. The room temperature shall be thermostatically controlled and regulated by an air conditioner or heat pump. Heat calculations will be required for each design.
 - b. One room shall be designed to house the emergency generator and air compressors. The generator room temperature shall be thermostatically controlled with an exhaust fan. The generator room shall also have air intake and exhaust louvers sized for the air exchange requirements of the generator. Air exchange calculations will be required for the design. The engine room shall also have a 10-foot wide by 8 foot tall (minimum) painted steel roll up door access to allow removal and replacement of the generator if necessary. The generator room shall contain acoustical panels to ensure noise levels comply with City or County Standards.
 - c. A chemical room shall be provided for odor control chemicals to be injected into the wetwell. Any water supply for the chemical room shall have its own independent backflow preventer.
 - d. All lift stations shall be equipped with a comfort station. The comfort station shall include a lavatory with hot and cold water and a toilet.
- J. All lift station accesses to the wet well and valve vault require Bilco or District approved traffic lids with stainless steel, spring assisted doors. All lids shall be rated for H-20 loading.

6.05 SEWAGE LIFT STATION FEATURES AND APPURTENANCES

- A. All lift station valves shall be plug valves as specified by the District.
1. All plug valves shall be of the non-lubricated, eccentric type with resilient faced plugs. Resilient plug facings shall be of a type that is recommended

by the valve manufacturer to be suitable for use with raw sewage. Plug valve manufacturers shall be in accordance with the Approved Materials List. Valves shall be installed to allow for the plug to rotate up to the soffit of the forcemain limiting grit wear of the plug seat.

2. The exception to the above will be that the valves on the pipe train for the pig launcher shall be resilient wedge gate valves, if a pig launching system is required by the District.
- B. Provide couplings or fittings as required to provide easy removal and replacement of all valves and equipment.
 - C. All ductile iron pipe and fittings within the lift station site shall be lined per Standard Specifications Section 09800.
 - D. All lift stations shall be designed with a PVC liner on the interior wet well walls and ceiling. The PVC liner shall not be designed for wet well floors. The floor of the wetwell shall be sealed with a corrosion resistant epoxy coating in accordance with the Approved Materials list.
 - E. All lift stations shall be designed with Tristar docking station and emergency standby generators with an auto transfer switch feature. Generators shall be furnished by manufacturers in accordance with the Approved Materials List. Generator fuel storage shall be sized for a 24-hour period of time at full load. Fuel storage tank shall be located outside the building; fuel containment tank shall convault or approved equal.
 - F. To facilitate unit removal without wet well entry, all lift stations shall be designed with ultrasonic type liquid level indicator assembly located near the access hatch of the wet well.
 1. A secondary ultrasonic type liquid level indicator shall be designed as the back up to the primary ultrasonic system. It shall be used as a backup for pump control when the primary ultrasonic level indicator is out of service.
 - G. One float switch circuit shall be designed to signal the emergency high level alarms and turn on all pumps when the primary and secondary sensors are inoperable. The high-level alarm pump call shall override the primary and secondary level sensors. All lift stations shall be designed with a 2-inch minimum water service line to the station with backflow protection. The water meter for the service will be installed by the District.
 1. The water service shall include the meter, meter box, and an approved reduced pressure principle back flow device. The water meter will be installed by the District.
 2. The water service line and reduced pressure principal backflow device. shall be installed per EVMWD Standard Drawings W-10, W-11 and W-21.
 3. After the reduced pressure principal backflow device, one 0.75-inch diameter hose bib, 2.5-inch fire hose threaded connector and a connector

for an emergency eye wash and shower shall be installed. The location for the eyewash stations shall be approved by the District.

- H. An odor control evaluation shall be performed by the Engineer and approved by the District which consists of treating odors as compounds within the liquid phase, as well as containing and treating foul air. The recommendations of this evaluation shall be included in the preliminary design report for the lift station and reviewed by the District.
- I. At a minimum a passive carbon scrubber plumbed to the headspace of the wetwell shall be installed on all lift stations. If an active system is recommended by the odor control evaluation a backup carbon scrubber with isolation valves shall be installed.
- J. If directed by the District, the lift station shall be designed with chemical injection into the wet well and/or force main. If chemical injection is required by the District, the lift station shall contain space for chemical storage, including a chemical containment area, and it also shall contain an emergency eye wash station that is located not more than 10 seconds away from the hazard along an unobstructed access to the station per ANSI Section Z358 standards. The eye wash station shall contain a flow switch that is tied into the telemetry system.
 - 1. Electrical equipment in enclosed areas where gas may accumulate shall comply with both NEC requirements and NFPA 820 regulations for hazardous locations. A sump termination panel shall be used to terminate all wiring coming from electrical and instrumentation equipment within the wetwell. The sump termination panel shall utilize a passive venting system to separate wetwell gasses from the terminal blocks and conduits leading back to the control panel. Waterproof electrical disconnects may be utilized in place of a sump termination panel.
- K. Sewage Lift Station Electrical Requirements
 - 1. Edit District's Standard Specifications to site adapt for specific project. Prepare specifications from District provided electronic files showing edit feature for all changes.
 - 2. The electronic copy of design guideline drawings are available on the District's website.
 - 3. Service voltage shall be 480/277 volts, 3 phase, 4 wire. Equipment voltage characteristics shall be as follows:

Equipment	Rating	Voltage	Phase
Motors	½ hp and below	115 volts	Single phase
Motors	Above ½ hp	460 volts	3 phase
		(200 volts	3 phase)*
Unit heaters	2 kw and below	208 volts	Single phase
Unit heaters	3 kw and above	480 volts	3 phase
Lighting		115 volts	Single phase

*Where 480 volts is not available.

- L. All necessary interfacing with utility companies shall be completed by the consultant from the start of the project.
- M. Power Distribution:
- N. Size service for operation of total connected load (all pumps, including standby).
- O. All electrical equipment and wiring in the wet well shall comply with the applicable provisions of NEC Article 501 for Class I, Division 1 locations. All electrical equipment and wiring in the valve vault shall comply with applicable provisions of NEC Article 501 for Class I, Division 2 locations.
- P. In addition to the hazardous area classification, identify wet well and valve vault as “corrosive locations” in drawings.
- Q. Station lighting shall be designed for the following illumination levels:

Valve vault	30 foot-candles
Control room	50 foot-candles
Generator room	30 foot-candles

- R. Lighting fixtures shall be located as to facilitate relamping and maintenance.
- S. Lighting fixtures in the valve vault shall be corrosion-resistant and explosion proof (list as a minimum for use in Class I, Division 2, Group D locations). Provide light switch in the vault for control of fixtures.
- T. Interior lighting fixtures shall be enclosed and gasketed LED.
- U. Exterior building lighting fixtures shall be wall-mounted LED, vandal resistant, and UL listed for wet location. Provide additional pole-mounted luminaries per District’s standard drawing to illuminate station site to an average maintained illumination level of 1.0 foot-candle with an average to minimum uniformity ratio of 4:1. Locate one pole-mounted luminaire over the wet well. Control exterior building and pole-mounted luminaries with a manual override switch located near the man-gate. Exterior lighting system shall be designed to minimize offsite impact.
- V. Battery-operated emergency lights shall be provided in the control room and in the generator room.
- W. Provide permanent on-site generator with automatic transfer switch. Size generator for starting pumps with full voltage starting to account for possibility of solid-state starter failure. Where the pump sizes are relatively small (up to 75 hp), the generator shall be sized to start and run all of the pumps, including standby pumps, and serve all other loads at the station. Where the pump sizes are 100 hp or larger, the generator shall be sized to start and run all non-standby pumps and serve all other loads at the station. Necessary interlocks shall be provided to prevent the standby pump from starting and running when the station is on standby generator power. However, the standby pump

shall be capable of starting and running, if one of the other pumps fails to start. Size the generator to limit transient voltage dip to 20 percent.

1. Ample flow of air to support combustion and to dissipate the heat produced shall be provided. The ventilation design shall be based on the air requirements for the size of generator set being used.
 2. The exhaust system shall be complete with flexible connection, exhaust pipe, condensation trap with drain, exhaust silencer, wall thimble, support hardware, etc. The silencer and exhaust piping within the generator room shall be insulated and covered and shall be supported independently of the engine. The exhaust outlet shall be taken through the wall, not through the roof. The end of the exhaust pipe shall be turned up and fitted with a rain cap.
 3. Provide solid-state starters with bypass starters for all pump motors.
- X. BB. Provide 36-inch space adjacent to the MCC controls section for a future SCADA system cabinet.
- Y. Noise Control:
1. The various systems shall be designed so that the noise levels at the property line do not exceed the limits set by the City/County codes.
 2. Source of noise for exterior control are the ventilation fans, pump operations, generator exhaust, odor control system (where used), etc.
 3. Worksheets shall be completed and submitted for review documenting noise control design data and calculations.
- Z. If VFDs are provided, submit harmonic analysis to District per specification Section 16. Perform analysis both with utility and generator as power source.

6.06 CATHODIC PROTECTION

- A. Where the sewage lift station, piping, and/or appurtenances are likely to be subjected to corrosion especially where corrosive soils are encountered or because of other unfavorable conditions, the District may require special protective coatings and/or wrappings. In such cases the details of the materials and methods to be used shall be as specified by the Private Corrosion Engineer and approved by the District. The District may request that soil boring samples and laboratory analysis be provided as part of the project to make sure whether or not unfavorable soil conditions exist. If corrosion protection is required, it shall be designed by the Private Corrosion Engineer and approved by the District.

6.07 TYPICAL PLAN SET LISTING

- A. The following is a typical plan sheet listing for a sewage lift station project:
1. Title Sheet
 2. General Notes, Legend, Benchmark and Basis of Bearings

3. Location Map, Vicinity Map, List of Drawings
4. Construction Notes
5. Abbreviations, Pump Design Condition
6. Paving/Site Plan
7. Access Road Paving and Section
8. Yard Piping Plan (may be more than one sheet)
9. Yard Piping Profiles (may be more than one sheet)
10. Miscellaneous Details (may be more than one sheet)
11. Wet Well and Valve Vault Plan
12. Wet Well Sections (may be more than one sheet)
13. Water, Drain and Sample Line Plan
14. Generator Plan and Details
15. Chemical Room Layout
16. Chemical Storage and Injection Systems Layout and Details
17. Ventilation Plan
18. Schedules and Details
19. Miscellaneous Mechanical Details (may be more than one sheet)
20. Diesel Fuel System and Standby Generator Details
21. Surge Tank Details
22. Odor Control System Details
23. Gate Details
24. Architectural Cover Sheet, General Notes
25. Architectural Floor Plan, Roof Plan, Exterior Elevations, Details
26. Architectural Schedules – Door and Opening Types
27. Architectural Details
28. Structural Symbols Notes and Abbreviations
29. Structural Foundation and Floor Plan
30. Structural Roof Framing Plan
31. Structural Longitudinal Section
32. Structural Transverse Sections
33. Structural Roof Framing Sections and Details
34. Structural Foundation and Wall Details
35. Structural Wetwell Plan and Section

36. Structural Miscellaneous Concrete Details
37. Single Line Diagram and Panel Board Schedule
38. Electrical Site Plan
39. Pump Station Lighting Plan – Light Fixture Schedule
40. Power Plan
41. Details, Sections and Elevations
42. Conduit Schedule
43. Logic Control Diagram
44. Process and Information Diagram
45. RTU Connection Diagram
46. RTU Radio and Tower Details

END OF SECTION