

LWD STANDARD SPECIFICATIONS

DIVISION 1 – SEWER SYSTEM PROCEDURES, PLANNING, AND DESIGN PART 1 – PREPARATION AND PROCESSING OF WASTEWATER FACILITY PROJECTS

1.01 Introduction

Utility improvement projects may include wastewater collection, pumping, and transmission facilities that connect to the Leucadia Wastewater District (LWD) sewer system. The usage, type, design and construction of such facilities must comply with LWD rules and regulations, including this Standard Specification (Standard Spec) and the LWD Wastewater Ordinance. Upon successful design, construction, and completion of sewer facilities in accordance with the Standard Spec, ownership of the sewer facilities, with the exception of facilities within private buildings and sewer service laterals, is generally transferred to LWD, which assumes responsibility for their operation and maintenance.

These procedural guidelines are intended to provide the public and LWD staff with well-defined, concise, and understandable procedures for the processing of sewer improvement projects.

These guidelines are not a substitute for regulations and permitting requirements of other public agencies, such as the Cities of Carlsbad and Encinitas. Owner is solely responsible for ensuring compliance with all non-LWD regulations and permitting requirements.

1.02 Definition of Terms and Abbreviations

The following Definition of Terms are in addition to those specified in the "Greenbook", Standard Specification for Public Works Construction, latest edition plus latest Supplement only as prepared and published as intermediate amendments to the Greenbook by Public Works Standards, Inc.

Acceptance - The action by LWD accepting ownership of privately constructed sewer facilities in accordance with this Standard Spec. See Final Acceptance for a list of requirements.

Agency - Shall be interpreted throughout the Standard Spec and Greenbook to be the LWD.

Appurtenances - Valves, pumps, piping, fittings, cleanouts, manholes, frames and covers, lateral markers, and all other work required to make a complete sewer installation.

Board - The Board of Directors of the Leucadia Wastewater District (LWD).

Building Sewer – Privately owned sewer facilities that convey wastewater to the public sewer system.

Collection Line - LWD's sewer pipeline to which the sewer service laterals are connected.

Contract - The Contract between the Owner and the Contractor.

Contractor - The person or entities entering into a contract with the Owner for performance of the work or improvement pursuant to certain specifications. The Contractor shall be a licensed State of California Class-A, or approved Class C-34 or C-42 contractor.

Developer - Same as Owner.

District - The Leucadia Wastewater District (LWD).

Engineer - Shall be interpreted to be the same as the LWD District Engineer, unless otherwise noted.

Field Approval – Construction work is considered to have Field Approval after the following activities are complete: all construction work; Owner notification to District that construction is complete; inspection and approval of final work by the LWD Inspector; Inspector submittal of written final project inspection report recommending acceptance of work by the LWD General Manager.

Final Acceptance – Same as **Acceptance**. Final Acceptance only occurs after all of the following items and actions are complete: issuance of title insurance for all project easements; Field Approval; Notice of Completion is filed with County Recorder with no resulting liens claimed after 60 days posting; filing of the Dedication of Sewers Form by the Owner with LWD; receipt and acceptance of as-built record drawings by LWD from Owner; completion of all other pre-acceptance items required by this Standard Spec, and execution and recordation of a Notice of Acceptance by the LWD General Manager.

FOG (Fats, Oils and Grease). Any substance, such as a vegetable or animal product, that is used in, or is a byproduct of, the cooking or food preparation process, and that turns or may turn viscous or solidifies with a change in temperature or other conditions.

Food establishment. Facilities defined in California Uniform Retail Food Services Establishments Law (CURFFL, California Health & Safety Code section 113789), and any commercial entity operating in a permanently constructed structure such as a room, building, or place, or portion thereof, maintained, used, or operated for the purpose of storing, preparing, serving, or manufacturing, packaging, or otherwise handling food for sale to other entities, or for consumption by the public, its members or employees, and which has any process or device that uses or produces FOG, or grease vapors, steam, fumes, smoke or odors that are required to be removed by Type I or Type II hoods. A limited food preparation establishment is not considered a food services establishment when engaged only in reheating, hot holding or assembly of ready to eat food products and as a result, there is no wastewater discharge containing a significant amount of FOG. A limited food preparation establishment does not include any operation that changes the form, flavor, or consistency of food.

General Manager - Same as LWD District Manager

Grease control device. Any grease interceptor, grease trap or other mechanism, device, or process, which attaches to, or is applied to, wastewater plumbing fixtures and lines, the purpose of which is to trap or collect or treat FOG prior to it being discharged into the sewer system. Grease Control Devices may also include other proven methods to reduce FOG, subject to the approval of the District.

Grease interceptor. A multi-compartment device that is constructed in different sizes and is generally required to be located according to the California Plumbing Code, underground between a food

establishment and the connection to the sewer system. These devices primarily use gravity to separate FOG from the wastewater as it moves from one compartment to the next.

Grease trap. A grease control device used to serve individual fixtures, and is not an approved substitute for a grease interceptor.

Inspector - The personal representative of LWD acting through LWD, the LWD District Manager, or the LWD District Engineer.

Island Area Plan. The Island Area Collection System Plan adopted by LWD as may be updated from time to time. The Island Area Plan provides sewer facility planning and design guidance for the area within LWD's sphere of influence in the City of Encinitas commonly referred to as the "Island Area" that is generally located west of Interstate 5, east of Highway 101, south of La Costa Avenue and north of Encinitas Boulevard. A copy of the Island Area Plan is available for inspection at the LWD office.

Limited food preparation establishment. See food establishment.

LWD District Engineer - A registered engineer appointed by LWD to act directly, or through properly authorized agents, on behalf of LWD.

LWD District Manager - The General Manager of LWD.

LWD Wastewater Ordinance – Ordinance 119 adopted by the LWD Board of Directors on April 3, 2008, as may be amended from time to time. Privately constructed sewer facilities and the Standard Spec are subject to the terms and conditions of the LWD Wastewater Ordinance, which is the principal regulatory document for LWD,

Owner - Any property owner or agent thereof who makes application for LWD service or enters into an agreement with LWD and/or any person or entity who agrees to construct and install facilities which after acceptance will become part of LWD's system and who must select and employ a licensed Class-A, or approved C-34 or C-42, contractor to perform the work.

Private Contract Work - Work done pursuant to a Contract between Contractor and Owner.

Private Engineer - A registered civil engineer employed by Owner.

Privately Owned Sewer Facilities – Private Sewer Facilities that are not intended for dedication and acceptance by LWD.

Private Sewer Facilities – Sewer Facilities that are privately constructed and not dedicated and accepted as a public sewer facility by LWD. Private sewer facilities generally include sewer facilities within a privately owned building, service laterals, private pump stations, grease interceptors, and all facilities located between the sewer customer and the connection to the collection line, including the integral wye fitting that connects to the privately owned Service Lateral.

Public Sewer Facilities – Sewer Facilities owned and maintained by LWD, including facilities designed and constructed by LWD and facilities that have been dedicated and accepted as part of the public sewer

by LWD. Private sewer facilities constructed for dedication to LWD do not become public sewer facilities until they have been accepted by LWD in accordance with this Standard Spec.

Real Property Owner – The owner of any land where sewer facilities are to be constructed, including property served by the project and any other properties where sewer facilities will be installed. All applications, agreements or other documents that affect real property must be executed by, or include written authorization from, the owner of the real property affected.

Sewer Service Lateral, Service Lateral, or Lateral - Sewer pipeline from the plumbing of a building to a collection line including portions that extend across public rights-of-way and the saddle, wye or other physical connection to the Collection Line. Service laterals are privately owned and maintained.

Sewer Facilities – All facilities, public or private, used for the transfer, storage and treatment of wastewater, including without limitation, building sewers, service laterals, collection lines, force mains, pump stations, plant headworks, grease interceptors, treatment plants and related appurtenances.

Sewer service permit. Permits issued by the LWD that authorize discharge into the Public Sewer System, including permits issued prior to adoption of this Ordinance.

Specifications - The LWD Standard Spec and the Standard Specifications For Public Works Construction - latest Edition (Greenbook) plus latest Supplement only as prepared and published as intermediate amendments to the Greenbook by Public Works Standards, Inc. If in conflict, these standards govern in the order stated with the LWD Standard Spec having precedence. Other Greenbook supplements by other agencies, such as the County of San Diego or the City of San Diego or other, shall not apply to work in LWD.

Standard Drawings – Division 3 of the LWD Standard Spec, and 2) the Regional Standard Plans For Public Works Construction - latest Edition. If in conflict, the LWD Standard Spec Division 3 Drawings shall have precedence.

Subdivider – Same as Owner and Developer.

Trunk Line - A main line sewer pipeline to which collection lines are connected and which serves the primary purpose of transporting sewage from collection lines to the treatment plant.

See Abbreviations on the next page.

The following Abbreviations are in addition to those specified in the Greenbook.

Abbreviation	---	Word or words
APPROX	---	Approximately
CL	---	Class, Centerline, or Clearance
CLR	---	Clear
CMP	---	Corrugated Metal Pipe
CONT	---	Continuation
CPLG	---	Coupling
DEF	---	Deflection
DR	---	Drive
E	---	Existing or Electrical or East
EXIST	---	Existing
FLG	---	Flanged
FT	---	Feet
G	---	Gas
HP	---	High Pressure
IE	---	Invert Elevation
IRR	---	Irrigation
LWD	---	Leucadia Wastewater District.
MIN	---	Minimum
MJ	---	Mechanical Joint
MSL	---	Mean Sea Level
N	---	North
OH	---	Overhead
PE	---	Plain End
PL	---	Property Line
PR	---	Preliminary Title Report
RD	---	Road
REQD	---	Required
RT	---	Right (Turn)
RW	---	Recycled Water
R/W or ROW	---	Right-Of-Way
SCH	---	Schedule
SDG&E	---	San Diego Gas & Electric Company
SDRSD	---	San Diego Regional Standard Drawings
SO	---	South
SQ	---	Square
ST	---	Street
T	---	Telephone
TV	---	Television
UG	---	Underground
USC&GS	---	United States Coast & Geodetic Survey
W	---	Water or West
W/	---	With

1.03 Design and Construction Policy

LWD requires that private sewer facilities be designed and constructed in the manner that is best suited for existing and future service requirements. This policy helps reduce costs and facilitate proper planning and orderly expansion of sewer service, avoids the need to reconstruct sewer facilities not properly designed for future demands, and minimizes public and private inconvenience caused by sewer facility construction projects. To accomplish these objectives, LWD District Engineer applies the following policies to the design and construction of new sewer facilities:

A. New Sewer Facilities:

1. Sewer facilities shall comply with this Standard Spec and the LWD Wastewater Ordinance;
2. Sewer facilities accepted by LWD shall be constructed in the public right-of-way whenever feasible;
3. Where construction of sewer facilities to be dedicated to LWD within a public right-of-way is not feasible, they shall be located within easements dedicated to LWD;
4. Extension of public sewer in streets shall be required at least 10 feet upstream of the downstream boundary of the property being served, or longer as necessary to accommodate the number of sewer laterals being connected from that property;
5. Each Owner shall be responsible for the design and construction of all on-site and off-site sewer facilities necessary to accommodate their project, as reviewed and approved by LWD;
6. Each Owner shall be responsible for attainment of private easements needed to connect their project to the LWD sewer system;
7. Each Owner shall provide LWD approved easements necessary to accommodate connection of upstream properties to the LWD sewer system;
8. Extension of sewer easements and public sewer in sewer easements for future upstream sewer connections shall be required across the entire real property requesting sewer service with termination at a new upstream manhole in public right-of-way wherever possible;
9. Sewer facilities shall be of a size, slope, and depth necessary to serve both on-site real property and all potential properties that may need to connect to the sewer facilities in the future; and
10. Sewer facilities shall comply with planning and design guidance adopted by LWD for specified areas, such as the Island Area Plan.

These policies are addressed in more detail below. Owners are strongly encouraged to meet with the District Engineer early in the planning process to scope the overall needs of a proposed project.

1.04 Construction of Facilities by LWD

LWD will not construct facilities to provide utility service to land being divided for a subdivision or parcel map development, except where facilities to be constructed are part of the LWD Capital Improvement Program or as a formal LWD Improvement District or Assessment District with organization and funding previously approved by the LWD Board of Directors.

1.05 Facilities Dedicated To LWD by Owners

Owners of land will provide, at their own expense, all facilities required for utility service within the area to be developed.

Owner shall provide all necessary sewer and related technical documents including: sewer study, tentative map, final map, preliminary title report, sewer improvement plans, grading plans, geotechnical investigation and report, annexations, easements, and encroachment permits prepared by the Private Engineer, who shall be a civil engineer licensed by the State of California. All such documents shall be prepared and submitted to LWD together with any required agreements and fees for review and approval by the LWD District Engineer. The Private Engineer shall be solely responsible for the technical adequacy and accuracy of all technical documents regardless of review and approval by LWD or the LWD District Engineer.

To provide required services within a development, it may be necessary for an Owner to also provide certain off-site facilities or to over-size the on-site facilities, that are to become part of the LWD system. In such event, Owner may be entitled to reimbursement of certain costs for such off-site or over sizing of on-site facilities in accordance with requirements discussed hereinafter for Reimbursement Agreements.

1.06 Construction of Sewer Facilities That Will Not be Dedicated to LWD

All sewer service laterals shall be designed, constructed, inspected, tested, and approved in accordance with the LWD Standard Spec and LWD Wastewater Ordinance. Ownership and maintenance of all sewer service laterals will remain with the property owner. Sewer service laterals shall not be dedicated to LWD, nor shall LWD accept ownership or maintenance of sewer service laterals from Owner.

Private multi-unit sewer laterals and private pump stations are disfavored design options that are only allowed where there is a showing of unusual circumstances, such as technical infeasibility or significant hardship. The District Engineer must also find that they will not pose an unacceptable risk to the public sewer system. Multi-unit sewer laterals and private pump stations require a Supplemental Sewer Service permit. Supplemental permit conditions for private multi-unit sewer service laterals shall require a formal agreement between Owner and LWD in the form of a **PRIVATE SEWER SERVICE LATERAL AGREEMENT, APPENDIX R**. Supplemental permit conditions for privately owned pump stations shall require a formal agreement between Owner and

LWD in the form of a **PRIVATE SEWER SERVICE PUMP STATION AGREEMENT, APPENDIX S**. The agreement(s) shall be recorded by Owner against, and shall be an obligation running with, the property. The agreement(s) shall include requirements for Owner and all future owners of all, or any portion of, the property to be solely liable and responsible for compliance with the LWD Standard Spec regarding design, construction, operation, maintenance, repair, and replacement of the privately owned sewer facilities. Owner shall comply with the LWD Standard Spec and shall submit such design packages to LWD for review, approval, and for record purposes. LWD shall have no obligation whatsoever to design, construct, operate, maintain, repair, or replace any aspect of privately owned sewer facilities. Each such agreement will be subject to the requirements, review, and approval of LWD.

1.07 Development Requirements and Procedures

This section sets forth the general permit, planning and development requirements for privately constructed sewer facilities. Any questions or matters not covered herein or required interpretation of any part of these procedures shall be brought to the attention of the LWD District Engineer for clarification.

A. Sewer Service Permit

A Sewer Service Permit is required for all privately constructed wastewater facilities. There are three general permit categories: (1) Industrial Wastewater, (2) Food Establishment Wastewater, and (3) Domestic Wastewater. In addition, Supplemental Permits are required for private pump stations and multi-unit laterals, and Permit Amendments are required for work involving existing facilities. Refer to the LWD Wastewater Ordinance, Article III, for detailed information regarding permit categories and procedures. The information and procedures below are intended to implement the permit requirements of the LWD Wastewater Ordinance.

B. Legal Description and Annexation Status Determination

The following process shall be used to determine if annexation of the subject property into the LWD service boundary is required:

1. A legal description of the property to be served by the proposed sewer and any property through which that sewer will traverse must be filed with LWD in the form of a Preliminary Title Report or equivalent documentation acceptable to the LWD District Engineer;
2. LWD will review the property location and LWD files to determine whether the subject property is within the existing LWD district boundary, or whether the property is eligible to be annexed to LWD;
3. If the property is not currently within the LWD district boundary, LWD staff will determine if the property is within the "sphere of influence" approved by the Local Agency Formation Commission (LAFCO) and whether the property can physically be served by LWD; and

4. LWD will inform Owner if annexation to the District is required and, using the information provided at the time, provide a preliminary assessment of any special sewer requirements that would be imposed by LWD, as a condition of annexation. If required, the annexation must be processed through LAFCO by either Owner Initiated, or District Initiated proceedings. The District Initiated process is further described hereinafter.
- C. Annexation Procedure: The following rules and procedures apply to LWD initiated annexations:
1. If LWD determines that annexation is appropriate and elects to initiate the process, LWD will provide a **CONSENT TO ANNEXATION FORM, APPENDIX J** and a **LAFCO CHANGE OF ORGANIZATION APPLICATION, APPENDIX K** to Owner;
 2. Owner must return the executed **CONSENT TO ANNEXATION FORM, APPENDIX J**, the **LAFCO CHANGE OF ORGANIZATION APPLICATION, APPENDIX K**, and an annexation review deposit to LWD;
 3. Owner shall prepare the following sections of the LAFCO Change of Organization Application prior to LWD review of Annexation:
 - a. Metes and bounds legal description;
 - b. Reproducible parcel/plat map and vicinity map; and
 - c. California Environmental Quality Act (CEQA) documentation prepared under the direction of LWD or other agency acting as lead agency for purposes of CEQA. CEQA documentation may be in the form of a Notice of Exemption, Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report that specifically addresses environmental impacts of the proposed annexation to LWD;
 4. LWD staff will prepare a Resolution for approval by the LWD Board of Directors that will include the LWD Consent to Annexation Form, LAFCO Change of Organization Application, legal description, plat map, etc.;
 5. Upon approval of the Resolution by the LWD Board of Directors the Resolution is sent by LWD to LAFCO together with the completed LAFCO Change of Organization Application, LWD Consent to Annexation Form, Sewer Availability Letter, Metes and Bounds Legal Description, Plat Map, CEQA documents, and LAFCO payment to LWD by Owner;
 6. LWD should thereafter receive a certificate of filing from LAFCO after all necessary materials are received and acknowledged by LAFCO;
 7. LAFCO will then conduct an Authority Hearing to determine the status of the Annexation and may waive notice, hearing, and election;

8. If a hearing is not waived by LAFCO and there is protest of 50% or more, Annexation is canceled. If protest is greater than 25% and less than 50% a vote is held. When the majority of voters approve the Annexation, it is approved by LAFCO. LWD will be sent a copy of the LAFCO resolution regarding the annexation;
9. LWD will request a check for payment to the State Board of Equalization from Owner;
10. LAFCO will issue and LWD will receive a Certificate of Completion; and
11. LWD will refund any unused portion of the annexation deposit, or additional funds will be requested for payment to cover the LWD cost of processing.

D. Miscellaneous Project Reviews:

1. Owner may submit miscellaneous items to LWD for review, such as: tentative maps ("TM"); minor grading plans for small projects; requests for sewer availability letters for submittal to jurisdictional cities, and other similar items.
2. Such items shall be submitted for review in sufficient time for LWD to provide sewer conditions to Owner and jurisdictional city.
3. At the time of filing, Owner shall deposit with LWD a sum, to cover the estimated cost of LWD District review, plan checking, and engineering services.
4. LWD will review the requested items and provide any special sewer system requirements, including annexation if necessary.

E. Plan Check Application: Owner is responsible for preparation of detailed engineering drawings, easements, encroachment permits and other documents required for the approval and construction of the proposed sewer facilities. Information provided shall include design specifications for proposed or existing grease control devices for food establishments. The plans, easements, and encroachment permits shall be prepared in accordance with this LWD Standard Spec. Each sewer system shall provide for sewer service, where applicable, to each lot in a subdivision and to each parcel in a parcel map development. The utility system proposed shall not be detrimental in any way to operation of the current or proposed LWD utility system. The following procedures apply to plan submittals:

1. Owner submits **APPLICATION FOR PLAN CHECK, APPENDIX I**, to LWD. LWD staff calculates the amount of the plan check deposit in accordance with the current LWD fee schedule and requests deposit from Owner. LWD staff opens a project file by starting a **PROJECT CHECKLIST, APPENDIX L**. LWD staff is responsible for maintaining and updating the project checklist as the project milestones are accomplished;

2. Owner submits plan check fee and documents including:
 - a. Two blueline sets of the Sewer Improvement Plans;
 - b. One copy of the Grading Plans for informational purposes only;
 - c. Electronic files, if applicable, containing the project boundary with streets, parcels or lots, sewer pipelines, and manhole locations;
 - d. One copy of the Tentative Tract Map or Parcel Map;
 - e. Preliminary Title Report;
 - f. One copy of the Conditions of Approval;
 - g. One copy of the design calculations for the sizing of the wastewater system;
 - h. LWD Sewer Easement and / or Quitclaim documents, if applicable;
 - i. LWD Encroachment Permit documents, if applicable;
 - j. LWD Sewer Supplement, if applicable; and
 - k. Grease Control Device specifications, if applicable;
3. LWD assigns a location code number to project for cost tracking and forwards deposit to LWD Finance Department;
4. LWD assigns a task order number and authorization to LWD Engineer for the project; and
5. Both sets of plans are delivered to LWD District Engineer for plan checking.

F. Easement or Right-Of-Way for Public Sewer Facilities

1. Whenever plans provide for any portion of facilities intended for dedication to LWD to be constructed in other than a dedicated public street or road, Owner shall grant or cause to be granted an easement or right-of-way along with a title report and title insurance insuring clear title in favor of LWD.
2. LWD may require that the grant of easement provide a right-of-use by off-site properties for LWD sewer system construction, connection, and maintenance purposes.
3. LWD easements shall be exclusive unless otherwise approved by LWD Engineer. In some cases, LWD may allow joint use of easements subject to review and approval and conditions set by LWD Engineer.
4. Owner shall obtain easement approval from LWD Engineer as follows:
 - a. LWD will determine the form of the Grant of Sewer Easement. The Sewer Easement shall be an **EXCLUSIVE SEWER EASEMENT, APPENDIX A**, unless otherwise approved by LWD Engineer. As requested and only if approved by LWD Engineer, the Grant of Sewer Easement may be in the form of a **NON-EXCLUSIVE SEWER EASEMENT, APPENDIX B**;
 - b. Owner shall submit a plat map and legal description of the easement, prepared by a registered California Civil Engineer. The plat map shall

normally be prepared using a readable scale drawing on standard 8.5"X11" paper showing all dimensions and necessary data. The LWD Engineer will then send the appropriate document to Owner for signature in the form of either an **EXCLUSIVE SEWER EASEMENT, APPENDIX A** or a **NON-EXCLUSIVE SEWER EASEMENT, APPENDIX B** to Owner for signature;

- c. Owner shall submit the Sewer Easement document to LWD for review with a Preliminary Title Report (PR) for easement title insurance for the benefit of LWD. The conditions of the easement title insurance shall be as follows:
- (1) The PR and final standard policy of title insurance shall be prepared specifically for the Sewer Easement. The standard policy of title insurance shall be subject to the review and approval of the LWD District Engineer;
 - (2) All encumbrances to the area of the easement shall be shown on the plat map and all exceptions to the title insurance exclusively for the easement shall be listed in the PR and final policy of title insurance. Exceptions not applying to the easement shall not be included in the PR;
 - (3) Owner shall cause all existing lenders and owners of the property to subordinate their interests to the rights of the new easement by prior or concurrent recorded document;
 - (4) Any and all prior rights in the real property of the proposed sewer easement and owners of said rights shall be identified by Owner. The requirements of those prior easements shall be satisfied by Owner with regard to the recording of the new sewer easement. If required by LWD, Owner shall cause subordination or joint use agreements with the prior rights easement holders to be recorded prior or concurrent to the new easement. LWD will assist, at Owner's expense, in the negotiation of a joint use agreement, if necessary, and if LWD approves joint use of the easement area;
 - (5) Satisfied or paid Deeds of Trust shall be removed from the policy at the effort and expense of Owner;
 - (6) Property tax payments shall be paid through the most recent bi-annual assessment;
 - (7) The Preliminary Title Report shall be updated to reflect required and other changed conditions and submitted for final approval by the LWD District Engineer; and

- (8) The insured value of the easement for title insurance shall be \$150 per linear foot of easement or \$50,000, whichever is more. The basis of insured value may be updated from time to time by LWD.
5. Owner shall submit one copy of the fully prepared Sewer Easement document along with the Improvement Plans to the LWD District Engineer for review. After any required corrections to the improvement plans and after any required corrections, subordinations, and agreements to the Preliminary Title Report are completed and recorded, Owners shall submit an updated Preliminary Title Report and obtain approval from the LWD District Engineer.
6. After LWD approval, Owner shall have the easement signed and notarized by each and all owner(s) of the property subject to the easement. Owner shall deliver the approved notarized Sewer Easement Document to the LWD District Engineer for final approval and forwarding to the LWD General Manager for signature.
7. The LWD District Engineer will instruct Owner's title insurance company to pick up the fully executed Sewer Easement Document from LWD, record the easement(s) with the County Recorder, and to issue the Title Policy in the required amount to LWD. Recording may be withheld by the title company pending reimbursement of title insurance and related costs by Owner. Owner's title insurance company shall return an original recorded copy to the LWD General Manger.
8. Owner shall record the easements at the County Recorder's Office prior to signature of the original "mylar" Improvement Plan title sheet by the LWD District Engineer. The Policy of Title Insurance will be issued after easement recording. The Policy of Title Insurance shall be provided to LWD prior to Final Acceptance of the sewer facilities. The Improvement Plans shall include reference to all recorded easements including the County Recorder's document number and date recorded for the subject easement.
9. All of the above items shall be completed, or caused to be completed, by Owner and at Owner's expense. All expenses of LWD to review and facilitate this process shall be at Owner's expense.
10. For discontinuation of an existing easement that was granted to LWD a **QUIT CLAIM DEED, APPENDIX Q**, shall be used to release ownership and liability of such real property.

G. Encroachment Permits

The following rules and procedures apply to projects that require an encroachment permit:

- a. Owner shall obtain approval from LWD Engineer for acceptability, location, dimensions and extent of any encroachment into LWD sewer easements;

- b. The Encroachment Permit shall be in the form of **ENCROACHMENT PERMIT, APPENDIX C**, unless otherwise approved by LWD District Engineer;
- c. A drawing of the encroachment shall be prepared on Mylar using convenient scale (letter-sized sketch is desirable) showing all dimensions and necessary data to properly describe the extent of the encroachment. The Encroachment Permit document shall be completed and submitted for LWD review;
- d. Review and Approval: Two (2) copies of fully prepared encroachment document shall be submitted to LWD District Engineer for review. After any required corrections are completed, approval can be obtained from LWD District Engineer; and
- e. The original approved encroachment document shall be signed and notarized by Owner and delivered to LWD. LWD shall then sign the Encroachment Permit and return it to Owner for recording by the County Recorder. The agreed upon encroachment will not be allowed until LWD receives a recorded copy of the encroachment permit from the County Recorders office.

H. Plan Check and Approval

1. Plan checking is performed by LWD Engineer and "red-lined" plans are returned to the Private Engineer with comments or corrections as necessary to conform to specifications.
2. Plan checking also includes review of plans and specification for Food Establishment Grease Control Devices. See LWD Wastewater Ordinance, Article III, for detailed information regarding Food Establishment Wastewater Permit Conditions. The following applies to all Food Establishment Wastewater Permit applications:
 - a. Owner shall submit architectural plans for LWD review, including plumbing plans;
 - b. Plumbing plans shall comply with Uniform Plumbing Code, latest edition, with regard to grease facilities and sizing requirements;
 - c. Size, type, and construction of grease interceptor shall be approved by LWD District Engineer;
 - d. Location of grease interceptor must be approved by County Health Department;
 - e. LWD approval of grease interceptor and/or FOG Best Management Practices (BMPs) shall be in the form of a **SEWER PERMIT FOG SUPPLEMENT, APPENDIX T**, as modified by the LWD District Engineer for the specific application. For a property owner occupied Food Establishment, **APPENDIX T1** shall be used. For a tenant occupied Food Establishment,

APPENDIX T2 shall be used. The **SEWER PERMIT FOG SUPPLEMENT, APPENDIX T2** shall be executed by both the property owner and tenant; and

- f. All other building, plumbing, and electrical requirements shall be in accordance with the approved permits issued by the jurisdictional city.
 3. Private Engineer submits revised plans as necessary. The Private Engineer shall return the red-lined set of plans and the updated set of plans.
 4. LWD District Engineer completes plan check and determines that the plan meets LWD Standard Spec and is acceptable for approval. Approval of plans by LWD District Engineer shall not relieve the Applicant of any responsibility for errors in the plans either of commission or omission. Such errors, when brought to the attention of the Private Engineer by LWD, shall be promptly remedied by Owner.
- I. Agreement to Improve Subdivision Sewers: After plan approval for projects that include construction of facilities to be dedicated to LWD, Owner will be required to execute the standard LWD **AGREEMENT TO IMPROVE SUBDIVISION SEWERS, APPENDIX D**.
- J. Owner Security: At the time of the execution of the Agreement to Improve Subdivision Sewers, Owner shall file with LWD the following security:
1. A good and sufficient **PERFORMANCE BOND, APPENDIX E**, in an amount not less than 100% of the estimated cost of the improvements, to secure the faithful performance of the terms and conditions of this agreement; and
 2. A good and sufficient **MATERIAL AND LABOR BOND, APPENDIX F**, in an amount not less than 50% of the estimated cost of the improvements, to secure the contractor, his subcontractors, and persons renting equipment or furnishing labor or materials to contractor or subcontractors for the improvements.

The form of the bonds shall be as specified by LWD. In lieu of filing the bonds as provided above, Owner may furnish other security, such as cash, irrevocable letters of credit or other security acceptable to LWD. Such security shall be in the same amounts and for the same purpose as the bonds specified above and in a form satisfactory to LWD.

K. Final Submittal and Approval of Project Documents

Subject to approval of required easements, encroachment permits and other documents required for the proposed sewer facilities, the final approval of project plans and authorization to proceed shall occur as follows:

1. Upon approval of the drawings, LWD requests that the Private Engineer prepare a construction bond estimate in accordance with current LWD approved unit costs;

2. LWD District Engineer approves bond estimate by Private Engineer using LWD approved unit costs. LWD District Engineer determines Performance and Materials and Labor Bond amounts;
3. LWD prepares **AGREEMENT TO IMPROVE SUBDIVISION SEWERS, APPENDIX D**, including **PERFORMANCE BOND, APPENDIX E and MATERIALS AND LABOR BOND, APPENDIX F**, and forwards to Owner for execution and return to LWD;
4. Owner returns the following to LWD:
 - a. The executed Agreement to Improve Subdivision Sewers, along with all other executed documents required by LWD;
 - b. The required deposits and security, (either cash, surety bond, or letter of credit), acceptable to LWD;
 - c. Recorded copies of all required grants of easements or rights-of-way and policy of title insurance as earlier required herein. (Owner shall assure LWD receives a copy from County Recorder); and
 - d. If all items are complete, the project will be presented to the General Manager with a recommendation for approval of the Agreement to Improve Subdivision Sewers;
5. Upon approval of the **AGREEMENT TO IMPROVE SUBDIVISION SEWERS, APPENDIX D**, by the General Manager, Owner shall submit the Mylar construction plans for signature by LWD Engineer;
6. LWD Engineer signs title page of original project drawings (Mylars);
7. LWD staff files bonds and agreement in project file and informs LWD District Engineer they have been executed;
8. LWD staff determines construction inspection fee deposit in accordance with current fee schedules and requests inspection fee deposit from Owner;
9. Owner submits inspection fee deposit; and
10. LWD staff reviews plan deposit balance and refunds surplus funds or requests additional fees to cover plan check costs.

Approval of construction plans and the **AGREEMENT TO IMPROVE SUBDIVISION SEWERS, APPENDIX D** shall automatically expire if construction does not commence within one (1) year of the date the construction plans were approved by the District Engineer. If construction does not commence within the one year period, said plans shall be resubmitted for approval by LWD District Engineer. The resubmitted plan check shall be

subject to current LWD fees. This requirement may be waived on a case-by-case basis at LWD discretion.

L. Construction and Inspection

After LWD approval of the project plans, **AGREEMENT TO IMPROVE SUBDIVISIONS SEWERS, APPENDIX D** – if applicable, and all other easements, permits or documents required by LWD and attainment of any additional approvals required by the City of Encinitas, City of Carlsbad or any other agency with jurisdiction over Owner's project, construction may commence and LWD will provide inspection services as follows:

1. LWD will provide inspection for all privately constructed sewer facilities, including work to be performed under the **AGREEMENT TO IMPROVE SUBDIVISION SEWERS, APPENDIX D**, at the sole expense of Owner. Owner shall reimburse LWD for all such costs and expenses prior to final approval and acceptance. LWD Inspector shall charge field time to the project via the LWD Location Code;
2. Construction of the facilities shall be subject to inspection at any time by the LWD District Engineer and/or Construction Inspector;
3. Owner submits two bond paper and one reproducible mylar copy of plans reviewed, approved, and signed by LWD District Engineer and all jurisdictional agencies and submittal of shop drawings for all proposed materials to LWD. LWD staff forwards one set to LWD Inspector and one to project file;
4. Upon receipt by LWD of the approved plans, and prior to beginning construction of the facilities, Owner shall schedule a preconstruction meeting with the LWD District Engineer and/or Construction Inspector. The preconstruction meeting shall be held in accordance with the **PRECONSTRUCTION MEETING AGENDA, APPENDIX V**;
5. Upon completion of the preconstruction meeting and signature of the **PRECONSTRUCTION MEETING AGENDA, APPENDIX V**, Owner shall commence construction of the facilities and complete the same in accordance with the Agreement to Improve Subdivision Sewers, the approved plans, the LWD Standard Specs, and the instructions given at the preconstruction meeting;
6. All materials and work shall be performed only in the presence of LWD's authorized representative, unless otherwise allowed by said representative. All work done in the absence of LWD's authorized representative, without prior approval, shall be subject to rejection. In all cases, Owner shall obtain approval from LWD Inspector prior to backfilling over any sewer pipe or sewer wyes;
7. Owner shall request availability of inspection from LWD at least two (2) working days in advance of any work to be done. Inspection will be provided as reasonably available and shall be coordinated with the LWD Inspector. No inspection shall be available on holidays or weekends, unless approved by LWD;

8. The inspection of work shall not relieve Owner of any obligation to fulfill their agreement. Defective or unapproved work shall be remedied and made good, and unsuitable materials may be rejected, notwithstanding that such work and materials have been previously undiscovered by the LWD District Engineer or LWD Inspector. If the work, or any part thereof, shall be found defective at any time before the final acceptance of the whole work, Owner or his Contractor shall expeditiously make good such defect in a manner satisfactory to LWD District Engineer;
9. The LWD District Engineer or LWD Inspector may require at their discretion additional testing of installed materials to verify proper installation. These tests may include closed circuit televising, mandrel testing, low pressure air test, and/or other tests deemed necessary by LWD;
10. All costs for testing, retesting, and reinspection incurred by LWD that are necessitated by rejected or defective materials and/or workmanship shall be at the sole expense of Owner and shall be reimbursed to LWD prior to final approval and acceptance; and
11. When all construction work has been completed, Owner shall notify LWD that the work is ready for final inspection. An LWD representative shall thereupon inspect the finished work and will either approve the work, or reject the work pending fulfillment of unsatisfied requirements.

M. Video Inspection

1. Any person constructing sewer improvements shall video tape the interior of the pipe by means of closed circuit television (CCTV) inspection. Owner is required to retain a firm experienced in CCTV inspection and acceptable to the LWD District Engineer. Owner shall pay the full cost of field inspection and television inspection of the construction at no cost to LWD. An LWD Inspector must be present during video inspection. Request for inspection shall be a minimum of two (2) working days in advance. The video inspection shall be sent to LWD District Engineer in digital form of DVD or CD for approval.
2. If the sewer construction work is not acceptable, improvements shall be corrected and said sewer improvements shall be again video inspected for resubmittal, until satisfactory to the LWD District Engineer.

N. Field Approval

1. Upon completion of the facilities, or when only minor outstanding construction items are remaining, a preliminary walk through inspection by the LWD inspector shall be conducted, and a punch list of any outstanding items will be prepared by LWD. It shall be the responsibility of Owner to assure any outstanding items are completed in a timely manner.

2. Field Approval shall be granted by the LWD inspector after he or she is satisfied that all improvement work has been completed in accordance with the approved plans and LWD Standard Spec and any other applicable agreements. Field Approval occurs when the inspector submits a written final project inspection report recommending acceptance of work to LWD General Manager.
3. The LWD Inspector may grant Field Approval before all punch items are complete if the Inspector determines that the remaining items are minor in nature and that Owner is working in good faith to complete the remaining punch list items.
4. LWD staff reviews construction inspection deposit balance and refunds surplus funds or requests additional fees to cover construction inspection costs.

O. Final Approval and Acceptance of Sewer Facilities by LWD

The following process shall govern Final Approval and Acceptance of the sewer facilities by LWD:

1. After receipt of Field Approval, LWD directs Owner to prepare and timely file (within 10 days of completion) **NOTICE OF COMPLETION, APPENDIX M**, with County Recorder for recordation. Within ten (10) days thereafter, notice of the filing shall be sent (via registered or certified mail, or by first-class mail, evidenced by a certificate of mailing) to all contractors hired by SUBDIVIDER and all other potential claimants that provided preliminary 20-day notices. SUBDIVIDER shall provide DISTRICT with a copy of the recorded Notice of Completion and proof that all notice requirements have been satisfied. Owner shall provide LWD with copy of recorded **NOTICE OF COMPLETION, APPENDIX M**;
2. **NOTICE OF COMPLETION, APPENDIX M**, is posted for 60 days (30 days for mechanics liens and 60 days for original contractor lien) by County Recorder to trigger the deadline for the filing of liens;
3. After at least 65-days have passed since the filing of the **NOTICE OF COMPLETION, APPENDIX M**, and upon confirmation that there are no outstanding liens related to the project, Owner shall submit an executed **DEDICATION OF SEWERS FORM, APPENDIX N** to LWD;
4. Upon receipt of the executed Dedication of Sewers Form, confirmation that there are no outstanding liens related to the project, confirmation that all outstanding punch list items have been completed, submittal and acceptance of the soils compaction report, submittal of As-Built plans, confirmation that all Owner accounts with LWD have been made current, and completion of all other pre-acceptance items required by this Standard Spec, the facilities shall be referred to the General Manager for final acceptance;

5. Final Acceptance, with the exception of private building facilities and sewer laterals, of sewer facilities into the LWD utility system will be made by the LWD General Manager, by execution of the **NOTICE OF ACCEPTANCE, APPENDIX G**;
6. After Final Acceptance, LWD staff exonerates 75% of Performance Bond and 100% of Materials and Labor Bond. The remaining 25% Performance Bond remains in effect for the one (1) year warranty period;
7. After Final Acceptance, Owner shall remove any temporary sewer plugs in accordance with the Temporary Sewer Plug Plan approved for the specific project and similar to that found within the **PROTOCOL FOR PLUGGING OR UNPLUGGING SEWERS, APPENDIX U** for LWD approval; and.
8. Project file is closed. Copies of **AGREEMENT TO IMPROVE SUBDIVISION SEWERS, APPENDIX D**, and **NOTICE OF COMPLETION, APPENDIX M**, are forwarded to LWD with memo stating the assets have been acquired by LWD.

P. As-Built Plans

At the completion of construction, As-Built drawings signed by the Engineer of Record shall be submitted to LWD signed by the Engineer of Record. Said plans shall be corrected to conform to the work as constructed. LWD will review the plans for completeness and will require resubmittal, if necessary. After LWD approval, As-Built Plans, including two (2) blue-line copies, the original "Mylars," and a digital copy shall be submitted to LWD. This As-Built process shall be completed prior to filing of the **NOTICE OF COMPLETION, APPENDIX M**.

Q. Use of Utilities for Occupancy Prior to LWD Acceptance:

Subject to LWD approval, Owner may purchase and obtain sewer services for occupancy prior to final acceptance of sewer facilities by LWD under the conditions stated below. LWD retains discretion to deny requests for use of utilities prior to acceptance if LWD, in its sole and absolute discretion, determines that such use is not in the best interest of LWD or the public. When allowed and prior to the purchase of sewer capacity for each connection, Owner shall meet the following conditions:

1. Execute a **TEMPORARY SERVICE AGREEMENT, APPENDIX O** with terms and conditions approved by LWD;
2. Sufficient funds will be on deposit in Owner's LWD account to cover anticipated LWD expenses;
3. Per current LWD Ordinance, sewer capacity and other appropriate fees and charges will be paid for each connection requested;

4. Prior to connection of any sewer service(s), the sewer system shall have been constructed in accordance with LWD specifications and requirements and received LWD approval;
5. Owner shall submit an updated or new **PROTOCOL FOR PLUGGING OR UNPLUGGING SEWERS, APPENDIX U** for LWD approval;
6. During any period of non-use or use of the sewer prior to LWD acceptance, Owner shall be responsible for sewer maintenance and cleaning, as necessary and/or as required by LWD;
7. Construction bonds shall not be reduced or released; and
8. Prior to the connection of the last sewer service, the project shall be referred to LWD's General Manager for acceptance.

R. One Year Warranty Period

1. Owner and Owner's Contractor shall guarantee all work for the subject facilities' including work associated with removal of temporary plugs, against defective materials and workmanship, against settlement of backfill, and damage to pavement for a period of one year from the date of execution of the **NOTICE OF ACCEPTANCE, APPENDIX G**, by LWD. Owner shall require the same written guarantee by Contractor in the Construction contract for the subject facilities. Owner shall furnish to LWD, at no expense to LWD, a warranty bond for the performance of the foregoing guarantee, or other means acceptable to LWD, in the amount of twenty-five percent (25%) of the Owner submitted and LWD approved construction value of the project.
2. When defective material or workmanship is discovered in the work requiring repairs or replacement to be made under this guarantee, all such repair or replacement work shall be completed by Owner at his own expense within ten (10) days after written notice has been given to him by LWD. Should Owner fail to complete repair or replacement of the work as directed within ten (10) days, LWD may make the necessary repairs or replacement and charge Owner with the actual cost of all labor and materials required. In emergencies demanding immediate attention, LWD shall have the right to repair or replace the defect or damage and charge Owner with the actual cost of all labor and material required.
3. Any collateral damage, including damage to other LWD property or other third party property caused by a defect in materials or workmanship during the warranty period, including LWD expenses, shall be borne solely by Owner through reimbursement to LWD, or LWD use of Owner posted Performance Bonds. This section does not otherwise limit Owner's liability for defects under the law.

S. Reimbursement Agreements:

1. Where LWD determines in its sole discretion that an Owner is eligible for reimbursement for part of the cost to construct off-site and/or over-sizing on-site facilities, Owner shall be notified of the opportunity and option to execute a written **REIMBURSEMENT AGREEMENT, APPENDIX H**, prepared by LWD. Only those design fees and actual project and construction costs approved by LWD in its sole discretion will be allowed for reimbursement under the agreement. Reimbursable Costs shall be limited to the actual cost to design, permit and construct sewer facilities, less the portion attributable to providing sewer service to Owner's property as determined by the District Engineer. Owner shall provide the District Engineer with a summary of actual costs and receipts in support. The District Engineer shall have sole discretion to determine if the actual costs are reasonable. Costs determined to be eligible for reimbursement shall be reimbursed only as other customers of LWD connect to facilities for which the reimbursement is allowed. Reimbursement Agreements must receive final approval from the LWD Board of Directors.
2. The maximum reimbursement amount, reimbursement fee, and interest on the reimbursement amount shall be determined in accordance with the reimbursement agreement. The reimbursement agreement will automatically terminate on the earlier of ten (10) years from the date of its execution or the date upon which Owner has received the amount eligible under the reimbursement agreement.
3. Reimbursement agreements are an accommodation to Owners and not a guarantee or promise of full or, even, partial repayment.

T. Minor Deviations: Deviations from the requirements and procedures of this Standard Spec may be allowed by the District Engineer or LWD General Manager if they find that the deviations are minor in nature, do not impair the LWD system in any way, are consistent with District policy, and are necessary due to unusual circumstances such as technical, legal or physical infeasibility.

1.08 Fees

A. Annexation Fees

1. A minimum LWD processing deposit is required for review of proposed annexation to LWD, as determined by LWD from time to time.
2. The Local Agency Formation Commission (LAFCO) requires a fee for processing an annexation depending on acreage.
3. The State Board of Equalization requires a fee for processing of annexations depending on acreage. The State Board of Equalization fees shall be processed through LAFCO and only after LAFCO approval.

B. Improvements Plan Check Fees

1. Any Owner desiring Tentative Map, grease control device, or improvement plan checking shall pay to LWD the full cost of plan checking. An **APPLICATION FOR PLAN CHECK, APPENDIX I**, shall be filled out by the Private Engineer or Owner submitting the plan and submitted with a deposit for the estimated cost of plan checking. The deposit for plan checking shall be determined in the LWD fee schedule available from LWD. The estimated cost of plan checking is based on two (2) plan checks and the approval process. If additional plan checks are required, additional plan checking fees will be required. The amount of these fees will be determined by LWD District Engineer based on the anticipated additional plan checking required.
2. If Owner's total plan check payments exceed LWD's total cost for plan checking, the difference shall be refunded to Owner or applied to Inspection Fees. If Owner's total payments for plan checking are less than LWD's total costs, Owner shall pay the difference to LWD prior to approval of the sewer improvement plans.

C. Easement and Encroachment Permit Processing Fees

1. For each private contract requiring the processing of sewer easements or Encroachment Permit, Owner shall pay LWD the full cost required to process the sewer easement(s) or Encroachment Permit(s). The estimated cost of the sewer easement processing or Encroachment Permit fee is included on the Application for Sewer Plan Check and Construction Permit. In addition, the report and a policy of title insurance insuring the easement in favor of LWD shall be furnished at the sole cost of Owner.

D. Grading Plan Check Fee:

1. When required by the local grading plan jurisdiction, LWD will review private development grading plans for compliance with the LWD Standard Spec. Owner shall pay for the full cost of the review at the time the plans are submitted to LWD. The cost of the grading plan check is dependent upon the complexity of the grading plan, as designated in the current LWD fee schedule. For projects with extensive grading or special circumstances, LWD will request early application and additional deposit for improvement plan checking. The plan checking deposit shall be based on current LWD fee schedule.

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LWD STANDARD SPECIFICATIONS

DIVISION 1 - SEWER SYSTEM PROCEDURES, PLANNING, & DESIGN PART 2 - SEWER SYSTEM PLANNING

2.01 General

This section provides a description of the planning requirements for sewer improvements within the Leucadia Wastewater District (LWD). Sewer system design criteria are presented in Division 1 - Part 3 of these standards.

Reference shall be made to the LWD Sewer Master Plan, which outlines LWD requirements for wastewater conveyance, treatment and disposal for ultimate development conditions.

The existing LWD boundary map with individual parcels shown is posted at LWD's office. Approximately the north-half of LWD is located in the City of Carlsbad and the south-half of LWD is located in the City of Encinitas. These cities govern land use and public right-of-way encroachment requirements for their respective areas of jurisdiction.

LWD's "Sphere of Influence" for sewer service is larger than the current LWD boundary and includes additional service areas that are conceptually approved for annexation to LWD by the Local Area Formation Commission (LAFCO).

A potential customer for sewer service must first verify that the proposed service area is currently part of LWD. If the parcels requesting sewer service are not already part of LWD, then these parcels must be within the LAFCO Sphere of Influence and must be annexed in accordance with the procedures discussed in Division 1 of these standards. Annexations may particularly be required in the "old Leucadia area", where a number of existing parcels are currently served by septic tanks, or along the perimeter borders of LWD.

- A. Service Area: Sewer service is currently provided to the areas surrounding LWD as follows:
1. North of LWD sewer service is provided by the City of Carlsbad through the Carlsbad Municipal Water District;
 2. Northeast of LWD sewer service is provided by the Vallecitos Water District;
 3. Southeast of LWD sewer service is provided by the City of Encinitas through the Cardiff Sanitation District; and
 4. Southwest of LWD sewer service is provided by the City of Encinitas through the Encinitas Sanitary District.

2.02 Flow Estimate

Sewer flows shall be calculated using appropriate industry standard techniques. The flow estimates must account for proposed upstream development using land use projections outlined in the 1999 Wastewater Master Plan.

A. Drainage Basins:

1. System-wide drainage basins within the LWD service area are presented in 1999 Wastewater Master Plan. Site specific drainage basins should be established using an appropriate topographic map. Sewers should be laid out to flow by gravity to the collection system. Pump stations should be avoided to the greatest extent possible.
2. Preliminary sewer planning for the area known as the "Island Area," west of Interstate 5, east of Highway 101, south of La Costa Avenue, and north of Encinitas Boulevard is contained in the LWD Island Area Collection System Plan, May, 2007. Most of the properties in this area are within the LAFCO recognized LWD Sphere of Influence and require formal annexation through LAFCO, as described in Division 1 – Part 1 of these Standard Specs. The Island Area sewer planning generally requires new sewers to be located within existing streets and at a pre-determined required minimum depth. New sewers in the Island Area shall meet the requirements of both the LWD Standard Specs and the LWD Island Area Collection System Plan, a copy of which is available for reference at the LWD office.

B. Land Use: Ultimate land use projections shall be used for estimating wastewater flows from developments. The ultimate land use designations and population densities shall be based on the Encinitas and Carlsbad General Plans.C. Flow Estimates: Flow estimates shall be determined as the product of the number of equivalent dwelling units (EDUs) and a unit flow factor. Flow factors for average and peak flows are presented in the following paragraphs.

1. Average Flow - A flow factor of 215gpd/EDU shall be used to calculate average sewage flows. Table 1-2-1 presents EDU Factors required to be used to determine the number of EDUs for a given land use.
2. Peak Flow - Sewer pipelines must be designed and sized using peak flow conditions determined by multiplying average flows by a peaking factor. Peaking factors shall be determined based on population. Acceptable peaking factors are presented in Table 1-2-2.

TABLE 1-2-1 LEUCADIA WASTEWATER DISTRICT EDU FACTORS	
WASTEWATER USE CATEGORIES	EDU FACTORS
<u>Single Family Residence</u>	1.0
<u>Multiple Dwelling</u> (Apartments, duplexes, condominiums, and townhouses) - Each living unit	1.0
<u>Mobile Home or Trailer Park</u> Mobile home or trailer space	1.0
<u>Motel or Hotel</u> Each Unit w/o Kitchen Each Unit w/Kitchen	0.33 0.55
<u>Guest House</u> Each Unit w/Kitchen	1.0
<u>Medical Care or Elder Care</u> (Hospitals, skilled nursing homes, convalescent homes, retirement homes, assisted living homes, and similar facilities) Multiple dwelling without individual kitchen & with community eating facilities, Per individual bed with minimum 1.0 EDU Multiple dwelling with internal kitchen and on-site community eating facilities per living unit Multiple dwellings with internal kitchen and no on-site community eating facility per living unit Single dwellings with internal kitchens regardless of community facilities	0.4 0.8 1.0 1.0
<u>Churches, Theaters and Auditoriums</u> Each unit of 115 Persons or fraction thereof	1.0
<u>Schools</u> Elementary per 60 pupils or fraction thereof for each elementary school Junior High per 50 pupils or fraction thereof for each Jr. High school High School per 30 pupils or fraction thereof for each High school	1.0 1.0 1.0
<u>Laundries - Self Service</u> Per each washer	0.75

WASTEWATER USE CATEGORIES	EDU FACTORS
<u>Food Establishment including Restaurants, Taverns, and Similar</u> Limited Food Preparation Establishments – seating not included Additional for each unit of 7 seats with multi-service utensils Additional for each unit of 15 seats with single-service utensils All Other Food Establishments – seating not included Additional for each unit of 7 seats with multi-service utensils Additional for each unit of 15 seats with single-service utensils	1.0 1.0 1.0 2.6 1.0 1.0
<u>Ballrooms, Banquet Facilities, and Convention Facilities</u> Per block of 40 seats	1.0
<u>Automobile Service Stations</u> Not more than four (4) gasoline pumps More than four (4) gasoline pumps Additional for each washing rack, pit, or floor drain (Drains subject to collecting toxic, hazardous, or potentially explosive waste are not allowed to be connected to sewer). Car washes shall be individually evaluated by LWD Engineer based on peak net discharge rate of specific equipment to be used with internal water recycling required.	2.0 3.0 2.0 Per Review
<u>Banks and Savings and Loan Associations</u> Each 3000 SF or portion thereof	1.0
<u>Other Commercial or Industrial Users</u> Up to 1,000 SF Plus for each additional 1,000 SF or portion thereof up to 5,000 SF Plus for each additional 1,000 SF or portion thereof over 5,000 SF	1.0 0.4 0.6
The capacity fee for establishments with unusual sewer characteristics or for any commercial use not described in the categories above shall be fixed by the Board of Directors by motion, resolution, or ordinance when each specific application is submitted.	Per Case

TABLE 1-2-2 PEAK FACTORS	
POPULATION	PEAK FACTOR
Less than 5,000	(A)
5,000	3.10
10,000	2.88
15,000	2.75
20,000	2.66
30,000	2.53
40,000	2.44
60,000	2.31
80,000	2.22
100,000	2.14
150,000	2.01
Intervening Populations	Pro rate

(A) For populations less than 5,000 use the following formula where P = Population in thousands:

$$Q_{\text{maximum}} / Q_{\text{average}} = (18 + (P^{0.5})) / (4 + (P^{0.5})).$$

2.03 Pipeline Sizing Requirements

In general, gravity sewer pipelines shall be sized to achieve the minimum required velocity using open channel flow formulas at peak flow conditions. The following are other pipeline requirements.

- A. **Minimum Pipeline Size:** No public sewer shall be less than eight (8) inches in diameter. Service laterals shall be a minimum of four (4) inches in diameter. Six (6) inch diameter laterals are required for commercial developments.
- B. **Minimum Pipeline Slopes:** Generally, sewer pipeline slopes shall be established such that open channel flow produces a minimum allowable velocity of 2 ft/sec and a maximum velocity of 10 ft/sec for peak flows at the design depths of flow noted elsewhere. More specifically, minimum slopes for a range of pipeline sizes are provided in Table 1-2-3.

Table 1-2-3 MINIMUM PIPELINE SLOPES		
Pipeline Size - In.	Minimum Pipeline Slope (%)	Remarks
4	2.00	Residential laterals only
6	1.00	Multi-Unit & commercial laterals only
8	2.00	Public sewer with service to less than 10 homes
8	1.00	Public sewer with service to 11 to 40 homes
8	0.40	Minimum collection system pipeline size for service to 41 homes or more
10	0.30	
12	0.25	
15	0.15	
18	0.10	
21	0.08	

- C. Single Versus Multiple Sewer Service Laterals. Individual sewer customers shall be served by individual laterals and multi-customer laterals shall not be allowed, unless otherwise approved by the LWD District Engineer.
- D. Pipeline Size Criteria: A Manning's coefficient of roughness of 0.013 shall be used for all pipeline conditions unless otherwise approved by the LWD District Engineer. Sewers less than 15 inches in diameter shall be designed to flow ½ full at peak flow. Sewers 15 inches in diameter or more shall be designed to flow ¾ full at peak flow.

Mannings formula for open channel flow shall be used for hydraulic calculations:

$$V=(1.486/N)*(R^{2/3})*(S^{1/2}) \quad \text{and} \quad Q = AV$$

V = Velocity in feet per second

N = Manning coefficient of roughness = 0.013

R = Hydraulic radius in feet = Area/Wetted Perimeter at specified depth of flow

S = Slope in feet per foot

Q = Flow in cubic feet per second

A = Cross sectional open area of the pipe in square feet

2.04 Pipeline Separation

The horizontal separation between sewer and water pipelines shall be 10 feet as required by the State of California, Department of Health Services criteria. Special sewer construction requirements, shown on *LWD Standard Drawing No. S-2*, are required where 10 feet of separation cannot be achieved.

The minimum horizontal separation between sewer and all other utilities is five-feet, unless otherwise approved by the LWD District Engineer. Sewer laterals shall be placed a minimum of five-feet apart along the main and five-feet from the nearest manhole. Sewer laterals shall be placed a minimum of 10 feet from water laterals.

A minimum vertical separation of one-foot shall be provided and the sewer shall cross under water and reclaimed water pipelines, unless approval from the State Health Department is provided to LWD in writing for the specific crossing.

2.05 Pipe Materials

Acceptable gravity sewer pipeline materials include polyvinyl chloride (PVC) and vitrified clay pipe (VCP). Materials and construction methods shall be in accordance with Division 2 of the LWD Sewer Standards (Green Book).

2.06 Grease Interceptors

- A. General: When determined by LWD that waste pretreatment is required, an approved grease interceptor shall be installed. Grease interceptors shall be of the outdoor underground type unless otherwise approved by the LWD District Engineer. The approved grease interceptor shall be connected to the waste line leading from sinks, drains, and other fixtures or equipment in establishments such as restaurants, cafés, lunch counters, cafeterias, bars and clubs, hotel, hospital, sanitarium, factory or school kitchens, or other establishments where grease may be introduced into the sewage system. A grease interceptor or grease trap is not required for individual dwelling units or for any private living quarters. Toilets, urinals, and other similar fixtures shall not drain through the interceptor.
- B. Requirements: The Owner is required to identify any area of the development where grease interceptors shall be installed. Grease interceptors require the submittal of a **SEWER SUPPLEMENT (FOG), APPENDIX T**. Sizing, construction, and installation of grease interceptors shall be of the outdoor underground type and shall be in accordance with these LWD Standard Specs including **LWD Standard Drawing No. S-26** and the Uniform Plumbing Code (UPC), 2006 Edition. In case of conflict, these LWD Standard Specs shall govern with regard to type and design of the grease interceptor. Owner shall submit plan and elevation drawings, sizing calculations, and manufacturer's information with the LWD Sewer Supplement for approval by the LWD District Engineer.

2.07 Pump Stations

- A. General: Public and private wastewater pump stations shall be avoided whenever possible. Division 1 Part 1 Section 1.06 of the LWD Standard Specs requires prior LWD approval and recorded legal agreement in the form of a **PRIVATE SEWER AGREEMENT FOR PRIVATE PUMP STATIONS, APPENDIX S**, for use of a private sewer pump station. Said legal agreement is required prior to approval of tentative map, grading, or improvement plans.

- B. Requirements: Prior to the start of design of any pump station or submittal of any drawings, meetings with the LWD District Engineer and LWD operations staff shall be held to discuss LWD's design criteria. During construction, inspections or operational checks for compliance with all requirements will be coordinated with LWD staff at one (1) month intervals until completion and twelve (12) month intervals thereafter for warranty of units.
- C. Site Planning and Access: The site should be landscaped in an acceptable manner. The landscaping shall be similar to the adjacent area landscaping in a manner satisfactory to LWD. Every pump station shall be secured by a fence or wall adequate to prevent unwanted entry.

Toilet facilities will be required for pump stations with 2 MGD or more capacity and those consisting of a wet well/dry well configuration.

Vehicular access roads to pump stations shall be provided and shall be paved and a minimum of 20 feet wide at six (6) percent maximum slope and to allow access to wet well for a Vactor truck. The station shall have a parking area for two, one-ton trucks with a turnaround. No private gates shall be permitted across access roads.

2.08 Multi-Unit Lateral

Multi-unit laterals may only be used where a specific individual or organization has financial responsibility for the cleaning and maintenance of all of the connected sewer service laterals and consists of either a group of apartments under single ownership, a condominium or homeowners' association, or a commercial customer with single land ownership. Division 1 - Part 1, 1.06 requires prior LWD approval and a recorded legal agreement in the form of a **PRIVATE SEWER AGREEMENT FOR MULTI-UNIT LATERAL, APPENDIX R**.

LWD STANDARD SPECIFICATIONS

DIVISION 1 - SEWER SYSTEM PROCEDURES, PLANNING & DESIGN PART 3 - SEWER SYSTEM DESIGN

3.01 General

Division 1 Part 2, Sewer System Planning, provided a description of the planning guidelines for sewer improvements such as flow estimation, pipeline sizing, pipeline separation and pump station design criteria. This section describes the design requirements for sewers to be accepted for ownership by LWD as public sewers. These requirements include: preparation of plans, sewer location and alignment, minimum pipeline cover, and manhole, lateral, and pump station requirements.

3.02 Improvement Plans

Improvement Plans shall be presented on "D" size sheets with dimensions and Title Block conforming to the requirements of the jurisdictional city. All Improvement Plans shall include the following in accordance with guidelines established herein. Improvement Plans shall be free of advertising, insignia, labels, emblems, or other markings not relevant to the work. When approved and accepted by the LWD District Engineer, such plans shall become the property of the Leucadia Wastewater District.

- A. Title Sheet: In addition to the city requirements, the title sheet shall include at a minimum: a vicinity and location map; key map; LWD approved basis of elevation, coordinates, and basis of bearing; notice and phone number for Underground Service Alert; legend (including quantities); LWD "Public Sewer System Approval" signature block; LWD Sewer Notes; list of abbreviations; legend; and statement of the Engineer of Work or Responsible Charge. The location map shall be at 200-scale and shall include the sewer pipelines and numbered manholes. LWD Sewer Notes may be placed on the title sheet or subsequent sheets, if necessary. The project title and submittal number shall be placed just outside the border on the right hand edge of the title sheet. *LWD Standard Drawing No. S-20* provides an example title sheet for privately developed public sewers.
- B. GIS Table: A Global Information Systems (GIS) Table shall be included in each set of plans. The table shall contain information on the proposed manholes and proposed sewer system according to *LWD Standard Drawing No. S-22*. The basic information required includes: Manhole ID number, upstream manhole coordinates, length of pipe between manholes, pipe size, pipe material, pipe slope, manhole location, manhole rim elevation, manhole invert elevation, manhole depths, type of manholes, and number of connections.
- C. Plan and Profile Sheets:
 1. General: Plan and profile sheets shall be prepared at a scale of one inch equals forty feet horizontally (1:40H) and one inch equals four feet vertically (1:4V). A one inch equals eight feet vertical scale may be used if necessary. Plan and profile sheets shall include; scale, north arrow(s), benchmark information, and a sewer data table showing pipeline bearing and curve data. Special details, if necessary, may be

required on the plan and profile sheets. Structures shall be numbered sequentially from the downstream end of the system.

2. Plan Strip: The plan strip shall include; lot lines and numbers, driveway limits, alignment of sewer pipeline, location of sewer laterals and pipeline appurtenances, all existing and proposed utilities that run parallel or cross the proposed pipeline, easements, all horizontal alignment data, including stationing, pipeline bearing and curve data, and location and description of existing and proposed structures; limits and locations of street right-of-way, curb and gutter, sidewalk, all existing and proposed utility easements; etc. Sewer stationing shall normally follow the stationing of the street centerline with sewer on street centerline, but may in some cases be allowed to follow sewer stationing at the request of the Engineer and at the review and approval of the LWD District Engineer.
3. Profile Strip: The profile strip shall include; pipeline profile with pipe diameter, length between structures, material and slope, pertinent horizontal data such as stationing and offsets shown on a screened profile grid, existing and final (proposed) ground surface grades over pipe, and existing and proposed utilities that cross the proposed pipeline. Where connection is made to an existing pipeline between manholes, the following note shall be added to the plans, "Contractor shall field survey (pothole) existing pipe invert elevation and submit survey data to LWD for approval prior to connection."

In the event that the ground surface at the property lines paralleling the sewer is lower than the surface over the sewer so that the difference in elevation would require the main line sewer to be lower than otherwise needed to provide building sewer connection at the required minimum depths, the ground surface at the property line(s) shall be shown as a short dash line and designated by a note "Ground Surface at (North, South, East, or West) Property Line." In addition, the finished building pad elevation, lateral invert elevation at the center of building pad, and lateral length to property line at the lateral connection location shall all be shown on the drawings. Minimum required lateral slopes shall be provided.

In the event that the house pad is lower than the top of manhole cover of the next upstream manhole of the public sewer, then the private house lateral shall be constructed with an approved backflow preventer. This is also a requirement of the Uniform Plumbing Code.

- D. LWD Sewer Notes: LWD Sewer Notes shall be included in all sewer improvement plans. The notes are included in the attached *LWD Standard Drawing No. GN-1 through GN-6* and are subject to revision by LWD. Developers should contact LWD for the latest edition.

E. Sewer Lateral Tables: A Sewer Lateral Table shall be included in the Improvement Plans for all laterals. An example of the acceptable format for the Sewer Lateral Table is shown on *LWD Standard Drawing No. S-24*. The lateral table shall, at a minimum, include:

1. Lateral Sequence Number;
2. Building Lot Number;
3. Sewer Station (at lateral connection to sewer main, sometimes same as street stationing);
4. Invert at Main (invert elevation of collection sewer at point of lateral connection);
5. Length (distance from main centerline to property line);
6. Drop to Main (required per Table 1-3-1, Drop to Main);
7. Invert Elevation of Lateral at Property Line;
8. Slope in % = $\frac{((\text{Item 7} - (\text{Item 4} + \text{Item 6})) * 100)}{(\text{Item 5} - 2.0')}$ -- (which should be greater than 2% for a 4-inch diameter lateral or 1% for a 6-inch diameter lateral. The 2-feet subtracted from Item 5 in this formula is the approximate length of the connection wye and 1/8th bend along the length of the sewer service lateral.);
9. Ground Elevation at Property Line (top of curb or edge of pavement);
10. Depth at Property Line;
11. Pad Elevation (lowest top of floor elevation of building being served);
12. Upstream MH Rim Elevation;
13. Backwater Valve Required – Yes or No (backwater valve required on lateral when the upstream manhole rim elevation is higher than the building pad);
14. Remarks (Such as "Deep Cut Lateral")

TABLE 1-3-1 DROP TO MAIN							
Sewer Main Size, In.	8	10	12	15	18	21	24
Drop To Main, Ft.	1.2	1.3	1.4	1.8	2.0	2.2	2.4

3.03 Sewer Main Design

A. Sewer Alignment:

1. General. In general, sewers should be located on the centerline of streets or easement. Pipelines should not be located under median strips or parking lanes. Sewers shall be placed on straight lines between structures wherever possible.
2. Change in Direction. The maximum change in direction allowed along any sewer main is 90° for pipelines 15 inches in diameter and less, and 45° for pipelines 18 inches and greater.
3. Easements. All LWD easements shall be exclusive, unless otherwise permitted by the LWD District Engineer. The minimum easement width required is twenty feet, except where authorized by LWD. Access to facilities shall be via a road consisting of 4-inch (minimum) Class 2 aggregate base with a maximum slope of six (6) percent, unless otherwise approved by the LWD District Engineer.

Any sewer easement encroachment not addressed in the original sewer easement grant deed requires a supplemental encroachment permit.

The minimum sewer easement width shall be 20-feet and the distance of the centerline of the sewer from edge of easement shall be 10 feet, unless otherwise approved by the LWD District Engineer.

Only where approved by the LWD District Engineer, easements may be non-exclusive under the following conditions: the minimum outside clearance from other utilities is five feet except that for water or reclaimed water the required outside clearance separation is 10 feet. The minimum distance of the centerline of the sewer from edge of easement or other authorized and permitted encroachment, such as a building roof overhang or other obstruction, shall be 10 feet.

4. Utility Crossings. Sewers shall cross other utilities at a perpendicular angle, unless otherwise approved. In any case, utilities crossing at a skew angle of 75° or less shall be avoided.
5. Horizontal Curves. Horizontal curves shall be avoided whenever practicable. Horizontal and vertical curves are not permitted in the same length of pipe. The minimum radius of any horizontal curve is 200 feet. The maximum length of any curve is 300 feet. Horizontal curve requirements for rigid (VCP) and flexible (PVC) pipe are given in the following tables.

Curvature in Rigid Pipes - Restrained joints provide no deflection. Flexible joints (gasketed) allow joint deflection.

- a. Curvature in clay pipe (VCP) shall conform to the requirements of Table 1-3-2.

TABLE 1-3-2	
MINIMUM RADIUS OF CURVATURE, R (feet)	
Nominal Pipe Diameter (inches)	Pipe Length 6' or less
6 to 12	200
15 to 24	300
27 to 36	400
39 to 42	500

- b. Curvature in AWWA C900 and AWWA C905 PVC "Pressure Water" Pipe and Ductile Iron Pipe used as forcemain shall be accommodated solely through joint deflection with axial bending not allowed. Allowable joint deflection shall be one-half of the deflection allowed by the pipe manufacturer's catalog literature. Such literature shall be submitted to the LWD District Engineer for review and approval.
- c. Curvature in SDR 35 PVC Sewer Pipe - Longitudinal bending (up to 15-inch diameter pipe) of SDR 35 PVC pipe with gasketed joints is allowed through axial flexure of the pipe. Mechanical means shall not be allowed to accomplish these radii. The curvature shall be accomplished in the trench by the Owner. The curve shall be accomplished by bending of the pipe without deflecting the joints. Overbelling of joints shall be avoided. Minimum radii shall be per Table 1-3-3.

TABLE 1-3-3	
ALLOWABLE MINIMUM RADIUS OF CURVATURE FOR SDR 35 SEWER PIPE (by longitudinal bending)	
Pipe Size (inches)	Radius (feet)
4 to 8	200
10	250
12	300
15	350

All sewers, particularly curved sewers, shall be final inspected by color Closed-Circuit-Television (CCTV). A digital color CD or DVD shall be recorded in the presence of the LWD Inspector and presented to LWD. The video shall be in color and show stationing and locations of all manholes and laterals. The Developer and/or Contractor shall bear all costs for the CCTV inspection process.

B. Sewer Profile:**1. Pipe Bedding and Pipe Zone Requirements**

Maximum depth of pipe is 20-feet unless specifically allowed deeper by the LWD District Engineer.

Provide a crushed rock bedding and pipe zone in accordance with Green Book Section 306-1.2.13 and per *LWD Standard Drawing No. S-11*, Type C for:

- a. SDR 35 PVC sewer pipe in native sand, gravel, or saturated topsoil from 4-feet to 15-feet deep;
- b. AWWA C900/C905 PVC pressure pipe in native sand, gravel, or saturated topsoil from 15 to 30 feet deep;
- c. VCP in dry or wet clay soils from 4-feet to 13-feet depth; and

VCP in dry or wet clay soils between 13-feet and 30-feet of cover, utilize concrete encasement in the pipe zone per *LWD Standard Drawing No. S-15*.

Maximum ½-inch gradation Greenbook Section 200-1.2 crushed rock shall be used in the bedding zone for pipe up to and including 16-inch diameter and ¾-inch rock shall be used for piping larger than 16-inch. The Owner's engineer shall submit a special design with trench load and pipe deflection calculations for all pipe with greater than 30 feet of cover.

For VCP or PVC pipe in areas of high ground water, or suspected high ground water, all crushed rock bedding shall be encased in an approved geotextile fabric. The improvement plan engineer of record or project geotechnical engineer shall submit a recommended geotextile suitable for the in-situ soil conditions for approval by the LWD District Engineer.

To inhibit longitudinal flow of groundwater in the crushed rock pipe zone in areas of high ground water, or suspected high ground water, 1-foot long clay soil cutoffs shall be installed in the pipe zone and shall extend at least one foot into undisturbed soil on both sides of the trench. The clay soil cutoffs shall be the full height of crushed rock subgrade and pipe zone material. At least one clay soil cut off shall be located between sewer structures in all areas of high, or suspected high ground water.

2. **Minimum Sewer Cover:** The minimum sewer pipeline cover in streets, measured vertically from the pipeline invert to the finished grade, shall be seven (7) feet. Greater depths may be required where it is necessary to extend sewers to serve other areas, or to achieve a 5.5 foot depth of the laterals at the property line. In off-street areas, a minimum cover of four (4) feet may be considered for approval by the LWD

District Engineer provided sufficient erosion protection and depth for sewer extension to unsewered areas are satisfied.

3. Maximum Depth of Sewer: The maximum depth of sewer shall be 20 feet of cover over the top of pipe, unless otherwise approved. The maximum depth of sewer is based on sewer cleaning access requirements. Request for approval for deeper sewers shall include a sewer alignment and profile study showing that no other way of providing a sewer less than 20 feet of cover is possible.
4. Private Sewer Pump Stations, Sewers, and Multiple Sewer Laterals: LWD has no objection to use of private sewer facilities, which would entirely be the responsibility of the homeowner for ownership, operation, and maintenance. However, written approval from the jurisdictional building permit city for such private sewer facilities shall be provided to LWD. Also, a **PRIVATE SEWER AGREEMENT FOR PUMP STATIONS, APPENDIX S**, shall be recorded between LWD and the Owner in accordance with Division 1 Part 1, 1.06 Private Sewer Facilities will also be required.

Force mains from private pump stations shall discharge at a vertical grade break to a standard sewer lateral with cleanout at the property line. The lateral shall be connected to the collector sewer in the standard manner.

5. Pipeline Slopes: Pipeline slopes shall be established to provide a minimum velocity of 2 ft/sec and a maximum of 10 ft/sec. Should the predicted velocity exceed 10 ft/sec, special design (concrete encasement and AWWA C900 or C905 PVC pipe installation) requirements shall apply. Pipeline slopes shall be as uniformly continuous as practical.
6. Vertical Clearance: The minimum vertical distance between sewers and other utilities shall be one (1) foot. Special design is required for sewer laterals or gravity mains over water lines, see *LWD Standard Drawing No. S-2*. Sewer force mains are not permitted over water lines.
7. Vertical Curves: Reverse curves are not permitted and vertical curves should be avoided whenever practicable. If vertical curves cannot be avoided, special design calculations should be provided to the LWD District Engineer for review and approval.
8. Cut-off Walls: In steep unpaved areas, pipe (and trench) shall be protected by cut-off walls per *LWD Standard Drawing No. S-16*.
9. Connection of Collection Lines with Different Diameters. The crown elevations of connecting pipes shall be matched at manhole junctions.

3.04 Manholes

All manholes shall be constructed in accordance with *LWD Standard Drawing Nos. S-3, S-4, and S-5*. Each precast manhole manufacturer shall be pre-approved by LWD based on manufacturer submittal of materials and procedures. Such pre-approval shall be updated at time of any material or procedure changes by manufacturer.

- A. Manhole Size: Manholes shall be four (4) feet in diameter for pipelines 15 inches and less; five (5) foot diameter manhole shall be used when pipe diameter exceeds 18 inches or when depth exceeds 12 feet. Scaled detail plans shall be provided for all manholes with multiple angled inlets and outlet with adequate clearance provided between manhole base penetrations to assure clearance and water tightness.
- B. Manhole Location: The maximum allowable spacing between manholes is 350 feet for pipelines up to, and including, 18 inches in diameter, and 400 feet for pipelines greater than 18 inches.
1. Manholes shall be placed at the following locations:
 - a. Changes in direction
 - b. Changes in grade
 - c. Changes in pipe size or material
 - d. At intersection of mains
 - e. At the beginning and end of vertical curves (if allowed) of 200 feet or longer.

Where the change in grade of the incoming and outgoing pipelines is greater than 10%, or the potential for a hydraulic jump in the manhole exists, the grade change shall be made in a smooth vertical curve with a manhole 25 feet downstream from where the sewer levels out to a lesser grade.

2. Manholes shall not be located in the following locations:
 - a. Inaccessible areas.
 - b. Gutters and other depressions or areas subject to inundation.
 - c. In sidewalks or crosswalks.
 - d. In freeway ramps.
 - e. Between railroad tracks.
- C. Invert Drops Across Manholes: A minimum drop of 0.10 feet and a maximum of 0.60 feet shall be used on a straight-through line for pipelines 15 inches in diameter and less. For a 90° bend through the structure, a minimum of 0.20 feet and a maximum of 1.00 feet shall be used.

For pipelines of 18 inches and greater, the drop across a manhole shall be per the following formula:

$$\text{Drop in feet} = D \times \left[\frac{S_1 + S_2}{2} \right] + 0.1$$

Where D equals the inside diameter of the manhole, S_1 equals the invert slope entering the manhole, and S_2 equals the invert slope leaving the manhole. (All dimensions in feet and slopes are feet/foot.) Calculations shall be provided for review with final requirements summarized on the plans in a data table.

Provide a minimum 0.2-foot drop from any new sewer side inlet invert elevation to any new manhole sewer outlet elevation.

- D. Drop Manholes: Drop manholes may only be used with approval of the LWD District Engineer. Drop manholes may be allowed when two collection lines have a vertical difference of 4-feet or more and are connected at a manhole. Construction shall conform to *LWD Standard Drawing No. S-5*.
- E. Shallow Manholes: Shallow manholes may only be used with approval of the LWD District Engineer. Shallow manholes may be allowed when the minimum depth of sewer of seven feet can not be obtained. Construction shall conform to *LWD Standard Drawing No. S-27*.
- F. Manhole Lining: For 1) all new manholes 2) all existing manholes with new connections, and 3) all existing manholes with new manhole risers: the manholes shall be provided with Integrally Locking PVC or Polyurethane Protective Lining System per Section 500 of the Greenbook.
- G. Manhole Riser: Whenever existing LWD manhole frame and covers need an increased height adjustment to adjust to paving overlays, LWD subject to City approval, allows the installation of cast iron riser rings prior to paving to achieve a height adjustment typically between 1-inch and 2-inches per riser ring depending on the existing frame and cover model, and availability of mating riser rings. LWD will allow a maximum of two cast iron riser rings to be installed on an existing frame. Construction and installation of manhole cast iron riser rings shall conform to *LWD Standard Drawing No. S-29*. If a height adjustment greater than that allowed by two cast iron riser rings is required, then the contractor shall install new concrete risers and adjust manhole height per *LWD Standard Drawing Nos. S-3, S-4, and S-5*.

3.05 Cleanouts

Sewer cleanouts can be used at the upstream end of a line that will not be extended in the future. The maximum distance between a cleanout and manhole is 175 feet. Sewer cleanouts shall be in accordance with *LWD Standard Drawing No. S-8*.

A standard residential cleanout shall be provided at the property line on every sewer lateral to allow closed circuit television inspection of the lateral. Residential cleanouts shall be in accordance with *LWD Standard Drawing No. S-25*.

3.06 Sewer Laterals

- A. Standard Service Laterals: Each lot shall be served by at least one service lateral that extends from the main to the property line parallel to the street. Laterals shall not be placed in driveways or within five (5) feet of the property line between lots.

No laterals shall be connected to manholes. Laterals shall be placed perpendicular to the sewer main and no laterals shall be connected to manholes. If necessary, laterals may enter the main up to 45 degrees from perpendicular on the upstream side of the main. Laterals shall be spaced a minimum horizontal separation of ten (10) feet from water service laterals and water mains. Laterals shall be spaced a minimum horizontal separation of five (5) feet from all other utilities or structures, including adjacent sewer laterals, and manholes.

Bends are not allowed in laterals without the approval of the LWD District Engineer. Only when bends are approved, they shall be provided with cleanouts at each approved bend.

The minimum size of service laterals is 4-inches for residential properties and 6-inches for commercial properties or single owner multi-unit properties. The diameter of a sewer lateral shall be at least 2 inches less than the diameter of the sewer main to which it is connected.

Residential 4-inch laterals shall be placed at a minimum slope of two (2) percent (2 feet per 100 feet). A one (1) percent slope (One (1) foot per 100 feet) is acceptable for 6-inch laterals. Residential sewer laterals shall be constructed in accordance with *LWD Standard Drawing No. S-25*.

Laterals shall be placed with a minimum drop to main per *LWD Standard Drawing No. S-24* (measured as the vertical distance between the centerline of the main and the invert of the lateral at the connection point). This requires that the connecting wye be installed with the branch at 45 degrees up from horizontal. The sewer lateral shall be a minimum of 5.5 feet deep at the property line.

New lateral connections to new PVC or VCP mains shall be made only with standard prefabricated wyes.

When it becomes necessary to connect a sewer lateral to a main line sewer at a point where no wye branch has been installed in the main line sewer, a wye with collar shall be used. The wye shall be installed by cutting two cross-sections in the main line sewer pipe and placing the wye between the two sections and securing the wye snugly in place by use of PVC repair couplings. The pipe and wye shall be entirely encased with 3,250 psi concrete at least six (6) inches thick for one-foot each side of the wye.

- B. Deep Cut House Connections (Laterals): In general, deep cut risers shall be used when the sewer exceeds 12 feet in depth or when ground water exists at relatively shallow depths. Deep cut house connections shall be constructed in accordance with *LWD Standard Drawing No. S-18*.

- C. Survey: Where a proposed sewer connects to an existing manhole, the elevation of the inlets and outlets of the existing manhole shall be determined by actual survey and shown on the sewer profile as part of the improvement plan design and approval process. If the proposed sewer connection requires a new manhole on the existing main between existing manholes, the approximate elevation of the proposed manhole shall be determined by actual survey of the existing upstream and downstream manholes design and shall thereafter be field verified by potholing and survey prior to construction of the new upstream sewer.

3.07 Connections to Existing Sewers

- A. General: LWD has established formal protocol for the installation and removal of temporary plugs from sewer, whether the sewer is an existing or proposed LWD dedicated facility or even a temporary conveyance sewer. The protocol has been established for the express purpose of preventing sewer spills caused by construction related activities in both the not-yet-LWD-accepted, Developer-owned, upstream sewer and in the downstream LWD wastewater collection system. Connection to existing sewers shall be in accordance with the **LWD PROTOCOL FOR PLUGGING OR UNPLUGGING SEWERS, APPENDIX U**.
- B. Requirements: As part of each set of Sewer Improvement Plans submitted, the Developer shall include a Temporary Sewer Plug Plan for review and approval by the LWD District Engineer, that meets the requirements of **LWD PROTOCOL FOR PLUGGING OR UNPLUGGING SEWERS, APPENDIX U**.

3.08 Grease Interceptors

Grease interceptors shall be constructed in accordance with *LWD Standard Drawing No. S-26* and require a **SEWER SUPPLEMENT AGREEMENT (FOG), APPENDIX T**. All waste shall enter the interceptor through the inlet pipe only. The Grease Interceptor shall be designed, constructed, tested, and marked in accordance with the requirements of the 2006 Edition of the Uniform Plumbing Code (UPC) and the IAPMO Property Standard PS-118-2000 for FOG disposal systems. Shop drawings for all FOG equipment and grease interceptor shall be submitted to the LWD District Engineer for review and approval prior to purchase and delivery. All grease interceptors shall be provided with a downstream sample box, as shown on *LWD Standard Drawing No. S-26*.

3.09 Sewer Force Mains

- A. Number and Location: Two parallel force mains shall be required for all new pump stations. Force mains shall be constructed in separate trenches with a minimum of 5-foot horizontal separation.

Force mains may not be constructed in the same trench as sewers. Minimum separations from waterlines shall be those specified for sewers. Insofar as practicable, force mains shall be laid at continuously ascending grades without intermediate high points or low points.

- B. Cover: Minimum cover for force mains shall be five (5) feet from finish grade to top of pipe, plus additional vertical clearance to locate sewage-type (long-body) combination air release and air and vacuum release valves and appurtenances below ground.
- C. Size and Slope: Size of force mains must be considered in conjunction with characteristics of the pumping equipment to be provided. In general, the design rates of flow shall be not less than three (3) feet per second nor higher than eight (8) feet per second. Every attempt should be made to limit the maximum retention time in force main to six (6) hours.
- D. Material Type: Unless otherwise approved or specified, force mains shall be minimum Class 200, PVC C-900 or C-905. Other materials shall only be as approved by the LWD District Engineer.
- E. Appurtenances: Each pair of force mains shall be cross-tied with approved (eccentric plug valve) valving to allow either or both force mains to be operated at any given time.

Wet well or adjacent inlet manhole access will be provided for temporary engine driven pump suction line access. Two emergency connections with appropriate valving and engine driven pump discharge connection shall be required with one on each force main downstream of the crossover point. LWD shall determine whether a new engine driven pump shall be provided with the construction of the pump station, or whether an existing LWD unit may be used as stand-by for a given pump station.

Low Points in force mains shall be fitted with approved blow-offs (drains). High points shall have approved appurtenances for air release and air and vacuum release. Where sewer is reasonably available, force main blow-offs and air release and air and vacuum valve drains shall be connected to the collection sewer through dedicated laterals.

Thrust restraint design calculations shall be submitted for LWD review and approval. Restraint may be provided either by restrained joint pipe or by thrust blocks.

3.10 Pump Station Design

As noted in the Sewer Standards Division 1, Part 1, public and private wastewater pump stations shall be avoided whenever possible. Specific written agreement from the LWD District Engineer for the use of a pump station is required prior to approval of grading or improvement plans. If a pump station is approved, the design engineer shall submit a pump station basis of design report to the LWD District Engineer for review and approval. The design report shall address, but not be limited to, the following items. After approval of the basis of design report, subsequent plan and specification packages shall be submitted to the LWD District Engineer for review and approval at the 50%, 90% and 100% completion stages.

Pump station plans shall include pump curves, specifications, details, pump head, pump horsepower, pump capacity, electrical layout, control system layout-out, and schematics.

Sewer pump stations should be designed based on the projected peak influent flow plus 30%

Each pump station shall be provided with two independent sources of power. This could be accomplished by providing an on-site generator in addition to the electrical supply. The generator shall be located in a building or under cover and shall meet all city and environmental noise limitation requirements.

Every sewer pump station should be designed in accordance with the following criteria:

A. Pumps:

1. The minimum pump cycle time shall be in accordance with the pump and motor manufacturers' requirements. Note that larger motors require longer times between starts. Also, see other wet well sizing requirements related to minimum pump cycle time.
2. The minimum number of pumps per station shall be one duty pump and one standby pump of the same size. In pump stations in the immediate vicinity of the Batiquitos Lagoon, two stand-by pumps of the largest size shall be provided.
3. The minimum non-clog sewage pump size shall be 4-inches with the capability to pass a 3-inch sphere. Where smaller pumps (capacity) are required, grinder type pumps shall be used.
4. Pump/system curve data shall include the following: system curve, design operating point, required net positive suction head (NPSH), hydraulic efficiency, horsepower (HP) requirements, revolutions per minute (RPM), and other operating conditions required for each pump.
5. The most efficient pump performance shall be at the design Total Dynamic Head (TDH). Avoid pumps with "flat" pump curves, where a small change in TDH will result in a large change in pump flow.
6. A factory certified pump test curve for the actual pump units to be installed at the station shall be required.
7. The specified operating point shall be near the maximum efficiency point on the pump curve and within the manufacturer-recommended limits for radial thrust and vibration. Select a pump curve where the operating point will be near the center of the pump's recommended operating range. Pump equipment shall be dynamically balanced to prevent vibration. No surge cavitation or vibration shall be allowed within the limits of the stable operating range indicated on the pump curve.
8. Pumps are required to have mechanical type seals with a seal water system.
9. Edges on pump bases shall be chamfered.
10. For suction lift type pumps, TDH calculation must include the static suction lift elevation.

11. Self priming pumps may be allowed for above ground stations with a maximum suction lift of 10 feet, unless otherwise approved.
12. Dry pit submersible pumps shall be used in a wet well/dry well configuration to avoid extended shafting and to protect the pumps from accidental flooding of the dry pit.
13. Submersible pumps/motors, with stainless steel rail system, may be considered for direct installation in a wet well at the discretion and approval of the LWD District Engineer.

B. Piping and Appurtenances:

1. Pump isolation valves (suction and discharge) shall be round port plug valves with suitable operators per manufacturer recommendations.
2. Check valves with oil dampeners shall be between pump and discharge plug valve, with external spring-loaded arm.
3. Piping shall be ductile iron pipe with Protecto 401 lining, or approved equal.
4. Discharge line and manifold shall be supported and braced. Install sleeve couplings and/or flange coupling adaptors restrained by tie rods on the discharge piping for ease of removal of piping. These fittings will also prevent uneven tightening of flange faces. Victaulic type fittings are not acceptable.
5. Sleeves or wall spools shall be used for wall penetrations for pump suction lines and manifold discharge line.
6. In manifolds, "Wyes" are required and shall be the same size as the manifold. Wyes shall be installed for horizontal side entry. Vertical entry shall not be allowed.
7. Potable water services (for wash-down) shall not be smaller than 1-inch, and shall have an approved backflow prevention device. Wash down hose bibbs shall not be located in confined or below-grade locations.
8. On suction and discharge piping connected to each pump and on the discharge manifold horizontal and vertical runs, install a flexible coupling adaptor with tie rod thrust restraint to absorb vibrations and prevent stress in the pipe, and to allow minor adjustments in piping installations during construction between fixed well flanges. Piping supports under the suction and discharge lines shall be provided.
9. Pipe joints must be restrained. The following types of joints are acceptable: flanged, sleeve-type coupling restrained by tie rods, mechanical joint with set bolt retainer gland.

C. Controls:

1. Each pump shall have an hour-meter capable of reading 1/10th hour.

2. Pumps shall operate in a duty/standby mode, with alternators to switch pump starts after each pumping cycle.
3. Where practical, provide variable frequency drives (VFD) and controls.
4. All pump stations shall be equipped with LWD-approved instrumentation and telemetry, which shall be compatible with the LWD Supervisory Control And Data Acquisition (SCADA) System.
5. All electrical wiring, fixtures and equipment shall conform to all safety codes.
6. Pump control shall be via a Miltronics ultrasonic level sensing and pump control system with float back-up/for emergency pump start and stop. Submersible pressure transducers or other type of level control device may be considered where foam or scum mat may be problems.

D. Alarms:

1. Dry well shall have a "flooded" alarm.
2. Wet well shall have a high level and low level alarms independent from the pump controls.
3. Instrumentation and alarms shall be telemetered to LWD offices.

E. Ventilation:

1. Ventilation requirements shall conform to current Cal-OSHA (confined space regulations) and NFPA 820.

F. Dry Pit:

1. All interior concrete surfaces shall be coated with a LWD-approved sealer. All exterior buried walls and roof shall be waterproofed.
2. Provide sump and sump pumps to convey nuisance water out of dry pit.
3. All exposed welds shall be coated with non-corrosive coatings.
4. All equipment shall have adequate clearance to perform maintenance and repair work.
5. Guards shall be installed around all moving parts of equipment as required by safety codes.
6. Station shall have guard railings around floor openings which comply with required safety codes and are made of non-corrosive materials.

7. Guard rails shall have toeboards with 1/4 inch floor clearance made of non-corrosive materials.
8. Openings in guard rails shall have two chains with snap hooks and eyes made of non-corrosive materials.
9. Floor gratings shall be made of non-corrosive materials.
10. Safety warning signs shall be installed on all hazardous equipment.
11. Lifting eyes (non-corrosive materials) or hoists on monorail or bridge crane shall be installed above equipment and openings.
12. All concrete floors shall be treated with an approved topping.
13. All outside doors and frames shall be corrosion and vandal resistant.

G. Wet Well:

1. Every pump station shall be provided with emergency storage. The minimum storage volume shall be equal to 6 hours of average daily flow, unless otherwise approved by the LWD District Engineer. The volume of emergency storage may be adjusted based on site specific conditions and proximity to sensitive receiving areas.
2. The distance between the wet well floor and the turned down bell mouth suction inlet of diameter "D" shall be a maximum of $D/2$ and a minimum of $D/3$.
3. Wet well level shall readout in "inches of water."
4. Wet well walls and ceiling shall be PVC-lined with T-lock, as manufactured by Ameron, or equal.
5. Wet well floor shall be sloped toward the suction piping at 1/8 inch per foot.
6. Inlet into the wet well shall be above the high water operating level in order to allow for the free flow of the gases into the wetwell.
7. Pump stations receiving flow from trunk sewers (18-inches or larger) shall have auto-rake bar screens and automatic screenings handling and discharge with odor control.
8. Wet wells shall be designed to allow for the maintenance of wet well.
9. The wet well should be as small as possible to prevent septic action from taking place during periods of very low flow. However, the wet well must be large enough to provide at least 5 minutes pump running time at low flow to prevent overheating of the electric motor and controls. Designer shall provide written minimum running time confirmation and recommendation from the specified pump manufacturer for

the specific application. Provide at least one 36-inch diameter access manhole cover over wet well. See *LWD Standard Drawing No. S-7*. Do not provide steps or ladder for access into the wet well.

10. Wet well working volume shall be calculated and submitted for LWD approval, including submittal of maximum number of motor starts allowable per hour per motor manufacturer. Use of variable speed drive pumps and reduced wet well volume to suit will be considered.
 11. The exterior surface of wet wells and dry wells shall be adequately water proofed to prevent intrusion of ground water.
 12. Provide facilities for passive odor control with an activated carbon scrubber. Equipment shall include tanks, pumps, controls, and piping.
- H. Other Items: The Owner Engineer shall provide an operations and maintenance manual for review and approval by the LWD District Engineer.

If other design problems occur which are not covered herein, such as siphons, industrial waste treatment facilities, or other items, consult LWD for general requirements.

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LWD STANDARD SPECIFICATIONS

**DIVISION 2
SEWER SYSTEM STANDARD SPECIFICATIONS**

Greenbook Modifications

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GREENBOOK INTRODUCTION:

Leucadia Wastewater District hereby adopts the "Greenbook", Standard Specification for Public Works Construction, latest edition plus latest Supplement only as prepared and published as intermediate amendments the Greenbook by Public Works Standards Inc., as the specifications to be used to establish standards of work, material and construction procedures for improvements to the sewerage system within its boundaries. Green book supplements by other agencies such as the City of San Diego, the County of San Diego, or others shall not apply to work in LWD.

Division 2 of the LWD Standard Spec shall be used in conjunction with the entire text of the Greenbook. Specific exceptions, clarifications, highlighted requirements, and modifications to the Greenbook are specified herein with reference to the Greenbook Parts and Paragraphs.

If in conflict, the requirements of the Standard Spec take preference over the Greenbook.

**DIVISION 2 SEWER SYSTEM STANDARD SPECIFICATIONS
PART 1 - (GREENBOOK) GENERAL PROVISIONS**

ADD TO 1-2 DEFINITIONS

Definitions additional to the definitions included in the Greenbook Section 1-2 and specific to Leucadia Wastewater District are included in Division 1 – Part 1, Procedures of these LWD Standard Specs.

ADD TO 1-3 ABBREVIATIONS

Abbreviations additional to the abbreviations included in the Greenbook Section 1-3 and specific to Leucadia Wastewater District are included in Division 1 – Part 1, Procedures of these LWD Standard Specs.

ADD THE FOLLOWING TEXT TO SECTION 2-6 – WORK TO BE DONE

2-6.1 Preconstruction Meeting Requirements

Prior to construction the Owner/Developer and Contractor shall attend a preconstruction meeting with LWD and sign the **PRECONSTRUCTION MEETING AGENDA, APPENDIX V**. Any project specific requirements and those requirements of the **LWD STANDARD PRECONSTRUCTION MEETING AGENDA, APPENDIX V**, shall be discussed at the meeting prior to construction.

ADD THE FOLLOWING TEXT TO SECTION 2-9 - SURVEYING

2-9.5 Private Contract Surveying

All surveying work shall be done under the direction and supervision of a Land Surveyor licensed by the State of California. Prior to beginning any phase of the survey work, the Contractor shall submit to the Inspector, the Contractor's proposed plan for establishing lines and grades for control of the Project, including his plans and timetable for submitting data to the Inspector during the course of the work.

All survey data shall be recorded in accordance with standard methods approved by the LWD Inspector or Engineer. All original filed notes, computations, and other records for the purposes of layout shall be recorded in field books, or other methods acceptable to the LWD Inspector. The Contractor, immediately upon completing and reducing notes for a portion of survey, shall furnish four (4) copies to the LWD Inspector for review purposes.

With no exceptions and on all projects, "Cut Sheets" shall be forwarded to the LWD Inspector prior to staking and/or excavation. Any changes to the cut sheets shall be recorded as changes and a complete set of "Record Cut Sheets" shall be submitted to the LWD Inspector.

The Contractor shall layout the project by establishing all lines and grades at the site and along the pipeline alignments necessary to control the project and shall be responsible for all measurements, that may be required for the execution of the project, to the location and limit marks and tolerances prescribed in these specifications or on the plans.

The Contractor shall place and establish such additional stakes and markers as may be necessary for control and guidance of his construction operations and as requested by the LWD Inspector. Grade stakes shall include the following: sewer line designation; station; invert elevation; and cut distance. Contractor shall protect in place all grade stakes and hubs during construction. If the grade stakes are removed, damaged, or knocked down during construction the stakes shall be replaced by the Land Surveyor at the Contractor's expense.

Prior to establishing any base line and grade stakes, the Contractor shall have all utility lines located and marked in the field and shall have all rights-of-way cleared to grade, and ready for construction activities.

The Contractor shall provide surveyed elevations of all constructed manholes at the end of construction and prior to acceptance by LWD. Such submittal shall be signed by a California licensed Land Surveyor. Variation from approved design elevations may be cause for rejection and rework.

The Contractor shall protect property and street monumentation and if such monumentation is destroyed by his operations, the Contractor shall at no cost to the Owner, have the monumentation replaced in accordance with the laws of the State of California, and in particular in accordance with State Assembly Bill 1414 including recordation, as required by law.

ADD THE FOLLOWING TO SECTION 2-11 - INSPECTION

The Contractor shall request inspection from LWD at least two working days (2) in advance of any work to be done in order that inspection services may be provided. LWD inspection shall be based on the availability of LWD Staff. No inspection shall be available on weekends or holidays, unless approved by the LWD District Engineer.

ADD THE FOLLOWING TO SECTION 5-2 - PROTECTION

Whenever existing sewer pipe, manholes, forcemains, or other LWD pipe or structures are encountered in or near the lines of trenches being excavated, Contractor shall be required to use proper care in preserving the same intact, and will be held responsible for any damage to the existing facilities during the progress of the work through his failure to exercise sufficient care.

ADD THE FOLLOWING TO SECTION 7-5 - PERMITS

The Owner shall be responsible for providing California Environmental Quality Act compliance and obtaining all permits necessary to complete the work. All work in existing city streets will additionally require the Owner's contractor to obtain an encroachment permit from the jurisdictional agency.

ADD THE FOLLOWING NEW PARAGRAPH 9.1.1.1 TO SECTION 9 MEASUREMENT AND PAYMENT

9.1.1.1 No Cost to LWD. All sewer work shall be completed as Private Contract Work. All work necessary to meet the requirements of the LWD Sewer Standards shall be done at no cost to LWD.

**DIVISION 2 SEWER SYSTEM STANDARD SPECIFICATIONS
PART 2 - SEWER SYSTEM STANDARD SPECS (GREENBOOK)
CONSTRUCTION MATERIALS**

LWD has adopted the (Greenbook) "Standard Specification for Public Works Construction," latest edition plus latest Supplement, as the specifications to be used to establish standards of work, material and construction procedures for improvements to the sewerage system within its boundaries. If in conflict, the requirements of the "LWD Sewer Standards" takes precedence over the Greenbook. Specific exceptions, clarifications, and modifications to the Greenbook are discussed herein.

ADD THE FOLLOWING TO 201-1.1.2 Concrete Specified By Class -

Concrete used for precast concrete components and for cast-in-place manhole bases shall be 650-C-4000 concrete with Type V cement. Concrete for pipe bedding, encasement, anchors, and thrust blocks, or wall support for pipe shall be 560-C-3250. Concrete for cast-in-place water bearing structures shall be as required and approved by the LWD District Engineer on a case-by-case basis.

Adjust quantity of water so concrete does not exceed maximum slumps specified when placed; use minimum water necessary for workability required by the part of the structure being cast. Measure consistency of concrete in accordance with ASTM C143.

ADD THE FOLLOWING TO 201-1.2.1 CONCRETE, Portland Cement -

Only Type V, ASTM C-150 Portland Cement shall be used.

ADD THE FOLLOWING TO 201-1.2.4 CONCRETE, Chemical Admixtures -

No admixtures shall be allowed with calcium chloride or triethanolamine. Admixtures used in combination shall be physically and chemically compatible and shall be so certified by each admixture manufacturer and by Testing Laboratory that prepared respective mix design.

ADD THE FOLLOWING TO 201-1.2.5.3 CONCRETE, Fly Ash -

If fly ash is approved for concrete mix, only Class F shall be used with Type V portland cement. Class C fly ash shall not be used.

ADD THE FOLLOWING AFTER 201-1.4 CONCRETE Mixing -

Job mixing of concrete will not be allowed. Concrete will not be accepted without a stamped batch ticket by the weigh master. Concrete shall be deposited by truck or hopper only, use of other hand buckets is not acceptable. Exceptions to these requirements will not be allowed.

ADD THE FOLLOWING TO SECTION 201-5 CEMENT MORTAR -

Where shown on plans or specified, Class C cement mortar shall be used. Mortar shall not be allowed to stand after mixing for more than thirty (30) minutes. Any rock or air pockets found in mortar shall subject such work for rejection at the discretion of the LWD inspector.

ADD THE FOLLOWING TO SECTION 201-7.3 NON MASONRY GROUT – Non-Shrink Grout

Non-shrink cementitious grout shall be Sika Grout 212, or approved equal.

ADD THE FOLLOWING NEW SECTION AFTER 201-7.3 NON MASONRY GROUT – Non-Shrink Grout**201-7.4 – Grout Admixtures.**

Epoxy grout admixtures shall be used with cementitious grout for patching of manhole base per **LWD Standard Drawing Nos. S-3 and S-4**. Epoxy grout admixture shall be "Injection and Anchoring Resins-03930 Everset Type II", or equal, as manufactured by Sika Products, two component, epoxy adhesive and crack filler for use with Sika Grout 212, cementitious grout.

ADD THE FOLLOWING TO 206-3.3 GRAY IRON CASTINGS, Manhole Frame and Cover Sets

Manhole frame and cover shall be per **LWD Standard Drawing No. S-6** for standard 4-foot diameter manholes. Manhole frame and cover shall be per **LWD Standard Drawing No. S-7** for 5-foot diameter manholes. Watertight manhole frame and cover shall be provided in areas where ponding around the manhole may be possible per **LWD Standard Drawing No. S-27**.

ADD THE FOLLOWING TO 207-8.2.2 VITRIFIED CLAY PIPE, Dimensions and Tolerances

Pipe ends shall be perpendicular to the longitudinal axis. The socket shall be true, circular, and concentric with the barrel of the pipe within the allowable tolerances specified in the subsection. The ends of the pipe shall be so formed that when the pipes are laid together and the joints made, they shall constitute a continuous and uniform line of pipe and shall have a smooth and regular interior surface.

ADD THE FOLLOWING TO 207-9.2.4 IRON PIPE & FITTINGS General

Unless otherwise approved by the LWD District Engineer, iron pipe and fittings shall not be allowed. Ductile iron fittings and pipe shall be required with PVC forcemains at locations where fittings are necessary. Ductile iron pipe shall only be used adjacent to restrained joint ductile iron fittings and shall be approved on a case by case basis by the LWD District Engineer. All ductile iron pipe and fittings shall be provided with ceramic epoxy Protecto 401 lining with submittals for review and approval.

Ductile iron pipe and fittings require the following corrosion protection: one mil thick bituminous coating and two layers of 8 mil thick polyethylene bags and backfilled sand having a sand equivalent greater than or equal to 30, and may only be used with the approval of the LWD District Engineer based on detailed shop drawings submittals and review.

ADD THE FOLLOWING TO 207-17 PVC PLASTIC PIPE, 207-17.1 General.

Wrinkles, blistering, or any interior or exterior imperfections of PVC pipe shall be subject to rejection at the discretion of the LWD Inspector.

ADD THE FOLLOWING TO 207-17.3.1 PVC PLASTIC PIPE Joining Systems

All PVC pipe and fittings shall be furnished with integral bells and elastomeric gasket joints. All connections to manholes shall be completed using "GPK" flexible couplings in accordance with Section 208-6 of the Greenbook.

For repair of all plain end to plain end PVC sewer, repair coupling shall be made of PVC material meeting the same material requirements as the pipe being repaired. The PVC sewer repair couplings shall be rubber gasketed with no center stop. Pipe ends shall be thoroughly cleaned prior to installation of the repair coupling(s). The repair coupling shall be slipped all of the way on to one plain end pipe, then the pipe and adjoining pipes shall be aligned together and the repair coupling slipped back into a position equally spaced between the two plain end pipes. The PVC sewer repair coupling shall be as manufactured by Hug-Tite for SDR 35 sewer pipe or Pure Blue for C900/C905 sewer pipe, or approved equal. Calder or Furnco rubber repair couplings shall not be acceptable.

Saddles shall not be allowed. Only new wyes shall be installed or cut in.

ADD THE FOLLOWING TO 207-17 PVC PLASTIC PIPE

207-17B POLYVINYL CHLORIDE (PVC) SEWER PIPE FOR FORCE MAINS

PVC sewer pipe for force mains 2-inch through 3-inch in diameter shall be Schedule 80, Type 1, Grade 1, conforming to ASTM D-1784. Pipe lengths shall be 20-feet with solvent welded joints. Fittings shall conform to the same requirements as the pipe. However, the normal minimum force main nominal diameter shall be 4-inches, unless otherwise approved by the LWD District Engineer.

PVC sewer pipe for force mains 4-inch through 12-inch in diameter shall conform to AWWA C-900, Class 150 minimum. Pipe lengths shall be 20 feet with bell and spigot joints. Bell shall have a factory installed solid cross section elastomeric ring which meets the requirements of ASTM F-477.

Fittings shall have a pressure rating at least equal to that of the pipe. Pipe and fittings shall also be AWWA C-900 type. Restraint shall be provided with thrust blocks or through the use of Certainteed restrained joint AWWA C-900 pipe. Calculations for restrained joints lengths shall be submitted for review and approval by the LWD District Engineer.

PVC sewer pipe for force mains 14-inch through 24-inch in diameter shall conform to AWWA C-905, minimum Class 165 (DR 25). Pipe lengths shall be 20-feet, with bell & spigot joints. Bell

shall have a factory installed solid cross section elastomeric ring which meets the requirements of ASTM F-477. Fittings shall be fabricated of the same material as the adjacent pipe barrels with exterior fiberglass reinforcement, as manufactured by IPEX, or equal. Fittings shall have a pressure rating at least equal to that of the pipe. Cement mortar lined ductile iron fittings require the following corrosion protection: one 1-mil bituminous coating and two layers of 8 mil thick polyethylene bags and backfilled sand having a sand equivalent greater than or equal to 30, and may only be used with the approval of the LWD District Engineer based on detailed shop drawings submittals and review. All ductile iron pipe shall be lined by a factory approved applicator with ceramic epoxy Protecto 401, or other protective lining as approved by the LWD District Engineer.

Metallic locating tape shall be used with all PVC force mains. The tape shall be acid and alkali-resistant, three inches wide, 0.004 inch thick and shall have a 1,500 psi strength and a 350 percent elongation value. The tape shall be green and shall be inscribed with "CAUTION-BURIED SEWER" or similar appropriate wording. Color and printing shall be permanent, unaffected by moisture or soil.

ADD THE FOLLOWING TO 208-2.1 JOINTS FOR CLAY PIPE General

Type "D" Joints for VCP shall be allowed for repair purposes only and only as pre-approved by the LWD Inspector. With the exception of occasional repairs, all other VCP joints shall be Type G Polyurethane Joints. Joints shall be mechanical compression type similar to Speed Seal, manufactured by Gladding, McBean and Company, or the Wedge-Lock, manufactured by Pacific Clay Products, or as approved, and shall comply with ASTM C-425.

For repair of vitrified clay pipe (VCP) to PVC, a Romac Industries, Inc. Style RC 501, or approved equal, straight or transition coupling shall be used with a gasket range for each end of the coupling to match the outside diameter of the pipe on that side of the coupling being joined. The center rings shall be ductile iron per ASTM A536, Grade 65-45-12 and shall be provided with 16 mils fusion bonded epoxy in Corvel Yellow complying with AWWA C213 with surface preparation to shot blasted white finish. The end rings for the coupling shall be ductile iron per ASTM A536, Grade 65-45-12 and shall be provided with 16 mils fusion bonded epoxy color coded to the type of connecting pipe. Gaskets shall be SBR per ASTM D2000 MBA710, compounded for water and sewer service. All bolts and nuts shall be Type 316 Stainless Steel. Calder or Furnco rubber repair couplings are not acceptable.

ADD THE FOLLOWING TO 208-6.5 PIPE TO MANHOLE FLEXIBLE COUPLING – Installation Instructions

A "GPK" manhole connection fitting ("Sand Collar") shall be cast into the base of manholes for all connections. The connection shall be watertight and shall provide a flexible joint at the connection to the GPK fitting. The nearest pipe joint shall be at the end of the standard GPK fitting and not more than 2-feet outside of the manhole base, in any case. The invert channel in the manhole base shall be formed at the time the manhole base is constructed. No mortar will be allowed.

ADD A NEW SECTION 215 – PRECAST STRUCTURES**SECTION 215 – PRECAST STRUCTURES**

215-1 Precast Concrete. Precast products shall be supplied, manufactured, and fitted in accordance with the following requirements:

1. Each precast concrete manufacturer proposing to provide materials to Owners within LWD shall be pre-approved by LWD.
 - a. Each manufacturer shall submit a shop drawing for review and approval by the LWD District Engineer that specifies all relevant information regarding the precast manufacturer name, location, methods, materials, recommended installation, etc.;
 - b. All precast concrete components shall be designed and manufactured in accordance with ASTM C-478, latest edition; and
 - c. Concrete used in the manufacture of precast concrete shall be Greenbook 650-CW-4000 mixed with Type V cement, unless otherwise approved.
 - d. Precast components delivered for construction shall be inspected and approved for installation by the LWD Inspector. Precast components with rock pockets that are visible, or that have been repaired prior to delivery, will be rejected from the site.
2. All precast concrete structures installed below ground shall be subject to vacuum testing per Division 2 – Part 3 of the LWD Standard Spec.

215-1.1 Sewer Manholes. The following requirements apply to all sewer manholes constructed within LWD:

1. Owner shall only provide precast products that have been reviewed and approved by LWD within 2 years of the start of construction;
2. No manhole steps are allowed inside pre-cast sewer structures;
3. All new manholes shall be PVC or polyurethane lined per Section 500 of the Greenbook;
4. All precast joints shall be filled with 2-inch by 2-inch butyl rubber gasket, such as by CPS-210 by Press-Seal, or approved equal;
5. GPK "Sand Collar" manhole adaptors shall be utilized for all manhole connections; and
6. All patching within manhole bases shall be epoxy mortar.
7. For 1) all new manholes 2) all existing manholes with new connections, and 3) all existing manholes with new manhole risers: the manholes shall be provided with

Integrally Locking PVC or Polyurethane Protective Lining System per Section 500-2 of the Greenbook.

215-1.2 Traps and Interceptors. The following requirements apply to all sewer traps and interceptors:

1. Sewer traps and interceptors shall be designed, constructed, and operated in accordance with Chapter 10 of the Uniform Plumbing Code, 2006 Edition;
2. Traps are generally not allowed.
3. New food establishments shall be fitted with grease (Fats, Oils, and Grease (FOG)) interceptors;
4. FOG disposal systems shall be engineered, sized, and installed in accordance with the manufacturer's specifications and as specified in (International Association of Plumbing and Mechanical Officials – Product Standard) IAPMO PS 118-2000; and
5. FOG disposal systems shall have been tested and certified as described in IAPMO PS 118-2000 and in accordance with other national consensus standards applicable to FOG disposal systems, as discharging no more than 100 milligrams per liter of FOG.

ADD A NEW SECTION 216 – BACKWATER VALVES

SECTION 216 – BACKWATER VALVES

216-1 Backwater Valves. When a fixture is installed on a floor level that is lower than the next upstream manhole cover of the public or private sewer, such fixture shall be protected from backflow of sewage by installing an approved type of backwater valve. Fixtures on floor levels above such elevation shall not discharge through the backwater valve.

Backwater valves shall have bodies of cast iron, plastic, brass, or other approved materials; shall have non-corrosive bearings, seats, and self-aligning discs; and shall be constructed so as to ensure a positive mechanical seal. Such backwater valves shall remain sufficiently open during periods of low flows to avoid screening of solids and shall not restrict capacities or cause excessive turbulence during peak loads. Unless otherwise listed or approved, valve access covers shall be bolted type with gasket, and each valve shall bear the manufacturer's name cast into the body and the cover.

Backwater valves shall be submitted to the LWD Engineer for review and approval for every installation where backwater valves are required and used.

**DIVISION 2 - SEWER SYSTEM STANDARD SPECIFICATIONS
PART 3 - CONSTRUCTION METHODS**

The Leucadia Wastewater District adopts the "Greenbook", Standard Specification for Public Works Construction, latest edition plus latest Supplement, as the specifications to be used to establish standards of work, material and construction procedures for improvements to the sewerage system within its boundaries. If in conflict, the requirements of the "LWD Sewer Standards" take preference over the Greenbook. Specific exceptions, clarifications, highlighted requirements, and modifications to the Greenbook are discussed herein.

ADD THE FOLLOWING PARAGRAPHS TO 301-1.6 Adjustment of Manhole Frame and Cover Sets to Grade and SECTION 302-5.8 Manholes (and other structures)

Comply with the requirements of the jurisdictional City with regard to adjustment of manhole frame and cover sets prior to new paving and/or prior to overlay, as appropriate. Adjustment of manhole frame and cover will be inspected for good workmanship, soundness, and watertightness by LWD Inspector. Repair any items required for reinspection.

When cast iron riser rings are allowed by LWD, to increase the height of the manhole rim, the riser ring shall meet the requirements of ASTM A48, Class 30. Risers shall have a flange 360 degrees on the outside of the riser. The flange shall extend a minimum of ½-inch in height. All seating surfaces shall be machined and attain full contact of mating surfaces such that the raised manhole cover does not "rock" or move on the installed riser ring. Risers shall be marked with the foundry name, pattern reference number and height of rise, for example: (SBF 1310 X 2).

Cast iron riser rings shall meet the requirements herein and shall be manufactured by South Bay Foundry (phone 619-956-2780). Alternative castings meeting these specification requirements from other foundries may be submitted by the contractor for consideration, review, and approval.

Prior to purchase of cast iron riser rings, the Contractor shall:

1. Submit a copy of written approval from the jurisdictional city allowing the use of cast iron riser rings for manhole height adjustment;
2. Field inspect all existing manholes proposed to be raised with cast iron riser rings and shall record and submit for review and LWD approval the:
 - a. Existing casting pattern reference;
 - b. Proposed height of new cast iron riser;
 - c. Existing outside diameter of frame;
 - d. Existing inside diameter of frame;
 - e. Existing cover diameter;
 - f. Existing opening diameter;
 - g. Existing cover height; and
 - h. Proposed manhole liner.

3. Submit shop drawing information from the foundry for the specific riser(s) proposed to be used by the contractor showing compliance and compatibility with the above requirements and dimensions for review and approval by the LWD District Engineer.

After installation of riser rings the manhole shall be lined with a protective Integrally Locking PVC or Polyurethane Protective Lining System per Section 500-2.

ADD THE FOLLOWING NEW SUBSECTION TO 302-5.8 MANHOLES –

302-5.8.1 GREASE INTERCEPTORS

The grease interceptor must be set on a properly prepared base to insure against movement of either the tank or the inlet and outlet lines. The excavation shall be the proper width and length to accept the interceptor model selected and shall have enough extra width and length to allow for safe installation and sealing of the system. The excavation shall be bedded with suitable granular material and shall be compacted to 90% maximum dry density, or to the requirements of the project geotechnical engineer. Also, the bottom of the excavation shall be graded level. LWD Inspector and Manufacturer's representative shall be present during grease interceptor installation.

ADD FOLLOWING AFTER FIRST PARAGRAPH OF 303-1.8.1 - Placing Concrete. General.

Concrete shall not be placed until reinforcing steel and forms have been inspected and approved.

ADD THE FOLLOWING NEW SECTIONS AFTER 303-1.11 PAYMENT-

303-1.12 Water Testing Concrete Structures

All concrete structures shall be tested for water tightness by the Contractor. Units shall be filled to normal operating level, as shown on plans. Any noticeable leaks shall be repaired and, if necessary, the test shall be repeated until water tightness is insured. The cost of water shall be borne by the contractor. Vacuum test may be performed in lieu of hydraulic test; tests shall be in accordance with Section 306-1.4.7 of these specifications.

303-1.13 Pipelines Through Concrete Structures

Whenever a pipeline of any material terminates or extends at or through a structural wall or sump, the Contractor shall, where possible, install in advance of pouring the concrete, the pipe sleeve fitting or core drilled connection fitting, and special coatings as required for the particular installation.

Whenever any run of pipe is installed subsequent to placing of concrete, the Contractor shall accurately position the opening in the concrete for such pipelines. Openings shall be of sufficient size to permit a perfect final alignment of pipelines and fittings without deflection of any part and to allow adequate space for satisfactory packing where pipe passes through the wall to insure water

tightness around openings so formed. Core drilled pipe penetrations shall be provided with Sika Elastomeric Sealant, or approved equal, to ensure tightness around openings so formed. Sleeves or cores shall be grouted at both ends with non-shrink cementitious grout, using Sika grout 212, or approved equal.

REPLACE THE SECOND PARAGRAPH OF 303-3.2 Concrete. WITH THE FOLLOWING -

Precast concrete manhole rings, cones and sections required for pipeline structures shall be of the dimensions indicated on the drawings. They shall be made of 650-CW-4000 concrete with Type V cement as described in Division 2 Part 2 of these specifications.

REPLACE SECOND PARAGRAPH OF 303-3.7 Bonding and Grouting. WITH FOLLOWING -

Use "Injection and Anchoring Resins-03930 Everset Type II", grout admixture manufactured by Sika Products, two component, epoxy adhesive and crack filler with Sika Grout 212, cementitious grout or equal.

REVISE THE THIRD PARAGRAPH OF 306-1.1.1 General TO READ AS FOLLOWS:

Excavation shall include the removal of all water and materials of any nature which interfere with the construction work. Removal of groundwater to a level below the structure or pipe subgrade shall be required by Contractor at no expense to LWD. See **Standard Drawings GN-2, LWD Sewer Note 12.**

ADD THE FOLLOWING TO 306-1.1.1 - OPEN TRENCH OPERATIONS. Trench Excavation. General.

The requirements of the ASTM D2321 shall be followed for the installation of all piping systems.

Excavated material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the excavated banks to avoid overloading and to prevent slides or cave-ins. Excavation surfaces shall be graded as necessary to prevent surface water from flowing into the trenches.

Backfilling PVC Pipe Trenches. The Contractor shall excavate to four (4) inches below sub-grade and place four (4) inches of crushed rock bedding as specified and as shown on **Standard Drawing S-11.** Crushed rock shall be placed to insure a minimum cover of 1'-0" over top of pipe as specified and as shown on **LWD Standard Drawing No. S-11.**

REPLACE THE FIRST PARAGRAPH OF 306-1.1.3 Maximum and Minimum Width of Trench. WITH:

For pipe (except corrugated steel pipe), the minimum width of trench permitted shall be as indicated on **LWD Standard Drawing Nos. S-11 and S-12.** If any trench, through the neglect of the Contractor, is excavated below the bottom grade as required by the profiles, it shall be refilled to

grade, at the Contractor's expense for all labor and materials, with pipe zone materials as required per **LWD Standard Drawing No. S-11**, well tamped into place.

The requirements of the ASTM D2321 shall be followed for the installation of all piping systems with particular regard to the allowable depth of shoring systems wider than the maximum allowable width of trench specified herein. Shoring systems shall be installed per **LWD Standard Drawing No. S-11**.

The maximum width of trench shall be determined by the size of the sewer pipe being installed. For sewer pipe of diameter 8-inch through 24-inch the maximum width of trench shall be 24-inches greater than the outside diameter of the pipe. For sewer pipe of diameter 30-inch through 36-inch the maximum width of trench shall be 36-inches greater than the outside diameter of the pipe.

DELETE THE FOURTH PARAGRAPH OS SECTION 306.1.2.1.1 General AND REPLACE WITH THE FOLLOWING:

No water jetting or water densification of pipe bedding or backfill shall be allowed.

ADD THE FOLLOWING TO 306.1.1.5 Removal and Replacement of Surface Improvements-

Shrubbery, trees and sod, fences, property survey corners or markers, and other surfaces disturbed, shall be restored to a condition equal to that before the work began by the Contractor at his expense, furnishing all labor and materials incidental thereto.

ADD A NEW PARAGRAPH 306-1.1.7 Handling and Storing Pipe

During storage, handling, and transporting, every precaution shall be taken to prevent injury to pipe. Pipe shall be handled only by means of pipe manufacturer approved hooks on ends of sections, by means of dual fabric slings, or other methods approved by the LWD District Engineer for the pipe used. PVC pipe shall not be stored in direct sunlight. Store any rubber or neoprene materials in enclosures. Pipe shall be stored on shipping supports, or by other method approved by the pipe manufacturer or LWD District Engineer. Under no circumstances shall backfill be dropped onto any type of sewer or force main pipeline in a manner that is determined by the LWD District Engineer to be detrimental to the pipe.

ADD A NEW PARAGRAPH 306-1.1.8 Construction of Sewer Manholes

Manholes shall be constructed in accordance with **LWD Standard Drawings**. In addition, the following miscellaneous requirements apply:

1. Existing polyurethane or PVC manhole lining damaged during construction shall be repaired or replaced by the Contractor.
2. For 1) all new manholes, 2) all existing manholes with new connections, and 3) for all existing manholes that require new riser rings: the manholes shall be provided with Integrally Locking PVC or Polyurethane Protective Lining System per Section 500-2.

3. Watertight manhole frame and cover shall be provided in areas where ponding around the manhole may be possible per **LWD Standard Drawing No. S-28**.
4. A minimum of 48 hours of curing time is required for all manhole bases. No admixtures or accelerators shall be utilized without specific written permission from the LWD District Engineer and in no case shall such additives be allowed in lieu of 48 hours cure time.

REPLACE THE LAST FOUR PARAGRAPHS OF 306.1.2.1 General, 306-1.2.1 Bedding, WITH THE FOLLOWING –

Provide a crushed rock bedding and pipe zone in accordance with Green Book Section 306-1.2.13 and per **LWD Standard Drawing No. S-11**, Type C for:

1. SDR 35 PVC sewer pipe in sand, gravel, or saturated topsoil from 4-feet to 15-feet deep;
2. AWWA C900/C905 PVC pressure pipe in sand, gravel, or saturated topsoil from 15 to 30 feet deep;
3. VCP in dry or wet clay soils from 4-feet to 13-feet depth; and
4. VCP in dry or wet clay soils between 13-feet and 30-feet of cover, utilize concrete encasement in the pipe zone per **LWD Standard Drawing No. S-16**.

Maximum ½-inch gradation Greenbook Section 200-1.2 crushed rock shall be used in the bedding zone for pipe up to and including 16-inch diameter and ¾-inch rock shall be used for piping larger than 16-inch.

In areas of high ground water, or suspected high ground water, all crushed rock bedding shall be encased in an approved geotextile fabric. The improvement plan engineer of record or project geotechnical engineer shall submit a recommended geotextile suitable for the in-situ soil conditions for approval by the LWD District Engineer.

ADD THE FOLLOWING SECTIONS TO 306-1.2.2 - Pipe Laying

SECTION 306-1.2.2.1. Connections

- A. No new upstream sewer in construction shall be connected to the LWD wastewater collection system, except in the presence of the LWD Inspector. If such a connection will exist during the construction of the upstream Owner constructed sewer, then the connection shall be provided with a temporary sewer plug. A Temporary Sewer Plug Plan shall be in accordance with the LWD approved plans. In the event that the Improvement Plans do not have a Temporary Sewer Plug Plan, then the Contractor shall prepare a Temporary Sewer Plug Plan in accordance with the requirements of **PROTOCOL FOR PLUGGING OR**

UNPLUGGING SEWERS, APPENDIX U of the LWD Standard Specs for submittal, review, and approval by the LWD District Engineer.

- B. Subject to LWD approval, the Owner may purchase and obtain sewer services for occupancy prior to final acceptance of the project by LWD under the conditions stated below. LWD retains discretion to deny requests for use of utilities prior to acceptance if LWD, in its sole and absolute discretion, determines that such use is not in the best interest of LWD or the public. When allowed and prior to the purchase of sewer capacity for each connection, the Owner shall meet the conditions providing for this allowance in Part 1, Division 1 of these LWD Standard Specs including execution of a **TEMPORARY SERVICE AGREEMENT, APPENDIX O** with terms and conditions approved by LWD.
- C. **Manhole Connection Fittings.** A "GPK" manhole connection ("Sand Collar") fitting shall be cast into the base of manholes for all connections. The connection shall be watertight and shall provide a flexible joint at the connection to the GPK fitting. The nearest pipe joint shall be at the end of the standard GPK fitting and not more than 2-feet outside of the manhole base, in any case. The invert channel in the manhole base shall be formed at the time the manhole base is constructed. No mortar will be allowed.
- C. **Connection to Existing Manholes.** At the locations as shown on the Drawings, the Contractor shall connect to existing manhole structures and construct the new flow-through channels in each manhole base to accommodate the new sewer lines as required. Smooth transitions shall be installed from the inverts of the newly installed pipes to the existing manhole structures. **Manholes shall be core drilled and manhole connection fittings shall be connected to the core drilled hole by Link-Seal, or approved equal. The first flexible joint shall be located within one-foot of manhole base. Jack hammering shall not be allowed.**
- D. **Future Connections to Structures.** Drop manhole tees, concrete encased drop pipes, drop manhole one-fourth bends for all drop manholes, and all stub inlets that will be required for all proposed sewer extensions, as shown on the plans, shall be constructed as a part of the sewer structures required by the contract. The location, sizes, and elevations of these items shall be as shown on the details and plans.

SECTION 306-1.2.2.2 – Avoidance of Reverse Slope or Ponding in Sewers

Sewer pipe installation work shall be done in accordance with the following conditions:

1. Per **LWD Standard Drawing S-11 and S-12;**
2. Pipe shall be installed in a dry excavation;
3. Pipe shall be properly bedded at the required line and grade;

4. Care shall be taken in installing the pipe zone material with proper support of the pipe under the haunches and bells to avoid vertical or circumferential deflection of the pipe section;
5. Care shall be taken in moving the trench shield, if used, to avoid movement of the pipe; and
6. Care shall be taken in backfill of the pipe zone and trench to avoid moving the pipe, while also achieving required relative compaction.

For new sewers installed in relatively dry stable trenches and subgrade, as determined by the LWD District Engineer, there shall be no tolerance of reverse slope, as evidenced by ponding of flushing water in the pipeline during video inspection. Any such pipeline shall be removed upstream and downstream to the nearest sewer structure, unless otherwise approved by the LWD District Engineer, and shall be replaced at proper line and grade and retested. Point repairs of sags are not acceptable. The process of sag repair shall be repeated, if necessary, until no sags or ponding remain. The minimum waiting period before deflection and air pressure testing is allowed shall be 30 days.

For new sewers installed in saturated wet unstable soils, over-excavation and installation of crushed rock and geotextile shall be completed per **LWD Standard Drawing No. S-11**. Only as pre-approved by the LWD District Engineer based on this described geotechnical condition, the following sag or ponding allowances shall be tolerated by LWD based on the size of the sewer pipe:

Pipe Diameter, Inches	Flow Depth Criteria	Allowable Sag Only When Pre-Approved, Inches
8	½-full	0.50
10	½-full	0.50
12	½-full	0.75
15	¾-full	0.75
16	¾-full	1.00
18	¾-full	1.00
21	¾-full	1.25
24	¾-full	1.25
27	¾-full	1.50

ADD THE FOLLOWING SECTION 306-1.2.13.1 - Installation of Plastic Pipe and Fittings:

When existing soil conditions are stable and have a standard penetration test blow count equal to or greater than 13 blows per foot or shear strength greater than 750 psf obtained from an unconfined compression test, PVC SDR 35 sewer pipe, 4" through 15" diameter may be installed with not less than 4 feet of cover, nor more than 15 feet of cover. For cover greater than 15 feet, AWWA C900 or C905 PVC Class 200 pressure pipe shall be used with calculations submitted for approval.

Provide a crushed rock bedding and pipe zone in accordance with Green Book Section 306-1.2.13 and per **LWD Standard Drawing No. S-11**, Type C. Maximum ½-inch gradation Greenbook

Section 200-1.2 crushed rock shall be used in the bedding zone for pipe up to and including 16-inch diameter and 3/4-inch rock shall be used for piping larger than 16-inch.

In the following listed conditions, stable subgrade shall be established with overexcavation and backfill with 3/4-inch crushed rock and the crushed rock bedding zone shall be encased in a geotextile fabric.

- a. When standard penetration blow count is less than 13 blows per foot: or
- b. When shear strength is less than 750 psf obtained from an unconfined compression test: or
- c. When wet uniform subgrade conditions exist in the judgment of the LWD Inspector, the LWD District Engineer, the Improvement plan engineer, or the Contractor.

The improvement plan engineer of record or project geotechnical engineer shall submit a recommended geotextile suitable for the in-situ soil conditions for approval by the LWD District Engineer.

For shallower or deeper conditions, or for anticipated or actual field conditions that differ from these assumptions, the designer shall submit sewer pipe strength calculations for review and approval by the LWD District Engineer.

ADD THE FOLLOWING SECTION 306-1.2.13.2 Installation of Plastic Pipe and Fittings.

Wrinkles, blistering, or any interior or exterior imperfections of PVC pipe shall be subject to rejection at the discretion of the LWD Inspector.

Vibration, tamping, or recompaction of pipe zone material to re-shape an out of tolerance deflected PVC pipe shall not be allowed. Any PVC pipe previously installed that is excavated for repair due to incorrect grade or for exceeding allowable deflection tolerances shall be removed from the jobsite and shall not be used for any LWD facility.

ADD THE FOLLOWING SECTION: Section 306-1.2.14 Sewer Laterals

Sewer laterals shall be maintained by the property owner from the property owner plumbing to the sewer collection line. Damage caused to the sewer collection line by lateral wyes or saddles shall be repaired by the property owner. LWD will maintain the sewer collection line and downstream facilities.

Sewer laterals shall be constructed on an unyielding foundation, with joints closely and accurately fitted, true to line, and on a straight grade from the bend joining the main sewer to their upper ends, unless otherwise indicated on the plans. Sewer laterals shall not be laid on a slope greater than 45 degrees from a horizontal line unless required or approved by the LWD District Engineer. Wyes for sewer laterals shall be plastic PVC pipe fittings matching the sewer material. Acceptable wyes shall be made of either SDR 35 or C900; rubber wyes are not acceptable. The sewer lateral lines

shall be jointed to wyes by commercially manufactured bends. Bends are a part of the sewer lateral. Sewer laterals shall be installed on a uniform grade of not less than 1/4" per lineal foot as shown on the **LWD Standard Drawings** and as follows:

- A. Where depth of main line sewer and sewer lateral slope of 1/4" per lineal foot will result in a sewer depth at the termination of the lateral of 5-1/2 feet or less, then 1/4" per lineal foot slope shall govern.
- B. Where depth of main line sewer and sewer lateral slope of 1/4" per lineal foot will result in a sewer depth at the termination of the lateral of over 5-1/2 feet, the Contractor shall establish the slope of the lateral as follows:
 - 1. Where properties can be properly serviced by a sewer depth at the termination of the lateral of 5-1/2 feet, the slope shall be increased to result in the 5-1/2 foot depth, or a deep cut sewer lateral or riser may be used.
 - 2. Where properties slope away from the main line sewer such that a depth at the termination of the lateral of greater than 5-1/2 feet is required for proper service, the slope shall be laid to 1/4" per lineal foot or increased as required to service the property.
 - 3. In all cases, the Contractor shall establish the required elevations at the termination of the sewer lateral. Where a deep cut sewer lateral line is to be connected to a sewer main, all bends leading away from the sewer main wye branch are a part of said deep cut sewer lateral. All sewer laterals shall be installed with a suitable stopper of the size of the lateral.
 - 4. Sewer laterals shall not be connected directly to a manhole. They shall be connected to upstream or downstream sewer mains but not within 5 feet of one another. The exception of this statement is only at cul-de-sac and street knuckles. Manhole flow lines must be channeled for each sewer lateral. Manhole size shall be 5 feet in diameter where three or more collection sewers connect to a manhole.

Commercially manufactured wyes shall be installed where indicated on the plans or at such locations required by the LWD District Engineer. All wye branches not to be joined to sewer laterals shall be installed with a suitable stopper of the size of the wye branch. The wye branches, unless otherwise specified, will be inclined upward at an angle not greater than 45 degrees from a horizontal line. The use of double wyes will not be permitted.

When it becomes necessary to connect a sewer lateral to a main line sewer at a point where no wye branch has been installed in the main line sewer, a wye with collar shall be used. The wye shall be installed by cutting two cross-sections in the main line sewer pipe and placing the wye between the two sections and securing the wye snugly in place by use of PVC repair couplings. Installation shall be in accordance with manufacturer's recommendations. The pipe and wye shall be entirely encased with 3,250 psi concrete at least six (6) inches thick for one-foot each side of the wye. The

Contractor shall use special care to prevent bits of tile, sand, dirt, or other foreign material from entering the main line.

Contractor shall request LWD Inspection a minimum of two (2) working days to arrange for acceptable inspection time for all lateral connection excavations. Request of inspection shall be verified verbally, messages or written requests are not acceptable without verbal confirmation. Damage to sewer laterals during excavation for connection to building plumbing requires: notification to the LWD Inspector; repair; TV Inspection; and successful air pressure test of line segment to which it is connected.

A standard cleanout per **LWD Standard Drawing No. S-25** shall be provided on each lateral at the property line to allow closed circuit television inspection of the lateral.

SECTION 306-1.3.3 Jetted Backfill. REPLACE WITH THE FOLLOWING.

Water densification of backfill shall not be allowed under any conditions.

SECTION 306-1.4 TESTING PIPELINES, REPLACE SECTION 306-1.4.1 WITH THE FOLLOWING -

306-1.4.1 General

Pipeline testing for sewers within the Leucadia Wastewater District shall consist of the following tests, which are described, in detail below:

- Video Inspection Test (mandatory)
- Air Pressure Test (mandatory)
- Deflection Test (PVC Pipe only) (mandatory)
- Manhole Negative Air Pressure Test after Backfill (Vacuum Test - mandatory)
- Water Infiltration Test (discretionary)
- Forcemain Pressure Test (mandatory at test pressure approved by LWD District Engineer)

The Contractor at the Contractor's expense, including all materials, equipment and labor shall perform these tests. The tests shall be performed in the presence of the LWD Inspector or LWD District Engineer. All sewer pipes and forcemains shall be cleaned prior to testing by use of a high-pressure cleaning truck/vactor or Wayne Ball.

Testing shall proceed after compaction is complete and dry utilities are in-place, but prior to placing of permanent resurfacing. The tests shall include the main and laterals as a unit. All pipes are to be cleaned and empty at the time of testing.

When the facilities installed exceed the limits allowed by each test, the Contractor shall, at the Contractor's expense including materials, equipment and labor, locate the defects and make the necessary repairs or replacements in accordance with the Specifications to reduce the leakage or infiltration to within the specified limits. Any individually detectable leaks shall be repaired, regardless of the results of the tests.

CHANGE THE TITLE OF SECTION 306-1.4.4 Air Pressure Test, TO: 306-1.4.4.1 Air Pressure Test for PVC Sewer Pipe.

ADD THE FOLLOWING NEW SECTION 306-1.4.4.2 Air Pressure Test for VCP Sewer Pipe:

For all Vitrified Clay Pipe, a low pressure air test shall be conducted in accordance with ASTM C828-03 – Standard Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Lines.

DELETE 306-1.4.5 Water Pressure Test AND REPLACE WITH THE FOLLOWING:

306-1.4.5 Force Main Pressure Test

Upon the completion of the laying, jointing, and backfilling, but before final paving, the forcemain pipeline or portions thereof shall be hydrostatically tested. The lines shall be bulkheaded and tested in sections. The bulkheads used for testing shall be of adequate design and construction to withstand the required pressures without causing injury to or excessive stresses in the pipe. The Contractor, at his own expense, shall provide adequate anchorage at the extremities of the pipeline included in the contract, if required, to restrain any sections of the pipe while under test.

The test pressure at the location of the testing equipment shall be computed on the basis of the relative elevations of the test gauge and the lowest point in the section being tested, and shall result in a pressure of not more than 150 percent of design pressure at the lowest point in said section. The test pressure at the highest point in the test section shall be not less than 125 percent of design pressure. The test pump and gauge shall be connected to the force main at a location other than the highest point in the line, to facilitate release of air from the high point. A recording gauge shall be used.

Prior to testing, written confirmation of design and test pressures shall be provided from the design Engineer of Record to confirm that the pressure rating of the pipe material, fittings, and restraint system will not be exceeded. Alternative test procedures should be recommended for review and approval of LWD District Engineer, if necessary.

This test shall be made on all sections of the force main in order that all pipe, valves, and fittings may receive the test. The test pressure shall be maintained continuously by pumping for a period of at least one hour. At the end of the first hour, the pressure shall meet the requirements stated above.

Pumping shall then be discontinued for one hour and drop in pressure read on the dial of the gauge at the end of the second hour and recorded. The initial test pressure shall then be restored by pumping, and the quantity of water pumped into the line to accomplish this shall be measured accurately. No standard allowance for leakage will be allowed, however, a recommended standard allowance recommended by the pipe manufacturer may be submitted for review and consideration by the LWD District Engineer. If there is any sign of leakage or failure at any point on the line during the test, the test shall be discontinued until the same has been repaired, after which the test shall be repeated until the section tested shall have met the above requirements. The test shall be performed and accepted only in the presence of LWD's Inspector.

The Contractor shall provide all calibrated meters for measurement of leakage, all bulkheads, piping, calibrated gages, pumps and other equipment, and all power and labor necessary for the performance

of pressure tests satisfactory to LWD. The Contractor shall furnish all necessary equipment and labor to fill each section of pipeline tested and for pumping the water from one test section to another as may be necessary for obtaining and maintaining the required water pressure and for filling the entire pipeline with water after the conclusion of the testing, as hereinafter provided.

After the pipe has successfully met all test requirements specified herein, the entire pipeline shall be filled with water and so maintained until the completion of the contract unless otherwise ordered by LWD.

ADD THE FOLLOWING NEW SUBSECTION: 306-1.4.7 Manhole and Grease Interceptor Negative Air Pressure Test (Vacuum Test)

Manhole Negative Air Pressure Test (Vacuum Test). Vacuum testing shall be done in accordance with ASTM C 1244, latest edition. Each manhole and grease interceptor shall be tested immediately after assembly and prior to backfilling to pull all precast concrete segments together and to repair all vacuum leaks. Each manhole and grease interceptor shall be tested a second time for final acceptance after backfill in order to assure that the backfill operation did not damage the integrity of the vacuum seal. Any manholes or grease interceptors damaged or moved during final grading or paving shall be replaced retested, excavated if failed, repaired if necessary, and retested until passing.

All lift holes shall be plugged with an approved non-shrink grout. No grout will be placed in the horizontal joints before testing. All pipes entering the manhole shall be plugged, taking care to securely brace the plugs from being drawn into the manhole and grease interceptor.

For manholes the test head shall be placed at the inside of the top of the cone section and the sealed manhole shall be evacuated in accordance with the manufacturer's recommendations. A vacuum of ten inches (10") of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to nine inches (9"). The manhole shall pass if the time is greater than 60 seconds for a 48" diameter manhole, and 75 seconds for a 60" manhole.

For grease interceptors the test head shall be placed at the top of the cone section and the sealed manhole covers shall be evacuated in accordance with the manufacturer's recommendations. A vacuum of four inches (4") of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to three inches (3"). The manhole shall pass if the time is greater than 75 seconds for a 60" manhole.

If the manhole or grease interceptor fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Cracks longer than two-inches shall be cause for rejection of the casting and no patching shall be allowed. Retesting shall proceed until a satisfactory test is obtained.

DIVISION 2 SEWER SYSTEM STANDARD SPECIFICATIONS
PART 5 – SYSTEM REHABILITATION
SECTION 500 - PIPELINE

LWD has adopted the (Greenbook) "Standard Specification for Public Works Construction," latest edition plus latest Supplement, as the specifications to be used to establish standards of work, material and construction procedures for improvements to the sewerage system within its boundaries. If in conflict, the requirements of the "LWD Sewer Standards" takes precedence over the Greenbook. Specific exceptions, clarifications, and modifications to the Greenbook are discussed herein.

ADD THE FOLLOWING PARAGRAPHS TO 500-1.1.1 General:

500-1.1.1.1 Pipelining Methods. LWD allows, or does not allow, the various methods listed and as-noted in the following Table 500-1.1.1.1 Pipe Lining Methods.

Table 500-1.1.1.1 Pipe Lining Methods

Section	Title	Method - Common Name	Manufacturer	LWD Allowable
500-1.3	HDPE Solid-Wall Pipe Liner	Slip Lining	Plexco, or equal	No
500-1.4	Cured In Place Liner (CIPP)	CIPP	Sancon, Insituform, or equal	Yes
500-1.5	PVC Pipe Lining System - Grouted-In-Place	Spiral Slip Lining	Danby	No
500-1.6	Not Used in Greenbook	NA	NA	NA
500-1.7	Deformed / Reformed HDPE Pipe Liner	Fold & Form	U-Liner	No
500-1.8	CCFRPM Liner Pipe	Slip Lining	Hobas or equal	No
500-1.9	External In-Place Wrap	Same	Generic Plastic Liner & Reinforced Concrete	No
500-1.10.2	Folded & Reformed PVC Pipe - Type A	Fold & Form	NuPipe & Miller EX	Yes
500-1.10.3	Folded & Reformed PVC Pipe - Type B	Fold & Form	Am liner & UltraLiner	Yes
500-1.11	HDPE Spirally Wound Profile Wall Liner	Spiral Slip Lining	Weholite	No
500-1.12	PVC Closed Profile Liner Pipe	Slip Lining	Lampson Vylon	No
500-1.13	Machine Spiral Wound PVC Pipe Liner - Not Grouted In-Place	Spiral Slip Lining	Ribloc	No

500-1.1.1.2 Structural Pipe Lining Requirements. The Engineer shall submit structural calculations in accordance with industry standards for the given material and method for review and approval by the LWD District Engineer. Pipe loading shall include: soil, H-20 traffic impact, saturated groundwater to ground surface, and other anticipated loads. Structural calculations shall be based on structural replacement of the pipe assuming that the existing pipeline is fully deteriorated. Installed pipe materials shall have a demonstrated minimum 50-year life cycle.

500-1.1.1.3 Wastewater Bypass. The LWD District will provide typical average and peak wastewater flow rates for bypass design by the Contractor. The Contractor shall submit a bypass plan designed by a Civil Engineer registered in the State of California exceeding the capacity of the required flow rate. Pumps shall be engine driven critically silenced trailer mounted pumps. A minimum of two pumps, duty and standby, shall be provided. Full-time monitoring by a person qualified and trained to operate and maintain the bypass pumps and bypass system shall be provided.

500-1.1.1.4 Encroachment Permit Requirements. The Contractor shall obtain all environmental, coastal, encroachment, and other permits required by the jurisdictional city and all other agencies having jurisdiction over the work. The Contractor shall comply with all of the requirements of such permits including requirements for: allowed work hours; traffic control; compliance with noise limitation; odor control; public outreach; and any other requirements of the jurisdictional agencies.

500-1.1.1.5 Testing. The Contractor shall retain a third-party testing laboratory to verify source and specification of materials and that such materials meet all other requirements of the Greenbook. The approved third-party testing laboratory shall also direct the fabrication, sampling, and testing of materials installed as part of the work.

ADD THE FOLLOWING PARAGRAPHS TO 500-2 MANHOLE AND STRUCTURE REHABILITATION:

500-2.1.1 Manhole and Structural Rehabilitation Methods. LWD allows, or does not allow, the various manhole rehabilitation lining systems, as noted in the following Table 500-1.1.1.2.

Table 500-2.1.1 Manhole & Rehabilitation Lining Systems

Section	Title	Method - Common Name	Manufacturer	LWD Allowable
500-2.5	Integral Locking PVC Lining with Portland Cement Concrete	T-Lock	Ameron	Yes
500-2.6	Segmented PVC Lining with Cementitious Interstitial Grout	Segmented PVC	Danby, Permaform	Yes
500-2.7	Polyurethane and Epoxy Protective Lining	Polyurethane or Sancon 100	Sancon, Zebron, Utilithane	Yes
500-2.8	Epoxy Lining	Epoxy	Raven or Saurereisen	Yes
500-2.9	Epoxy Mastic and Flexible PVC Liner	Arrow Lock	Ameron	Yes
NA	Not yet in Greenbook	Single Step Urethane Mortar Lining	Sancon 200	No
NA	Not yet in Greenbook	CIP Epoxy FG Composite	PolyTriplex	Yes
NA	Not yet in Greenbook	New Plastic MH	Underground Technologies	Trial Only

500-2.1.2 Other General Requirements. The general requirements of 500-1.1.1 General described for pipeline rehabilitation including structural calculations, wastewater bypass, encroachment permit requirements, and testing shall also be met for all manhole rehabilitation work. In addition, the Contractor shall retain an independent third party inspector for inspection of the prepared manhole prior to application of rehabilitation, inspection of application of the rehabilitation method, and post installation spark and adhesion testing.