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SECTION 1

INTRODUCTION, AUTHORITY AND COMPLIANCE WITH LAW

1-01 INTRODUCTION

The Standard Specifications for Design and Construction shall govern sewer design and construction work by private individuals, public agencies and businesses within the boundaries of the Central Contra Costa Sanitary District (CCCSD). The jurisdiction of CCCSD includes the entire sewerage system and its appurtenances from the point of connection with each building's plumbing to the discharge terminus of the treatment plant outfall. The CCCSD Code and all uncodified ordinances of CCCSD shall be considered a part of these Specifications and all Plans, profiles, cut sheets, right-of-way documents, and specifications shall conform to the standards and requirements herein established.

Addenda to these Specifications may be issued periodically. Addenda will be distributed to active Job Engineers and Contractors registered with CCCSD, and will be made available to the public at CCCSD's offices.

1-02 AUTHORITY OF CCCSD

The authority of CCCSD to establish and enforce these Specifications is provided in Division 6, Part 1, of the Health and Safety Code of the state of California, and the CCCSD Code.

1-03 LAWS TO BE OBSERVED

The Contractor shall comply with federal, state, county, district, municipal and local laws, ordinances, orders, and regulations, which in any manner affect the work and/or those engaged or employed in the work.

The Contractor shall defend, protect, indemnify, and hold CCCSD, and all of CCCSD's officers, directors, employees and agents free and harmless from and against claim, loss and/or liability, including attorneys' fees arising from or based on the violation of any such law, ordinance, regulation, or order, whether by the Contractor or its employees, subcontractors or agents.

If the Contractor finds any discrepancy or inconsistency between information included in the Plans, or these Specifications and any law, ordinance, regulation, or order, it shall promptly notify CCCSD.

1-04 LICENSES AND PERMITS

Contractors doing sewer work within CCCSD boundaries shall be properly licensed in accordance with the provisions of Division 3, Chapter 9, Business and Professions Code, of the State of California, as amended; as required under Title 5 of the CCCSD Code, and as specified in Section 10 of these Specifications.

Prior to beginning any work, the Contractor shall obtain all permits and licenses, pay all inspection charges and permit fees, and give all notices necessary for compliance with applicable federal, state, county, district, municipal and local laws, ordinances, orders and regulations.

1-05 SAFETY

The Contractor shall be responsible for the safety of its plant, equipment and personnel, and the public in the immediate vicinity of work subject to these Specifications; and in addition to complying with applicable state and/or federal safety regulations, shall fully comply with the requirements of Section 15.01100 of these Specifications.

1-06 USE OF EXPLOSIVES

When the use of explosives is necessary for the performance of the sewer work, the Contractor shall ensure that it has the proper Cal/OSHA license to handle and use explosives for such work. The Contractor shall ensure that all explosives shall be stored in accordance with the provisions of Division XI of the Health and Safety Code. The Contractor shall take utmost care to avoid danger or damage to life and property. The Contractor shall obtain a permit for blasting from the local Fire Marshal. CCCSD may inspect blasting licenses and/or permits at any time. The Contractor shall notify Cal/OSHA and CCCSD Inspection regarding the time and place of the Contractor's use of explosives.

1-07 RIGHTS IN LAND AND IMPROVEMENTS

Nothing in these Specifications shall be construed as allowing the Contractor to make any arrangements with any person or entity to permit occupancy or use of any land, structure, or building within the work zone for any purpose whatsoever, either with or without compensation, in conflict with any agreement between CCCSD and any Owner, former Owner, or tenant of such land, structure, or building.

1-08 PERSONAL LIABILITY

No CCCSD director, officer, employee, or agent shall be personally responsible for any liability arising under or by virtue of the performance of the work.

1-09 SEWER SERVICE

The Contractor shall be solely responsible for providing uninterrupted sewer service to all connected properties affected by its work. The Contractor shall defend, protect, indemnify, and hold CCCSD, its officers, directors, agents, and employees free and harmless against any loss, claim, or liability, including attorneys' fees, arising from or based on failure to provide such continuous service.

- END OF SECTION -

SECTION 2

ACRONYMS, ABBREVIATIONS AND TERMS

2-01 ACRONYMS, ABBREVIATIONS AND TERMS

Wherever in these Specifications, or in any documents or instruments where these Specifications are referenced, any of the following acronyms, abbreviations, or terms is used, the intent and meaning shall be interpreted as follows unless the context clearly indicates that another meaning is intended:

A. Acronyms:

AAN – American Association of Nurserymen
AASHTO – American Association of State Highway and Transportation Officials
AB – Aggregate Base
AC – Asphalt Concrete
ACI – American Concrete Institute
ANSI – American National Standards Institute
APN – Assessor’s Parcel Number
AREA – American Railway Engineering Association
ASCE – American Society of Civil Engineers
ASME – American Society of Mechanical Engineers
ASTM – American Society of Testing and Materials
AWPA – American Wood Preservers Association
AWS – American Welding Society
AWWA – American Water Works Association
BC – Beginning of Horizontal Curve
BVC – Beginning of Vertical Curve
CAD – Computer Aided Design
Cal/OSHA – California Division of Occupational Safety and Health Act
CCCSD – Central Contra Costa Sanitary District
CISPI – Cast Iron Soil Pipe Institute
CL – Class
CLSM – Controlled Low Strength Material
C.O. – Cleanout
CRSI – Concrete Reinforcing Steel Institute
CSA – Canadian Standards Association
CTM – California Test Method
DR – Dimension Ratio (pipe O.D. divided by minimum wall thickness)
DWV – Drain, Waste, and Vent
EC – End of Horizontal Curve
EVC – End of Vertical Curve
FNPT – Female National Pipe Thread

GOE – Grant of Easement
GPD – (or gpd) Gallons per Day
GRD – Grease Removal Device
GWI – Groundwater Infiltration
HDD – Horizontal Direction Drilling
HGI – Hydromechanical Grease Interceptor
HWA – High Water Alarm
HWL – High Water Level
IAPMO – International Association of Plumbing and Mechanical Officials
I.D. – Inside Diameter
ILPS – Individual Lot Pumping Systems
IOD – Irrevocable Offer of Dedication
LFL – Lower Flammable Limit
LWA – Low Water Alarm
LWL – Low Water Level
MH – Manhole
MNPT – Male National Pipe Thread
MSDS – Material Safety Data Sheet
MULPSS – Multiple User Low Pressure Sewer System
NACE – National Association of Corrosion Engineers
NEMA – National Electrical Manufacturers Association
NRTE – Nationally Recognized Testing Entity
O.D. – Outside Diameter
OPD – Overflow Protection Device
PPI – Polyolefin Pipe Industry
PSSE – Private Sanitary Sewer Easement
PTFE – Polytetrafluorethylene (Teflon)
PUE – Public Utility Easement
RI – Rodding Inlet
RUE – Residential Unit Equivalent
RV – Recreational Vehicle
ROW – Right-of-way
RWQCB – Regional Water Quality Control Board
SDR – Standard Dimension Ratio (pipe O.D. divided by minimum wall thickness)
SSE – Sanitary Sewer Easement
SWPPP – Storm Water Pollution Prevention Plan
SWRCB – State Water Resources Control Board
TMH – Trunk Manhole
TV – Television
UL – Underwriters Laboratory
USA – Underground Services Alert
VOC – Volatile Organic Compound
WEF – Water Environment Federation
WOG – Water/oil/gas (pressure rating in psi for values)
UPC – Universal Product Code

Pipe Types:

ABS – Acrylonitrile Butadiene Styrene
ACP – Asbestos Cement Pipe
CIP – Cast Iron Soil Pipe
CIPP – Cured In Place Pipe
CL – Concrete Lined Steel Cylinder
CL&C – Concrete Lined and Coated Steel Cylinder
CMP – Corrugated Metal Pipe
DIP – Ductile Iron Pipe
HDPE – High Density Polyethylene
PE – Polyethylene
PMP – Perforated Metal Pipe
PVC – Polyvinyl Chloride
RCP – Reinforced Concrete Pipe
SDR-PR – Specification for Polyethylene Plastic Pipe
VCP – Vitrified Clay Pipe

B. Definition of Terms:

Acceptance - The formal written acceptance by CCCSD of an entire job which has been completed in all aspects in accordance with the Plans and Specifications and any modifications thereof previously issued.

Annexation - The inclusion of property within CCCSD boundaries by proper legal procedures.

Approved Materials List - The list of CCCSD-approved materials allowed for use in the construction and/or repair of sanitary sewers in accordance with these Standard Specifications.

Bedding and Backfill - Material as specified in these Specifications used to replace material excavated from trenches during sewer installation. Terms used to differentiate between zones of Bedding and Backfill are defined below:

Pipe Zone: the portion of the trench excavation between the bottom of the trench or the top of required foundation material and a horizontal plane twelve (12) inches above the highest point on the outside surface of the pipe barrel excepting bells.

- "Bedding" is that portion of the Pipe Zone between the bottom of the trench or the top of required foundation material and the lowest point on the outside surface of the pipe barrel excepting bells;

- "Haunching" is that portion of the Pipe Zone between the top of the Bedding and the horizontal centerline of the pipe;
- "Shading" is that portion of the Pipe Zone between the top of the Haunching and a horizontal plane twelve (12) inches above the highest point on the outside surface of the pipe barrel excepting bells.

Trench Zone: the portion of the trench excavation between the top of the Shading and the ground surface in unpaved areas, and the horizontal plane at lowest point of the pavement structural section in paved areas.

- "Trench Backfill" is that portion of the Trench Zone between the top of the Shading and the ground surface in unpaved areas or a horizontal plane two (2) feet below the lowest point of the pavement structural section in paved areas;
- "Final Backfill" is that portion of the Trench Zone in paved areas between the top of the trench backfill and the lowest point of the pavement structural section.

Building Drain - The building drain is the lowest part of a wastewater piping system and connects other wastewater pipes from within a building with the side sewer.

California Plumbing Code - The California Plumbing Code adopted by the State of California Building Standards Commission, latest edition.

Caltrans - State of California, Department of Transportation

CCCSD - The Central Contra Costa Sanitary District, Contra Costa County, California, and its employees, and/or authorized representatives.

City - Any incorporated municipality lying partly or entirely within CCCSD.

Contractor - Any contractor who meets CCCSD requirements and is licensed by the State of California to enter into contracts for and to perform the work of installing sewers under CCCSD jurisdiction.

County - The County of Contra Costa, State of California.

Cut Sheets - Sheets of tabulated data, indicating stations, structures, fittings, angle points, beginnings of curves, points on curves, ends of curves, sewer slopes, staking offsets, various elevations, offset cuts, and sewer depth.

Definition of Words - Wherever, in these Specifications, the words directed, required, permitted, ordered, designated, or words of like importance are used, they shall be understood to mean the direction, requirement, permission, or order of designation of CCCSD. Similarly, the words approved, acceptable, satisfactory, shall mean approved by, acceptable to, or satisfactory to CCCSD.

District - The Central Contra Costa Sanitary District, Contra Costa County, California, and its employees, and/or authorized representatives.

Board of Directors - The governing body of CCCSD.

Easements - Rights in real property granted or dedicated to CCCSD for the purposes stated in the document establishing the easement. Generally, these rights include the right to construct, alter, replace, repair, maintain, and operate sewer pipes, appurtenances, and appliances together with the reasonable right of access to such easements for these purposes over the remaining lands of the grantor.

Fixture Unit Equivalents - The unit equivalent of plumbing fixtures as tabulated in the Uniform Plumbing Code, latest edition.

Inspector - The person for CCCSD duly authorized and responsible for inspections and enforcement of CCCSD regulations relating to construction of public and private sewers, including pipelines, structures, materials, instruments, and appurtenances.

Irrevocable Offers of Dedication - A legal document used to create easements for CCCSD.

Job Engineer - The Engineer licensed by the State of California as a civil engineer, under whose direction plans, profiles, and details for the work are prepared and submitted to CCCSD for review.

Manufacturer's Name - Any manufacturer's name, specification, catalog number, or type used herein is specified to establish the standard required for the item. Other items will be considered providing they are substantially equivalent to the established standard.

Optimum Moisture Content - The moisture content at the maximum dry density of the soil or soil aggregate as determined by laboratory test ASTM D1557.

Owner - Any individual, partnership, firm, or corporation by whom the Job Engineer has been retained or who, as the Property Owner, is making arrangements with CCCSD.

Parcel Number - An arbitrary number assigned to each parcel of right-of-way, including easements and miscellaneous encroachments, as shown in the right-of-way log and/or on the sewer construction plans.

Paved Surface - Any form of pavement used on street, sidewalk, or other areas composed of concrete, asphalt, oil, brick, or treated crushed rock or any combination of said forms of pavement having a dense, cohesive, stable surface.

Permits or Licenses - Documents indicating permission or authorization to perform specific work under specific conditions at specific locations.

Person - Any individual, firm, company, corporation, or association.

Plans - Construction plans, including system maps, sewer plans and profiles, cross sections, detail drawings, etc., or reproductions thereof, which show the location, character, dimensions, and details for the work to be done and which constitute a supplement to these Specifications.

Plumbing System - All plumbing fixtures and traps, or soil, waste, special waste, and vent pipes within a building.

Preliminary Review - Plans stamped "Preliminary Review," dated and signed by CCCSD, indicate that the Plans have been reviewed, and may now be submitted as a part of the requirements for the final review for construction.

Profile - Cross-sectional detail (side view) drawing which show the vertical relationship between the sewer line invert, the ground surface at time of construction and the finish surface, and other existing and/or proposed underground facilities.

Property Owner - The person who holds record title to a parcel of property.

Public Sewer - A sewer located within a public right-of-way, easement or dedicated reservation which has been accepted by CCCSD.

Record Drawings - Plans signed and dated by CCCSD or design consultant, indicating that the Plans have been reviewed and revised, if necessary, to record as-built construction details to the maximum extent.

Relative Compaction - The percentage ratio of the field dry density of the soil or soil aggregate (determined by ASTM D6938) to the maximum dry density as determined by laboratory test ASTM D1557.

Review for Construction - The stamp, "Final Review of Construction Plans," on the Plans signed and dated by CCCSD, indicates that construction may proceed.

Right-of-way - All land or interest therein which by deed, conveyance, agreement, easement, dedication, usage, or process of law is reserved for or dedicated to the use of the general public, within which CCCSD shall have the right to construct, alter, replace, repair, maintain, and operate sewer pipes, appurtenances, and appliances together with the reasonable right of access to such easement for said purposes over the remaining lands of the grantor.

Riparian Tree – A tree that is within thirty (30) feet of the edge of a creek bank.

Roadway - All of a right-of-way dedicated, granted, used, or to be used for vehicle movement.

Sanitary District - The Central Contra Costa Sanitary District, Contra Costa County, California.

Section - Any reference to a Section which is not accompanied by further reference refers to a Section or Sections of these Specifications.

Sewers:

- Trunk Sewers - A public sewer which has been or is being constructed to accommodate the flow from one (1) or more main sewers and is not generally used for side sewer connections. Trunk Sewers are generally twelve (12) inches in diameter or larger.
- Main Sewer - A public sewer which has been or is being constructed to accommodate the flow from one (1) or more side sewers. Main Sewers are generally eight (8) or ten (10) inches in diameter.
- Side Sewer - A privately owned and maintained sewer line which connects the sanitary or waste plumbing (building drain) of a house or other building with the main sewer or site collector sewer. The side sewer begins at its point of connection (including the connection tap or wye) with the main sewer and terminates at its point of connection to the building drain, and is a collective term that includes both the lateral sewer and building sewer. The point of connection to the building drain shall be at the point where the plumbing first extends outside the foundation. Side Sewers are generally four (4) or six (6) inches in diameter.

- Site Collector Sewer (Residential) - A privately-owned and maintained sewer line constructed to serve a maximum of 6 four-inch connections. Site Collector Sewers are 6 inches in diameter.
- Lateral Sewer - The privately owned and maintained portion of the side sewer from its connection at the main sewer including the connection tap or wye and extending to a point five (5) feet beyond the property or easement line.
- Building Sewer - That portion of the side sewer from the end of the lateral sewer to the point of connection to the building drain.

Shell Building - A building intended to accommodate a variety of non-residential uses where the specific uses for particular spaces within the building can not be determined at the time of connection to the public sewer system.

Single-Family Residence - A single living structure designed to accommodate one (1) family.

Special Approval - Approval given by CCCSD, either in writing or as approved on the plans, for special construction considerations which may not meet the regulations and/or standards set forth in these Specifications or CCCSD Code.

Specifications - The CCCSD Standard Specifications for Design and Construction.

Standard Drawings - The drawings of structures or devices commonly used on CCCSD work and referred to on the plans and in these Specifications.

State - The State of California.

State Standard Specifications - The Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation (Caltrans), current edition.

Streets or Roads - Any public or private highway, road, street, avenue, alley, way, easement, or right of way used or to be used for vehicle movement.

Structures - Those structures or devices commonly used in CCCSD work such as manholes, rodding inlets, etc., as mentioned in these Standard Specifications.

Subcontractor - Any individual, partnership, firm, or corporation entering into a contract with the Contractor to perform part of the work.

Superintendent - The representative of the Contractor, present and responsible for the work at all times.

Surveyor - A Professional Land Surveyor or registered Professional Engineer (Civil) licensed by the State of California to perform land surveying.

System Maps - Scale maps on the first sheet or sheets of the job plans showing the relationship and ties between the properties to be improved and the nearest intersection of existing county or city improved road on each side of the property. The system maps also show all proposed sewer improvements and all parcels to be served by the improvements.

Travelled Way - The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

Uniform Plumbing Code - The Uniform Plumbing Code adopted by the International Association of Plumbing and Mechanical Officials, latest edition.

Work - All the work to be done under CCCSD permit or inspection, in accordance with the Plans, these Specifications, and/or permit conditions.

- END OF SECTION -

SECTION 3

CODE PROVISIONS AND POLICIES

3-01 THE CCCSD CODE

The CCCSD Code provides the authority of the Engineer; states that only Contractors licensed in the state of California (and Property Owners in particular cases) may perform work on private or public sewers, requires Contractor registration, and provides for Plan review, inspection, connection and other service charges.

3-02 ENFORCEMENT

Subject to due process, CCCSD may impose fines, disconnect sewers, pursue other enforcement provided in the Code and/or take legal action against any person or persons who violate provisions of the CCCSD Code. If work subject to CCCSD's jurisdiction, whether performed under a CCCSD permit or without permit, is determined to be deficient under these Specifications, CCCSD may:

- A. Correct deficiencies itself or by others at the Contractor or Owner's expense.
- B. Reject the work and disconnect the work from the CCCSD system at the Contractor or Owner's expense.
- C. Revoke or suspend permits or a Contractor's CCCSD registration for a period of time.

3-03 REGULATION OF PRIVATE SEWAGE DISPOSAL SYSTEMS

The design, construction, and maintenance of private sewage disposal systems including septic tanks and leach fields, and methods of sewage disposal other than CCCSD's public sewer system are governed by the statutes, ordinances, rules, and regulations of Contra Costa County and the State of California.

3-04 ANNEXATION

Only properties within the boundaries of CCCSD may receive sewer service through CCCSD public sewer facilities excepting only those properties that have current "out-of-agency service agreements" approved by the Contra Costa Local Agency Formation Commission.

3-05 BASIC SEWER SERVICE POLICY

Each property having a separate assessor's parcel number shall have a public sewer extended to it and a separate private side sewer extending from each building's waste plumbing discharge on the property to the public sewer, including to the connection tap or wye at the public sewer. CCCSD shall permit an exception to this policy if a property is the last lot that can reasonably be served from a public sewer via a private side sewer serving only the excepted property installed within a recorded, appurtenant easement across a single intervening property adjacent to the public sewer. Public sewers are owned, operated and maintained by CCCSD. Private side sewers shall be owned and maintained by the Property Owner.

3-06 THE LINE SIZE AND SERVICE POLICY

- A. The minimum nominal size of any new public gravity sewer shall be eight (8) inches in diameter.
- B. Private Side Sewers shall be four (4) inches in diameter for single-family residences. Other side sewers shall be six (6) inches in diameter or larger. Side Sewers shall be connected to public sewers six (6), eight (8), ten (10) and twelve (12) inches in diameter at manholes or by installation of approved taps, wyes or sanitary tees. Side Sewer connections to public sewers over twelve (12) inches in diameter shall only be made at manholes unless a specific written Special Approval for installation for installation of a tap is obtained from CCCSD. Joint use of a Side Sewer to serve more than one property will not be permitted. All Side Sewers shall be equipped with an approved Overflow Protection Device.

3-07 PAYMENT OF FEES AND CHARGES

Plan review and inspection fees, if required, must be paid before any sewer work is started. Annexation charges and other connection fees must be paid prior to the time of the connection of buildings to the sanitary sewer system.

3-08 REIMBURSEMENT PROGRAM

The Reimbursement Program provisions of the Code require that sewers be installed to provide for logical extension of service that avoids relocation or duplication of facilities. In the event a line may provide service to a property other than that owned by the installer, the proportional value of such service shall be determined and collected by CCCSD for the installer.

A. Reimbursement Procedure

1. No later than six (6) months after CCCSD's acceptance of a public main sewer extension proposed for reimbursement, the installer shall:
 - Pay the reimbursement account set-up fee;
 - Submit all of the following:
 - A complete reimbursement account application;
 - Copies of any agreements regarding the sharing of the costs that exist between the installer and any other party or parties;
 - Contracts, cancelled checks and receipts documenting the total sewer construction costs; and
 - A cost breakdown of pipelines, special structures, CCCSD fees and charges, engineering and right-of-way acquisition costs.

Failure to submit all of the required documentation within six (6) months from the date of final acceptance of the sewer work will result in the job being ineligible for the Reimbursement Program.

2. CCCSD staff will review the application and documentation submitted by the installer and determines the amount of allowable costs and the initial Reimbursement Fee (per Residential Unit Equivalent).
3. The CCCSD Board will conduct a public hearing to consider and establish the initial Reimbursement Fee.
4. The Reimbursement Fee will be adjusted for the effect of inflation and depreciation whenever a Reimbursement Fee is collected.

- END OF SECTION -

SECTION 4
DESIGN STANDARDS

4-01 DESIGN CRITERIA

A. General

When the estimated average base wastewater flow for the job exceeds 45,000 GPD, or additional flow carrying capacity may be required for existing or future connections upstream of the job, the Job Engineer shall provide a capacity study report when plans are submitted for preliminary review. The capacity study report shall include a table that presents the proposed pipe diameter, slope, length, Manning's roughness coefficient, full pipe capacity, design capacity (see 4.01.C. below) and the percentage of design capacity utilized for each proposed sewer reach. The percentage of design capacity utilized shall be calculated by dividing the design flow by the design capacity and multiplying by one hundred (100).

B. Design Flow

Design Flow = (Average base wastewater flow times Peaking Factor) plus (groundwater infiltration factor times acres).

NOTE: Peaking Factor - The peaking factor for the above equation shall be obtained from Figure 4-1. Figure 4-1 was derived from the maximum peak flows observed (based on 15-minute flow readings) during a two-week dry period in late January and early February 1985.

Average Base Wastewater - The average base wastewater unit flow factors are presented in the following table:

AVERAGE BASE WASTEWATER UNIT FLOW FACTORS

Land Use Category	Units	Unit Flow Factor (gpd/Unit)
Residential, Single Family	Residential Unit	195
Residential, Multiple Family	Residential Unit	105
Commercial, Industrial, Institutional (Government, Schools, Churches, etc.)	1,000 square feet	100

Groundwater Infiltration (GWI) - The GWI rate for use in the above "Design Flow" equation shall be 170 gpd/acre, unless CCCSD provides the Job Engineer with an area-specific rate. This rate is an average for summertime GWI following wet

weather seasons with higher-than-average rainfall in sewers constructed in CCCSD after 1985.

C. Design Criteria - Gravity sewers within CCCSD shall be designed in accordance with the following design criteria.

1. Design Capacity - Main and trunk sewers shall be designated on the following basis: (See Figure 4-1).

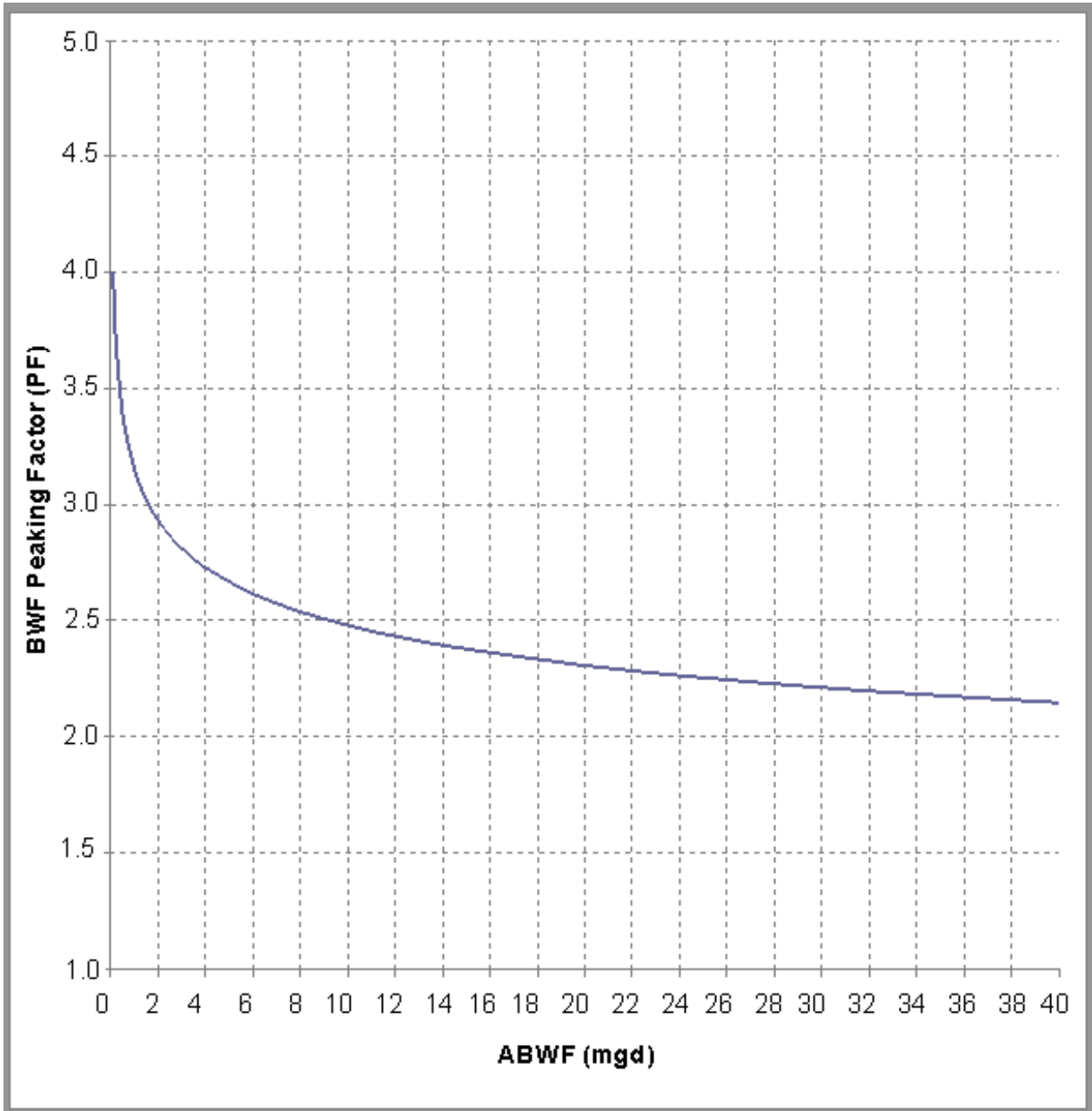


Figure 4-0-1 Peak Flow Curve

- a. For sewers eight (8) and ten (10) inches in diameter, design capacity shall be based on pipes flowing two-thirds full ($d/D < \text{or} = 0.67$).
 - b. For sewers twelve (12) inches and larger in diameter, design capacity shall be based on pipes flowing full without surcharging ($d/D < \text{or} = 1.0$).
2. Velocity and Slope - The minimum acceptable slope for sewer pipe is based upon a velocity of three (3) feet per second for main sewers and a velocity of two (2) feet per second for trunk sewers, both when flowing full. The minimum and maximum design flows for each pipe size at the minimum acceptable slope is provided in Section 4-03.A.4. However, CCCSD, at its sole discretion, may allow a lesser slope and/or a larger pipe size on a case-by-case basis where the elevation of the existing system constrains the available elevation drop. When the slope of the sewer exceeds twenty percent (20%), ductile iron pipe conforming to the requirements of Section 15.15061 of these Specifications shall be used.
 3. Pipe Diameter - Diameter of gravity sewers shall be determined by Manning's pipe friction formula, using a roughness coefficient, "n," of 0.013 or the pipe manufacturer's recommendation, whichever is greater.
 4. Pipe Cover and Clearance - Minimum pipe covers and clearance, as specified in Section 4-03.C, shall be maintained in the design of sanitary sewers. If certain conditions exist which make it impractical to meet the minimum cover and clearance requirements, the conditions and locations shall be specifically noted on the sewer profile on the Plans. Special Approval is required for each location where pipe cover or clearances are proposed to be less than the minimums specified. Special pipe, bedding, and/or backfill shall be as directed by CCCSD.
- D. Individual Lot Pumping Systems will be allowed only in cases where no feasible gravity sewerage alternative exists. If a sewage pumping system is proposed, the Contractor shall comply with the requirements of Section 15.13100 of these Specifications.

4-02 HILLSIDE AND CREEK AREA

- A. The Job Engineer shall submit a geotechnical report prepared by a registered Geotechnical Engineer or a Civil Engineer practicing in Geotechnical Engineering whenever:
 1. Sewers are proposed to be installed in easement locations where the existing or proposed cross-slope grade exceeds twenty-five percent (25%).

2. Sewers are proposed to be installed within twenty-five (25) feet of the top of a creek bank or fifty (50) feet of the centerline (flowline) of a creek.
 3. Sewers are proposed to be installed in historical slide locations or within the area of influence of a potentially unstable hillside.
- B. The geotechnical report shall address the following:
1. Geological setting, general soils and bedrock conditions along the proposed sewer alignment, and recommended setbacks from slides and creeks.
 2. Slope instability or other geotechnical hazards in the vicinity of the proposed sewer alignment.
 3. Potential groundwater issues.
 4. The effect of trenching and sewer installation on slope stability
 5. Recommended requirements for trenching, bedding, backfill, or special supports that may be recommended.
 6. Erosion potential of soils around sewer near water courses.
 7. Recommended corrective work if geotechnical hazards are identified.
- C. Installation of sewers in unrepaired slide areas will not be allowed.
1. If an acceptable gravity route is feasible around an unrepaired slide, the sewer must be installed around the slide.
 2. If the only feasible gravity route is through a slide area, a complete study of the slide must be made by a Geotechnical Engineer. The Geotechnical Engineer shall propose a slide repair acceptable to CCCSD.
 3. If a satisfactory gravity sewerage alternative does not exist, an alternative utilizing sewage pumping individual may be considered.
- D. Sewers shall not be located in creek beds or at the bottom of swales.
- E. If it is not feasible to locate gravity sewers on the downslope side of homes while maintaining a safe distance from drainage ways, an alternative utilizing sewage pumping shall be considered.

- F. Sewer crossings at creeks or swales shall be as nearly perpendicular to the centerline (flowline) of the drainage way as feasible, and in no case at an angle less than forty-five (45) degrees to the centerline (flowline) of the creek or swale.
1. The need for bank and bottom protection shall be evaluated by a Geotechnical Engineer and recommended protection shall be installed in the drainage way as part of the crossing installation.
 2. The Job Engineer shall pay particular attention to designing adequate support foundations and protection for the foundation.
 3. For spans greater than eighteen (18) feet, steel pipe conforming to the requirements of Section 15.15070 shall be used.
- G. The following design standards shall be used by the Job Engineer when designing sewers in hillside and/or creek areas.
1. Sewers to be installed in easements and private streets which are located in hillside and/or creek areas shall be restrained joint ductile iron pipe when the soil in which the sewer will be installed is fine grained, such as clay.
 2. Pipe material other than ductile iron may be used for sewers to be installed in easements and private streets which are located in hillside and/or creek areas when the soil in which the sewer will be located is coarse grained (including unfractured bedrock).
 3. Pipe material other than ductile iron may be used for sewers to be installed in public streets which are located in hillside and/or creek areas.
 4. If groundwater is present in the trench area, sewers shall be ductile iron (no bedding) regardless of the type of soil.
 5. Subdrains may be installed to convey underground water from its source to a storm drain or channel. These subdrains must be maintained perpetually by a permanent entity other than CCCSD.
 6. For sewers proposed parallel to existing swales or creeks, the sewer shall be located at least fifty (50) feet from the centerline (flowline) of the creek or swale, and at least twenty-five (25) feet from the top of the bank if the bank is defined, to minimize the potential slope failure in the vicinity of the sewer resulting from undercutting at the toe. A Geotechnical Engineer shall review the proposed alignment and furnish recommendations regarding long-term erosion and slope stability potential.
 7. Manholes to be installed at creek crossings shall be located at least fifty (50) feet from the center line of the creek, and at least twenty-five (25) feet from the top of the creek bank if the creek bank is defined.

4-03 MINIMUM PIPE SIZES AND STANDARDS

A. Main Sewers and Trunk Sewers

1. Size - Minimum nominal diameter for main sewers shall be eight (8) inches.
2. Pipe Selection - Pipe cover and trench configuration requirements for the various allowable pipe materials are specified in DWG-14 through DWG-18. The Job Engineer shall select pipe material and the strength or thickness class for each reach to be installed under the Job, subject to CCCSD review.
3. Pipe to be installed between successive structures shall be of the same size, material, strength or thickness class and manufacturer unless otherwise approved by CCCSD.
4. Minimum Acceptable Slope - The minimum allowable slopes for sewer pipe sizes and corresponding minimum and maximum design flows are as follows:

MAIN SEWERS

Nominal Pipe Size In Inches	Minimum Design Flow (Cubic feet per second)	Maximum Design Flow (Cubic feet per second)	Minimum Slope In Feet Per Foot
8	0.0	0.81	0.0077
10	0.82	1.28	0.0057

TRUNK SEWERS

Nominal Pipe Size In Inches	Minimum Design Flow (Cubic feet per second)	Maximum Design Flow (Cubic feet per second)	Minimum Slope In Feet Per Foot
15	1.58	2.45	0.0015
18	2.46	3.53	0.0012
21	3.54	4.81	0.00095
24	4.82	6.28	0.0008
27	6.29	7.95	0.0007
30	7.96	9.81	0.0006
33	9.82	11.87	0.00055
36	11.88	14.13	0.0005

B. Side Sewers (Lateral and House Sewers)

GENERAL - Each individual property with a separate Assessor's Parcel Number (APN) shall be connected by a separate private side sewer.

1. Size and Slope

- a. Minimum sizes and slopes for side sewers shall not be less than indicated below:

Description	Size	Slope
Homes (up to four RUE)	4"	2.0%
Trash Enclosures, Drinking Fountains	4"	2.0%
All Other Uses	6"	1.1%

The size of the side sewer shall not be smaller than the size the building waste plumbing at its connection to the side sewer.

- b. The maximum slope of any portion of a side sewer shall not be greater than one hundred fifty percent (150%).
2. Discharge Flow - The discharge from any side sewer at its connection to the main sewer shall not exceed one hundred gallons per minute (100 gpm) unless otherwise approved by CCCSD.
3. Fixture Units - The fixture unit equivalents for plumbing fixtures shall be based on the tables of the Uniform Plumbing Code, latest edition.
4. Pipe Material and Class - Lateral sewers installed concurrently with a main sewer extension shall be of the same material and class as the main sewer.
5. Vertical and Horizontal Deflections - Lateral sewers shall have an alignment that provides an angle of intersection with the downstream section of main sewer of no less than ninety degrees (90°). The maximum allowable deflection at any point in a side sewer shall be ninety degrees (90°). Consecutive bends shall be separated by a straight pipe segment at least two (2) feet in length.
6. Building Waste Plumbing - For new construction, the building waste plumbing shall be designed so that the point of its connection to the side sewer is on the side of the building facing the public sewer main.
7. Cleanouts - Cleanouts shall be provided in the side sewer system at the following locations:

- a. At the point of connection to the building drain within two (2) feet of building foundation.
- b. At any single bend greater than forty-five degrees (45°).
- c. At intervals along the side sewer system where the cumulative total of deflection from the point of connection to the main sewer or from another cleanout equals or exceeds ninety degrees (90°).
- d. At intervals not to exceed one hundred (100) feet.

(Cleanout risers shall conform to the requirements specified on DWG-26.)

8. Overflow Protection Devices - No person shall construct, alter, or repair a side sewer without confirming that an approved overflow protection device has been properly installed on the side sewer in conformance to the requirements specified on DWG-23.

Where reasonably possible, overflow protection devices shall be located in areas away from vehicular and foot traffic. If an overflow protection device must be located in an area which will have concrete or asphalt paving, such as a driveway or sidewalk, the device shall be installed in a CCCSD-approved reinforced concrete utility box fitted with a metal grate.

Where the sewage cannot overflow on the area surrounding an overflow protection device without damage to property, a CCCSD-approved check valve shall be installed.

9. Commercial Sewers - 6" commercial side sewer connecting to a 6" mainline shall connect with a manhole. A 6" connection to an 8" sewer mainline may require a manhole at connection.

C. Pipe Cover and Clearance

The following minimum and maximum allowable pipe cover and clearances shall be achieved in design and construction of sanitary sewers unless otherwise specifically approved in writing by CCCSD. Any portion of a Job, as shown on the Plans or encountered in the field, which does not meet the minimum cover or clearance requirements, must be revised or receive Special Approval before proceeding with the work.

Where sanitary main or trunk sewers are being designed for parallel installation with other utility pipe and/or conduits, the Job Engineer shall design the vertical alignment of the sewer so that future side or main sewer connections can be installed without conflict with parallel utilities or abrupt changes in the alignment of the main or side sewers. Other utilities shall not be installed directly over

sanitary sewers or with crossings at angles less than thirty degrees (30°) to the centerline of the sewer.

1. Main and Trunk Sewers - Minimum and maximum allowable cover for installation of main sewer extensions shall be as specified in DWG-19. Where sewers are to be installed in existing roadways that are not expected to receive major grade or surfacing changes, the pipe cover may be measured from the existing road surface to the top of pipe. Where sewers are to be installed in new roadways and/or in areas expected to become roadway, or in existing roadways that are intended to receive major grade or surfacing changes, the pipe cover shall be measured from the lower surface of the road structural section (bottom of the subbase) to the top of pipe. No sewer work shall begin in new or existing roadways that are scheduled for major improvement, until the roadway has been graded to within six (6) inches of design subgrade elevation at the lower surface of the road structural section (bottom of the subbase).

2. Side Sewers - Side sewers shall have the following pipe cover:
 - a. Minimum and maximum allowable cover for laterals shall be as specified in DWG-19.
 - b. Minimum cover for side sewers in driveways, parking, and all other traffic areas within properties shall be as specified in DWG-19 for laterals.
 - c. The minimum cover for side sewers outside of traffic areas from the property line to a point within eight (8) feet of the building waste plumbing connection shall be as specified in DWG-19.
 - d. Minimum cover for side sewers at the point of connection to the building waste plumbing (within two (2) feet of the foundation) shall be eighteen (18) inches.
 - e. Where available grade for side sewer installation is less than two percent (2%) and where the side sewer is more than one hundred (100) feet in length, field staking of cuts by a licensed surveyor, submittal of cut sheets and installation using an industrial-standard laser grade control system to confirm that the pipe is installed to the proper grade shall be required. Requirements for operation of laser grade control systems shall be as specified in Section 15.15000 of these Specifications.

3. Clearance from Other Improvements - Sewer pipes and structures shall be designed and constructed with a minimum of twelve (12) inches vertical and three (3) feet wall to wall horizontal clearance from all other utilities and improvements, except public water lines, unless a Special Approval is received from CCCSD.

4. Clearance from Public Water Lines - Sewers to be installed in the vicinity of potable water pipelines, shall be designed and constructed so as to provide wall-to-wall sewer-to-water pipeline separation (not including bells) in conformance with the minimum requirements shown in DWG-20 of the Standard Drawings. Sewers shall not be designed in the "Special Permission" zone unless specific written approval of the water utility is obtained prior to issuance of the CCCSD permit for construction.

D. Horizontal and Vertical Curves

1. Curved Alignments - Layout of curved alignments shall conform to the requirements specified in the applicable Section of these Specifications for the particular pipe material being used. The radius, deflection angle (delta), and length of all curves shall be indicated on the Plans adjacent to the curve. Curved alignments may be accomplished by:
 - a. Forced bending of the pipe if the radius of curvature is greater than the minimum allowable radius specified in the applicable Section of the Technical Specifications for the particular pipe material being used.
 - b. Using straight pipe segments, each of at least the minimum length specified in the applicable section of these Specifications for the particular pipe material being used, joined with fittings, couplings or bell and spigot joints installed as detailed on DWG-45. The joint deflection between any two (2) successive pipe segments shall not exceed the maximum deflection recommended in writing by the pipe, fitting or coupling manufacturer (see Approved Materials List). The maximum deflection between successive straight segments of pipe shall not exceed eleven and one quarter degrees (11-1/4°). The location of fittings and/or couplings and the length of straight pipe segments shall be shown on the Plans. The sum of the deflections of horizontal curves between consecutive structures shall not exceed forty-five degrees (45°).

E. Sewer Connections to Existing Systems

Connection of new main or trunk sewers to the existing sewer system shall be made at existing manholes or by constructing a new manhole at the point of connection, or by using an approved bell and spigot joint or repair coupling and matching pipe size, type, class, slope and alignment.

F. Sewer Alignment

Where sewer lines are to be installed within street or road rights of way, they shall, wherever practical, be designed and installed on the centerline of the existing or future roadway. Where a sewer line cannot be designed along the

centerline of a roadway, it shall be located within the paved area of the street or road, with not less than one (1) foot between the vertical projection of the outside surface of the pipe or structure at the surface and the nearest gutter or edge of pavement. Where practical, all sewer lines within easements or reserves shall be designed and installed on the center line of the sewer easement or reserve.

G. Sewer Pipe Plugs/Stubs

Stubs or plugs shall be designed and installed in all manholes from which future sewer line extensions are anticipated. The outboard end of stubs shall be a standard pipe joint end and shall be plugged with a standard watertight plug or cap, as supplied by the pipe manufacturer.

H. Sewer Line Extensions

In all new roadways, including all roads fronting or within subdivisions or other new developments where sewer lines are expected to be extended to adjacent properties, the sewer line shall be designed and installed to the end of the proposed roadway improvement prior to final paving of such roadway improvement. The sewer extension shall terminate with the proper structure or fitting, which will minimize the amount of pavement to be disturbed by future sewer extensions.

I. Sewers to Be Installed In Existing Improved Roadways

Where sewers are being designed for installation in existing improved city and/or county roadways, the Job Engineer shall submit the Plans for the proposed work to the city and/or county public works department for location and encroachment approval. The public works approval shall be obtained prior to submitting plans to CCCSD and shall be placed on the tracing for the first sheet of the Plans and shall appear on all subsequent prints of the Plans.

The City and/or County approval shall be preceded by the following note: "The following acknowledged public agency has reviewed these Plans and hereby approves the location of the proposed work and agrees to issue all necessary encroachment permits."

J. Railroad and Special Utility Crossings

Where sewers are to be constructed across or within utility or railroad rights of way requiring tunnels, bores, and/or special pipe, the tunnel, bore or special pipe shall extend the full length of the sewer line within the particular right of way. The minimum interior diameter of metal casings, when required, shall be eight (8) inches greater than the maximum outside diameter of the pipe barrel (excepting bells).

K. Private Site Collector Sewers

1. Design - Private Site Collector Sewers design shall conform to the main sewer extension criteria specified in this Section.
2. Plan Review - Plan review procedures and fees shall conform to the main sewer extension requirements specified in Section 6, Plan Review.

L. Sewer Installation Method

Unless otherwise indicated on the Plans, sewer shall be installed by the open-cut method. Alternate methods of installation may be proposed by the Job Engineer during the Plan Review process subject to the following requirements:

1. Horizontal Directional Drilling (HDD) - The minimum design slope for pipelines proposed for installation by HDD be three percent (3%; $S = 0.0300$). Design of pipelines proposed for installation by HDD shall fully comply with the requirements of Section 15.02330.
2. Boring and Jacking - Design of pipelines proposed for installation by boring and jacking shall fully comply with the requirements of Section 15.02340.
3. Pipe Bursting - Replacement of pipelines with existing sags greater than allowed under these Specifications (i.e., > 0.125 times the nominal diameter of the pipe) shall not be installed by pipe bursting. Design of pipelines proposed for installation by pipe bursting shall fully comply with the requirements of Section 15.02350.
4. Cured In Place Pipe (CIPP) - Replacement of pipelines with existing sags greater than allowed under these Specifications (i.e., > 0.125 times the nominal diameter of the pipe) shall not be installed using the CIPP method. Design of pipelines proposed for installation by pipe bursting shall fully comply with the requirements of Section 15.02360.

M. Suspended Pipes and Independent Exposed Sewers

The design engineer shall address the following for pipes suspended from bridges or crossings:

1. Vertical design for dead and live loads
2. Lateral loads
3. Seismic loads in any direction at 1g

4-04 SEWER STRUCTURES

A. Manholes

1. Locations - Manholes shall be located at all trunk and main sewer intersections, at all points where trunk or main sewer size changes and at intervals not greater than five hundred (500) feet unless allowed by CCCSD Special Approval. Where practical, manholes shall be located at the center of street or road intersections.
2. Drop Across Structures - Where the horizontal deflection angle between an incoming sewer and outgoing sewer at a structure will be more than thirty degrees (30°), the vertical drop across the structure from the inlet to outlet shall be at least twenty five hundredths (0.25) of a foot.

The maximum vertical drop between any incoming sewer and the outgoing sewer at a structure shall be one (1) foot plus the nominal diameter of the outlet sewer. The invert of any inlet sewer shall not be higher than the top of the shelf (i.e., drop manholes shall not be used unless specific Special Approval is obtained from CCCSD).
3. Deflection at Structures – At the manhole, the horizontal angle of deflection between incoming and outgoing sewers shall be less than or equal to ninety degrees (90°).
4. Connections to Existing Structures - Connections of new public and private sewers at existing manholes shall conform to the requirements shown on the Standard Drawings for manholes
5. Cul-de-sac Requirements - A special cul-de-sac manhole conforming to the requirements shown on DWG-7 shall be located at the end of any main line terminating within a cul-de-sac.
6. Manhole Protection Walls - Reinforced concrete, concrete masonry unit or interlocking block retaining walls conforming to the requirements shown on DWG-13 shall be installed around manhole rims and top blocks where required by the CCCSD.
7. Stationing and Elevations - For calculation purposes, the stationing of a manhole and the "thru" elevation of a manhole shall be considered as being located in the center of the manhole.

B. Use of Rodding Inlets

Rodding inlets are considered temporary terminal structures and may only be used when: 1) future main sewer extensions are possible beyond the proposed upstream end of the Job; and 2) a future sewer main sewer extension would not

require a manhole at the proposed upstream end of the current Job under the criteria specified in this Section.

C. Structures for Multiple-User Low-Pressure Sewer Systems (MULPSS)

1. Manholes - MULPSS manholes in conformance with the requirements of DWG-48 of the Standard Drawings shall be installed at each private pressure lateral service connection, point of intersection of branch main sewers and at any other location indicated on the plans or directed by CCCSD.
2. Flushing Inlets - Flushing Inlets in conformance with the requirements of DWG-49 of the Standard Drawings shall be installed at intervals not to exceed one thousand (1,000) feet, at the terminus of each MULPSS main sewer and at any other location indicated on the plans or directed by CCCSD.

D. Test Fittings

All test fittings, unless otherwise approved, shall be wye or tee branches of the same size, material and strength, pressure and/or thickness class as the line in which they are being installed.

E. Bolt-Down Manhole Frames and Covers

Bolt-down (watertight) manhole frames and covers shall be installed in conformance with the requirements of DWG-9 of the Standard Drawings where drainage conditions may cause storm waters to inundate sewer structures and in other locations required by CCCSD, in conformance with the requirements of DWG-9 of the Standard Drawings.

F. Temporary Access Structures

Temporary Access Structures in conformance with the requirements of DWG-32 of the Standard Drawings shall be installed at the upstream end of inactive stubs to provide access for cleaning, testing, TV inspection and location of the stub for future main sewer extension.

G. Check Dams

Check Dams shall be installed at intervals not exceeding twenty (20) feet, or at the locations and intervals otherwise indicated on the Plans or as directed by CCCSD, in sewer trenches located in swales to limit erosion of soil over the pipeline.

H. Trench Dams

Trench Dams in conformance with the requirements of DWG-33 of the Standard Drawings shall be installed at the locations and at the intervals indicated on the Plans, or as directed by CCCSD, to prevent the migration of groundwater through the pipe zone.

I. Pipe Anchors

Pipe Anchors in conformance with the requirements of DWG-43 of the Standard Drawings shall be installed at intervals not exceeding forty (40) feet, or at the locations and intervals otherwise indicated on the Plans or as directed by CCCSD, in sewer trenches where the slope of sewer exceeds thirty percent (30%).

J. Special Structures

Manholes proposed for trunk sewers forty-five (45) inches in diameter or larger, metering manholes, siphons, sewage pumping systems, vehicle/equipment wash racks, trailer/RV dump stations, all above ground wastewater facilities and other unusual structures or features shall require specific design review by CCCSD.

- END OF SECTION -

SECTION 5

PLAN PREPARATION

5-01 SIZES OF REQUIRED PLANS

All Plans submitted to CCCSD for review and/or approval shall be 24" x 36". Other sizes will not be accepted.

5-02 LETTERING

All printing and/or lettering shall be of one-tenth (1/10) inch minimum height and of such font and line weight as to be readily legible on half-scale (11" x 17") reproductions made from the original drawings. The sanitary sewer features and labels should be easily differentiated from other features on Plans.

5-03 TYPE OF PRINTS AND ORIGINALS

All prints of drawings, including Plans, profiles, details, maps, cut sheets, etc., submitted for review, shall be legible, of high quality, and produced on high contrast background paper capable of reproducing prints of equal or better quality than those submitted for review.

5-04 DATA REQUIRED ON PLANS

- A. A CCCSD job number, CCCSD map grid number, and CCCSD sheet number will be assigned by CCCSD when job Plans are received for preliminary design review. When submitting the job Plans for subsequent plan reviews, this information shall appear on all applicable sheets. The CCCSD job number shall also appear on all communications, legal descriptions for easements, plats, cut sheets, etc., which are associated with the job. For jobs that involve the construction of a manhole only (with or without lateral connections), the CCCSD job number shall be followed with the designation of the letter "M" (e.g. CCCSD 5479M).

The CCCSD grid number, job number, and plan page number shall appear within the last eight and one-half (8-1/2) inches of the lower right hand corner of all plan sheets in a minimum of three-eighth (3/8) inch height font.

Example: 77E5 CCCSD 1234 Sheet 1 of 4

B. Cover Sheet

All Plans submitted to CCCSD for review shall have a cover sheet. The cover sheet may serve as the entire plan submittal provided that all of the information presented in this Section can be shown at the scales indicated. An example cover sheet is shown in Figure 5-1.

The following information shall be included on the cover sheet, at a minimum:

1. Vicinity Map/Location Map

A Vicinity Map/Location Map (not necessarily to scale) showing the location of the job with enough detail to accurately determine the location of the proposed sewer improvements in relation to major cross streets and local highways.

2. System Map

A system map of a 1" = 100' scale (at a minimum) showing:

- All properties to be served by the sewer improvement
- Existing, proposed, abandoned and removed sewers
- Pipe sizes
- Pipe types
- Structures with assigned numbers
- Sewer line stationing
- Distances between structures
- Distance from the new sewer line connection point to the nearest existing structure in the public sewer system
- Laterals and ties to nearest property corner
- All sanitary sewer rights of way with associated widths and respective parcel numbers
- Tract names and/or numbers
- Street names
- Lot numbers
- Assessor's Parcel Numbers

3. Sewer Quantities Tables

A Sewer Quantities Table which indicates the total quantities of all types of pipe, structures, wye branches, laterals, etc. Precast manholes shall be called out separately from cast-in-place manholes. Public and private system quantities shall be shown in separate tables.

4. Sewer Quantities to be Abandoned Table

A Sewer Quantities to be Abandoned Table which indicates the total quantities of all types of pipe, structures, wye branches, laterals, etc., which are to be abandoned or removed as part of the job. A note shall be placed under this table, which states, "All sewer abandonments related to this job shall be performed in accordance with Section 15.02051 of the CCCSD Standard Specifications."

5. Right-of-Way Log

A Right-of-Way Log showing parcel numbers, last name of grantor or subdivision name and/or number, the type of rights, and the recording data of such rights, if available, for each sewer right-of-way parcel.

6. Owner's Name

The names and contact information for all owners and owner's representatives (if applicable), including street address, city, zip code, telephone number(s) and e-mail address.

7. CCCSD Stamp Area

A three-inch (3") high x four-inch (4") wide blank area providing a location for CCCSD to stamp the set of drawings designating the preliminary or final review status of the Plans.

8. Benchmark

A note identifying an acceptable benchmark for elevation that was used as the basis for vertical control of the design of the sanitary sewer including the following information:

- The public agency which established the benchmark
- The elevation datum for the benchmark
- The benchmark elevation
- A brief description of the benchmark and its location

SANITARY SEWER NOTES:

Benchmark:

NAVD88 is the official CCCSD datum. Where the NAVD29 datum is used for design, CCCSD will accept benchmark elevations transformed to NAVD88 elevations by use of a web-based program such as "Corpcon."

Materials and Construction

Materials and construction of sanitary sewers shall conform to the Central Contra Costa Sanitary District Standard Specifications (latest edition).

Compaction Testing

Compaction testing of bedding and backfill, conducted under the direction of a civil or geotechnical engineer licensed by the State of California, is required on this job. As a condition of CCCSD's acceptance of complete work, the engineer in charge of the compaction testing shall submit a Certification Report indicating that compaction results meet or exceed the requirements of the CCCSD Standard Specifications. Compaction testing and the submittal of the Certification Report shall be completed prior to acceptance televising of the sewer and installation of final paving.

Underground Utilities

Prior to any excavation, it is the Contractor's responsibility to determine the location of all utility installations including, without limitation, pipes, conductors and conduits for electricity, gas, water, telephone, cable TV, sewage, and storm drainage that could be encountered during excavation. At least 48 hours prior to commencing any excavation, the Contractor shall notify Underground Services Alert (USA) by calling 1-800-227-2600, or 811, in accordance with California state law.

Notification of Property Owners

The Contractor or Job Owner shall provide written notification to Property Owner(s) and/or residents, who may be impacted by the construction activities, that sewer improvements are going to be installed and the tentative schedule for the work. This notification shall be made before sewer Plans are submitted for final construction review and shall include information on major activities that will be performed. A copy of this notification and list of addressees shall be provided to CCCSD as part of the final construction plan review submittal.

Easement Staking

Survey staking of all public and private easements is required for this job. These survey stakes shall be set at the same time as the sewer cut stakes to confirm that the proposed sanitary sewer will be constructed within the easement. Survey stakes shall be placed at maximum fifty (50) foot intervals, at all angle points, and at the beginning, midpoint, and end of both horizontal and vertical curves. All easement staking and sewer cut stakes shall be available for preconstruction inspection by CCCSD prior to acceptance of the final construction Plans.

Precast Manholes

If the Contractor proposes to use precast manholes, complete shop drawings from the manufacturer shall be submitted and receive favorable review by CCCSD prior to ordering the bases.

Pavement Restoration

Pavement cut for trenching and/or damages caused during the work must be restored with a cross section equal to that of the existing road, or a minimum of two and one-half (2½) inches of asphalt over six (6) inches of aggregate base (whichever is greater). The limits of the pavement restoration must extend to competent existing pavement, and shall be "T-cut" with a minimum width equal to the trench width plus twelve (12) inches on each side of the trench. Where the edge of the "T-cut" is within twenty-four (24) inches of the edge of the existing paving, restoration in that area must extend to the edge of the road. More stringent requirements imposed by the local jurisdiction will supersede CCCSD requirements for pavement restoration.

Connections of Buildings

This job is for the construction of the main sewer line and lateral sewers only. Buildings shall not be connected to the sanitary sewer until:

- The main sewer extension is completed and accepted for use by CCCSD
- The building rough plumbing is complete and approved by the proper authority
- Applicable connection fees are paid to CCCSD
- A registered sewer Contractor obtains a connection permit from CCCSD.

Protection of Survey Monuments:

If survey monuments are disturbed or destroyed the Contractor shall engage a Land Surveyor to reset the monuments and file a Corner Record or Record of Survey as required by law. Copies of filed Corner Records shall be submitted to CCCSD.

Rev.	Date	By	Description

Designed:	Drawn:	Checked:	Date:
Submitted:			Date:
Reviewed:			Date:



ENGINEER NAME
STREET ADDRESS,
CITY, STATE, ZIP CODE

ABC DEVELOPERS
123 MAIN STREET
ANYWHERE, USA 12345
(925) 222-1212

SUBDIVISION 8244
SANITARY SEWER IMPROVEMENT PLAN
CONTRA COSTA COUNTY CALIFORNIA

Job No.
9103-88-10
Drawing No.
P-1

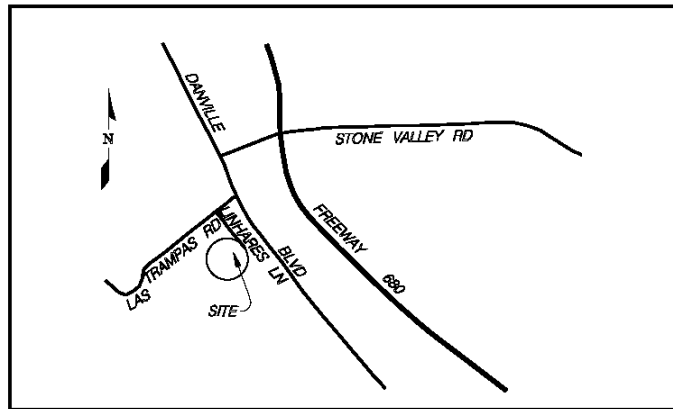
77E5 CCCSD 5479 Sht. 1 of 4

Figure 5-1 EXAMPLE COVER SHEET

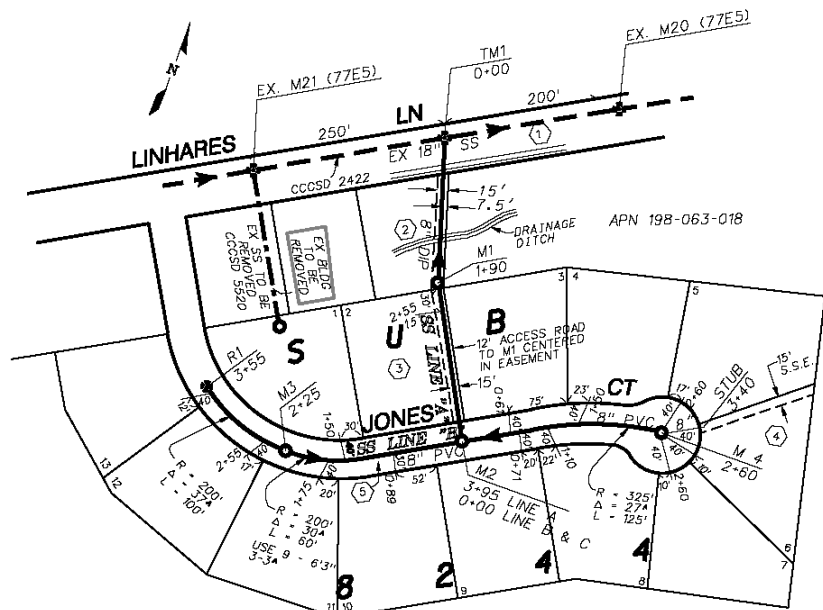
SUBDIVISION 8244 - JONES COURT

Martinez, California

SANITARY SEWER PLANS



VICINITY / LOCATION MAP
N.T.S.



SUB 8244 TOTAL ACRES = 8.25

SYSTEM MAP
0 100 FEET

OWNER / DEVELOPER: PROJECT LOCATION:
ABC DEVELOPERS, INC. APN: 198-063-017
123 Main Street LINHARES LANE
Anywhere, USA 12345 ALAMO, CA
(925) 222-1212

SANITARY SEWER QUANTITIES:
Trunk Manhole 1
Standard Manholes (precast) 3 (M2, M3 AND M4)
Rodding Inlets 1
8" PVC SDR 26 695 lf
8" DIP CL-52 (Polyencased) 395 lf
4" PVC LATERALS 12 (470 lf)
4" DIP Laterals 1 (15 lf)

SEWER QUANTITIES ABANDONED / REMOVED:
Rodding Inlet 1
8" VC Main Sewer 250 lf
4" VC Laterals 1 (25 lf)
Commercial Building 1 (2500 sq ft)

NOTE:
All sewer abandonments related to this project shall be performed in accordance with CCCSD Standard Specifications, latest edition.

RIGHT-OF-WAY LOG

PARCEL #	NAME	TYPE	RECORD DATA
①	Contra Costa County	Encroachment	
②	Smith	I.O.D.	
③	Sub 8244	CCCSD Dedication	
④	Sub 8244	CCCSD Dedication	
⑤	Sub 8244	Public Dedication	

APPROVAL SPACE



Figure 5-2 Cover Sheet

NAVD88 is the official CCCSD datum. Where the NGVD29 datum is used for design, CCCSD will accept benchmark elevations transformed to NAVD88 elevations by use of a web-based program such as "Vertcon."

9. Standard Notes

The following notes shall be shown for all plan submittals:

Materials and Construction

Materials and construction of sanitary sewers shall conform to the Central Contra Costa Sanitary District Standard Specifications (latest edition).

Compaction Testing

Compaction testing of bedding and backfill, conducted under the direction of a civil or geotechnical engineer licensed by the State of California is required on this job. As a condition of CCCSD's acceptance of complete work, the engineer in charge of the compaction testing shall submit a Certification Report indicating that compaction results meet or exceed the requirements of the CCCSD Standard Specifications. Compaction testing and the submittal of the Certification Report shall be completed prior to acceptance televising of the sewer and installation of final paving.

Underground Utilities

Prior to any excavation, it is the Contractor's responsibility to determine the location of all utility installations including, without limitation, pipes, conductors and conduits for electricity, gas, water, telephone, cable TV, sewage, and storm drainage that could be encountered during excavation. **At least 48 hours prior to commencing any excavation, the Contractor shall notify Underground Services Alert (USA) by calling 1-800-227-2600, or 811, in accordance with California state law.**

Notification of Property Owners

The Contractor or Job Owner shall provide written notice that sewer improvements are going to be installed and the tentative schedule for the work to Property Owner(s) and/or residents, who may be impacted by the construction

activities. This notification shall be made 7 calendar days before commencement of sewer construction work.

Easement Staking

Survey staking of all public and private easements is required for this job. These survey stakes shall be set at the same time as the sewer cut stakes to confirm that the proposed sanitary sewer will be constructed within the easement. Survey stakes shall be placed at maximum fifty (50) foot intervals, at all angle points, and at the beginning, midpoint and end of both horizontal and vertical curves. All easement staking and sewer cut stakes shall be available for preconstruction inspection by CCCSD prior to acceptance of the final construction Plans.

Manholes

Standard manholes for new construction shall be constructed with pre-cast manhole bases except for manholes to be constructed at the connection point for existing sewer mains. All pre-cast manholes shall have complete shop drawings from the manufacturer and receive favorable review by CCCSD prior to ordering the bases.

Pavement Restoration

Pavement cut for trenching and/or damages caused during the work must be restored with a cross section equal to that of the existing road, or a minimum of two and one-half (2-1/2) inches of asphalt over six (6) inches of aggregate base (whichever is greater). The limits of the pavement restoration must extend to competent existing pavement, and shall be "T-cut" with a minimum width equal to the trench width plus twelve (12) inches on each side of the trench. Where the edge of the "T-cut" is within twenty-four (24) inches of the edge of the existing paving, restoration in that area must extend to the edge of the road. More stringent requirements imposed by the local jurisdiction will supersede CCCSD requirements for pavement restoration.

Connections of Buildings

This job is for the construction of the main sewer line and lateral sewers only. Buildings shall not be connected to the sanitary sewer until:

- The main sewer extension is completed and accepted

for use by CCCSD.

- The building rough plumbing is complete and approved by the proper authority.
- Applicable connection fees are paid to CCCSD.
- A registered sewer Contractor obtains a connection permit from CCCSD.

Protection of Survey Monuments

If survey monuments are disturbed or destroyed, the Contractor shall engage a Licensed Land Surveyor in the State of California to reset the monuments and file a Corner Record or Record of Survey (ROS) as required by the law. Copies of filed Corner Records or ROS shall be submitted to CCCSD.

Tree Protection

Contractor shall protect all trees and shrubs that are within or adjacent to the construction area per CCCSD Standard Specification Section 15.02900. Refer to Arborist Report prepared by _____, dated _____. *(Last sentence is optional if pipeline works will be under drip line of protected trees.)*

Erosion Control

The construction site operator shall file a Storm Water Pollution Prevention Plan (SWPPP) with the Regional Water Board if the project disturbs one or more acres of soil or if the project disturbs less than one acre but is part of a larger plan of development that totals to one or more acres.

C. Computer Aided Drafting (CAD) System Maps

In addition to the System Map shown on the cover sheet, a CAD format System Map shall be provided with second preliminary plan submittal. A corrected CAD format System Map shall also be provided with the final plan submittal. An electronic (300 dpi, PDF or TIF format) copy of the submitted approved Plans shall also be provided with the preliminary and final construction drawings.

Main line extensions serving subdivisions serving fewer than five (5) lots may be granted a waiver from this requirement when the engineer's Plans are typically done by hand drafting. No digital submittal will be required for base information in an existing subdivision with no new lots being created. Digital submittals are required for any sewer alignment additions or modifications.

The following information shall be provided in the CAD format file and shall include only the information specified:

1. Data must be provided in AutoCAD format.
2. The CAD System Map shall be designed to be displayed at 1"=100' scale. The following information shall be provided on two different layers or in two different files. One (1) layer or file shall show sewer lines and structures only and one (1) layer or file shall show property and right-of-way lines only.
3. The CAD System Map shall be tied to the California State Plane Coordinate System, Zone 3, NAD 83, and shall have two grid ticks at opposite corners, just outside of the map data, labeled with the correct coordinates.
4. A scale bar and north arrow shall be shown on the CAD System Map.

D. North Arrow, Scale

The Vicinity Map, System Map, and all plan views shall have a North arrow shown thereon. The appropriate scale shall be indicated on all maps, Plans, and profiles.

E. Sewer Plans

Sewer Plans shall be drawn at a scale no smaller than 1" = 40' and shall follow in the same direction as the sewer profile. Sewer Plans shall contain the following information, at a minimum:

- The horizontal relationship between proposed sewer improvements and existing and/or proposed field conditions, including existing or proposed utilities and other facilities
- Sewer line size and type
- All structures and their respective numbers
- All property lines and corners adjacent to the sewer alignment
- Street names
- Sewer lateral locations, lengths and ties to property corners
- Route and elevation of side sewers proposed to connect to former septic tank service
- Proposed pumped service lots

- All necessary sewer line, lateral and structure stationing
- Horizontal curve data and stationing
- Any proposed modifications or alternatives to the CCCSD Standard Specifications, including, but not limited to, special details, special construction methods, trench configurations, and/or other requested Special Approvals, when such are anticipated or planned.
- Angle of deflection at each manhole

F. Sewer Profiles

Sewer profiles shall be drawn at a scale of 1" = 40' horizontal and 1" = 4' vertical and shall read from downstream-to-upstream, left-to-right whenever possible. Profiles shall contain the following information, at a minimum:

1. The existing ground surface at the time of sewer construction and the finished ground and/or paving surface. Cut sheets where the cut is less than the minimum cover requirements are subject to rejection.
2. All structures with their appropriate designations and stationing.
3. Design rim and in and out invert elevations for each structure.
4. Vertical curve data and stationing.
5. Sewer line size, pipe type, pipe class, slope and length of pipe between each pair of consecutive structures. Pipe types may be designated by abbreviations listed under Section 2 and pipe class as tabulated under DWG-19 of the Standard Drawings.
6. Existing and/or proposed utilities and other facilities that cross the alignment of the sewer
7. The vertical clearance between the sewer and other utilities when the vertical clearance is less than twelve (12) inches.
8. Road structural section thickness (base plus pavement) for sewers installed in new roadways.

When the pipeline is to be constructed from a subgrade, bench, or subtrench more than three (3) feet below finish grade over the pipeline,

such subgrade, bench, or subtrench profile shall be shown and identified on the sewer profile.

G. Sewer Line Stationing

Each proposed sewer line and its structures shall be stationed continuously upgrade from station 0+00 at its point of connection to another sewer line, either proposed or existing. Sewer line stationing shall be provided for all structures, laterals, horizontal curves and vertical curves. Where a structure is part of two (2) separate sections of sewer line, both sewer line stations shall be shown. The horizontal location and invert elevation for the beginning of the new sewer main (Station 0+00) shall be determined by taking survey measurements from existing CCCSD manholes and/or rodding inlets. For rodding inlets note the stationing of the ell and the rodding inlet.

H. Horizontal and Vertical Curves

Sewer line stations for the beginning and end of each horizontal curve as well as the radius, delta and length of each horizontal curve shall be shown on the Plans. Sewer line stations for the beginning, mid-point and end of each vertical curve, the total curve length, and the tangent slope of the sewer line before and after each vertical curve shall be provided on the profiles. Horizontal curves shall be described between structures. Should a horizontal curve continue through a sewer structure, separate curve information shall be provided using the structure as a beginning of curve and end.

For horizontal and/or vertical curves where fittings are required to achieve the desired radius, the number and type of fittings as well as the pipe lengths needed to achieve the radius shall be provided.

I. Structure Numbers

Manholes, trunk manholes, rodding inlets, and all other sewer structures shall be consecutively numbered downstream-to-upstream beginning with the number one (1).

J. Lateral Sewers

Lateral sewers shall be of sufficient length to extend from their connection at the main sewer to a point beyond all existing or proposed utility trenches. The lateral sewers shall typically end five (5) feet inside the property line or five (5) feet beyond the edge of the sewer easement (see DWG-25 of the Standard Drawings). If practicable, lateral sewers shall

connect to a manhole whenever there is one available in front of the property to be served.

K. Registered Engineer

In accordance with the Business and Professions Code, Professional Engineers Act, Section 6735, all civil engineering Plans, specifications, and reports submitted to CCCSD shall be prepared by a registered civil engineer or by a subordinate under his or her direction, and shall be signed by him or her to indicate his or her responsibility for them. In addition to the signature, all final civil engineering Plans, specifications, and reports shall bear the stamp of the registrant, and the expiration date of the certificate or authority.

5-05 PRIVATE SITE COLLECTOR SYSTEMS

Plans submitted to CCCSD for private site collector systems shall be prepared in accordance with Sections 5-01 through 5-05 of these Standard Specifications. Provided all of the required information can be shown on the plan view drawing, sewer profiles will not be required for six (6) inch diameter site collector system plans. Private site collector systems shall be connected to the public sewer system at a standard manhole.

- END OF SECTION -

SECTION 6

PLAN REVIEW

6-01 PLAN REVIEW PROCEDURES

The following procedures shall be followed when submitting Plans to CCCSD for sanitary sewer main extensions.

6-02 PLAN REVIEW FEE

Plan Review Fees provide for the initial and subsequent submittals of Plans for sanitary sewer main extensions. Fees are based on the time required for CCCSD to conduct a basic plan review (preliminary and final construction review). Additional plan review fees (actual cost) will be assessed if and when this basic review time is exceeded.

The initial Plan Review Fee shall be paid at the time that Plans for a main sewer extension are first submitted to CCCSD for review. Any additional fees will be due prior to the issuance of the CCCSD permit for sewer main construction.

6-03 PRELIMINARY DESIGN REVIEW

All Plans submitted for preliminary design review shall comply with the requirements of Section 5 of these Specifications. Plans which do not meet the minimum plan preparation and/or design standards, will not be reviewed and will be returned to the Job Engineer. Submittals for preliminary design review shall include:

- One (1) complete set of sewer plans prepared in conformance with Section 5-04;
- An electronic version (CD or via e-mail) of a CAD format system map as described in Section 5-04.C;
- One (1) copy of each underground facility maps and/or “as-built” record drawings for other utilities that were used for reference during design;
- Two (2) copies of the plat and legal description for each right-of-way required by Section 8;
- One (1) print of the subdivision or parcel map, including title or certificate sheet;

- One (1) completed Annexation Request and Petition, for each property to be served by the job that has not been previously annexed to CCCSD;
- When applicable, a completed Individual Lot Pumping System Application for each lot to be served by pumped service.

For sewer main extensions to be constructed in existing streets, the following shall also be completed prior to preliminary design review:

- An underground facility locating company and/or Underground Services Alert (USA) shall be contacted to obtain field marking of existing facilities prior to potholing;
- A properly licensed Contractor shall be engaged to pothole and expose potential conflicts with existing improvements where determination of actual physical location is needed for adequate design and clearance references, and the results of the potholing shall be noted on the Plans.

Upon its first receipt of Plans, CCCSD may perform a field verification to confirm that all underground facilities have been marked and that the Plans reflect the field marking. If facilities have not been marked or the Plans do not reflect the field markings, CCCSD will return the Plans to the Job Engineer without review.

As part of the 1st preliminary review plans, CCCSD will designate the particular main sewer reaches to be included in each separate CCCSD “job” and will designate a serial job number.

At the conclusion of each preliminary design review, one (1) set of Plans will be returned to the Job Engineer. CCCSD comments and required revisions will be noted on the Plans. Once the Plans meet CCCSD’s standards, the Job Engineer will be notified that final construction Plans may be submitted.

6-04 ADDITIONAL REQUIRED DOCUMENTATION

A. Right-of-Way Submittals

1. For all public sewer installations on private property, an Irrevocable Offer of Dedication (IOD) for a sanitary sewer easement is required (see Section 8). Legal descriptions and plats for the easements prepared by the Job Engineer), a copy of the current deed for the underlying property, and complete traverse, closure and area calculations shall be submitted prior to the second preliminary design review. One (1) copy of each legal description and plat marked with CCCSD comments and required revisions will be returned to the Job Engineer. Final, wet stamped, original documents shall be included with the final construction review

submittal. Once the legal descriptions and plats are acceptable, CCCSD will prepare an IOD document for each easement and send it to the Job Engineer for execution by the Property Owner. Original signed and notarized IOD documents shall be returned to CCCSD prior to the issuance of a permit for construction of the main sewer extension.

2. Appurtenant easements may be used in lieu of separate IODs for sanitary sewer installation in private roadways. Copies of all deeds for properties having an appurtenant right to the roadway shall be provided to CCCSD. Each deed shall show that the property has an appurtenant right for the installation of sewer pipelines within the roadway. These deeds shall be submitted with a summary document and map showing each owner's appurtenant rights and location of the specific parcel.
3. A properly executed, recordable Roadway Maintenance and Access Agreement in a form acceptable to CCCSD shall be submitted for each proposed private road alignment and each required sewer maintenance access road prior to the issuance of a permit for construction of the main sewer extension.
4. For public sewer installations in new developments or parcel splits requiring subdivision maps, CCCSD rights of way shall be established by means of either public dedications of the streets in which the sanitary sewer will be located, or irrevocable dedication of sanitary sewer easements to CCCSD (See Section 8-03 for required dedication language).

B. Encroachment Permits

Encroachment permits for sanitary sewer work to be done within county or city streets shall be obtained by the Contractor. CCCSD Inspector will verify said permits have been obtained prior to the commencement of work.

C. Geological Evaluation and Report

1. Due to the inherent hazards involved in excavation, trenching, and pipe laying in certain common geological formations within the CCCSD service area, CCCSD may require that a geotechnical evaluation be conducted, and a report, wet-stamped and signed by a licensed Geotechnical Engineer be included with the second preliminary plan review submittal. In general, a geotechnical evaluation will be required when sewers are proposed for locations on steep hillsides, within fifty (50) feet of creek beds, in areas of

established instability, in known fault or slip zones, spring or seepage areas, areas of corrosive soil, or where grading of benches is proposed for installation of the sewer pipelines.

2. The Geotechnical engineer shall inspect the proposed sewer alignment during the evaluation and his/her written report shall state observations made, problems identified and recommendations regarding, but not be limited to: 1) slope stability issues; 2) placement of spoils; 3) control of excavated material; 4) permanent versus temporary benches; 5) trench bedding and backfill requirements; 6) effect of benching on existing trees and vegetation; and 7) erosion control requirements. No grading or trenching shall commence prior to CCCSD receiving and evaluating the adequacy of the report.

D. Capacity Study Report

If required, the capacity study report as specified in Section 4-01 shall be submitted when the Plans are first submitted for design review.

E. Arborist Evaluation and Report

1. In those instances where the installation of the proposed main sewer extension may cause damage to existing large, established trees, CCCSD may require that a certified arborist or forester evaluate the proposed sewer main alignment. In these cases, a signed report including the arborist's or forester's observations and recommendations shall be included with the second preliminary plan review submittal. In general, an arborist's evaluation will be required when sewers are proposed for locations which cross the existing drip lines of large, established trees, especially heritage oak trees.
2. The certified arborist or forester shall inspect the proposed sewer alignment during the evaluation and shall state in his/her written report: 1) the observations made, 2) the problems identified, and 3) recommendations to address the problems. The arborist evaluation shall include, but not be limited to: 1) probable nature, extent and depth of the existing root system, 2) impact of sewer trenching on the existing roots, 3) necessary precautions and procedures to minimize impacts of sewer construction, 4) any realignment of the sewer proposed to avoid damage, 5) alternative trenching methods, 6) special backfill requirements, and 7) post-construction actions needed. No grading or trenching shall commence prior to CCCSD receiving and evaluating the adequacy of the report.

6-05 FINAL CONSTRUCTION REVIEW

- A. Plans submitted for final construction review shall comply with the requirements of Section 5 of these Specifications. When submitting plans for final construction review, the following items must be submitted by the Owner or Job Engineer for final review:
1. Four (4) complete sets of Plans and cut sheets;
 2. Two (2) additional prints of the cover sheet showing the required 1" = 100' scale sewer system map;
 3. An electronic version (CD or via e-mail) of a corrected CAD format system map as well as a 300 dpi, PDF or TIF format copy of the final construction review plans;
 4. One (1) set of prints of the recorded parcel or subdivision map;
 5. All original easement (IOD) documents, fully executed and ready for recording;
 6. Sewer construction bid, contractor's proposal, or signed construction contract including an itemization in accordance with the Sewer Quantities Table included on the plans in conformance with Section 5-04 of these Specifications. This document shall be submitted prior to CCCSD receiving the project improvement security referenced in Section 10-03, so that CCCSD can review and approve the amount for the project security;
 7. Payment of any remaining Plan review fees.
- B. Prior to the issuance of a permit for construction of the main sewer extension, submittal of the following documents and payments is required:
1. Payment of applicable inspection fees and charges;
 2. Payment by cashier's check or submittal of alternative project improvement security documents in the amount of 100% of the construction cost for the public sewer portion of the Job, as required in Section 10-03 of these Specifications;
- C. Two (2) original copies of the Owner's Sewer Improvement Agreement fully executed by the Job Owner(s).

6-06 STATUS OF PLAN REVIEW SUBMITTALS

If more than six (6) months pass between the time that the Job Engineer is notified that final construction plans may be submitted and the actual submittal of these plans, CCCSD will require an additional preliminary plan review cycle or

submittal of a written certification from the Job Engineer stating that there have been no material changes in field conditions that would affect the validity of the design or the information shown on the plans submitted for final construction review.

6-07 PROTECTION OF SURVEY MONUMENTS

- A. No saw cutting, pavement breaking or excavation shall be done until all survey monuments of record that may be disturbed by construction work have been located and properly referenced by a California Licensed Land Surveyor. Corner Records shall be filed showing all referenced points.
- B. Copies of filed Corner Records or a letter from the Land Surveyor stating that no monuments of record were found in the construction area shall be submitted to CCCSD prior to the issuance of a CCCSD construction permit.
- C. If survey monuments are disturbed or destroyed without having first been referenced, the Contractor shall engage a Land Surveyor to reset the monuments and file a Corner Record or Record of Survey as required by law. Monuments shall be replaced in accordance with the standards of the agency (city or county) having jurisdiction.

6-08 COMMENCEMENT AND COMPLETION OF WORK

- A. No construction work shall commence on a Job until CCCSD has favorably reviewed the plans, received other required documents and cut sheets, received all applicable payments and affixed its signed stamp indicating that construction may proceed on the cover sheet of each set of final construction plans and issued a permit to the Contractor for the Job.
- B. When any change(s) to job plans are proposed after completion of CCCSD's final review, or are required due to field conditions being different from those indicated in the final construction plans, (including, but not limited to, changes of pipe type, class, grade, cover, quantities or any other details that may affect the sanitary sewer installation), the work subject to change will be suspended until the change(s) have received favorable review by CCCSD through the above described process.
- C. If construction is proposed to be done in sections or phases, submittal and approval of the final construction plans for the entire job shall be as outlined above. A 1" = 100' (minimum) scale system map shall be submitted to CCCSD for its approval showing the schedule of the phased construction. Prior to the construction of each section or phase, the Job

Engineer or Contractor shall submit four (4) additional prints of the job cover sheet with the portion of work to be constructed under the particular section or phase “highlighted” on the 1”=100' scale sewer system map, cut sheets for the particular section or phase and applicable CCCSD plan review fees.

- D. The CCCSD permit for construction may be suspended or revoked by CCCSD at any time if it is determined that any portion of the Plans, cut sheets, and/or construction work fails to meet all CCCSD requirements. The CCCSD permit for construction will expire if actual field construction does not commence within three (3) months of the date shown on the permit.

- END OF SECTION -

SECTION 7

SURVEYING FOR CONSTRUCTION

7-01 GENERAL

The Job Engineer or Surveyor shall notify affected property owners when they plan to conduct surveys on private property and, if possible, obtain permission to enter onto the property. It is noted, however, that under State Law, licensed Surveyors may enter upon private property without permission.

7-02 CUT STAKES

For new installations of trunk, main and site collector sewers, the Job Engineer or Surveyor shall conduct a field survey, after rough grading is completed and in advance of anticipated trenching, and place offset cut stakes indicating the design location of the sewers and:

- Structures (manholes and rodding inlets);
- Wyes and taps for laterals; and
- Joints, couplings or fittings where pipe deflection will exceed three degrees (3°).

Each cut stake shall be marked showing the offset distance from centerline of the sewer, sanitary sewer stationing, depth of cut (surface to invert elevation), and structure type and number (if applicable).

In areas where benching is required for installation of the sewer, benches shall be cut prior to staking.

The maximum intervals for placement of cut stakes shall be:

- For straight horizontal alignments on constant design slopes of less than or equal to twenty percent (20%) grade, offset cut stakes shall be placed at intervals not to exceed fifty (50) feet.
- For straight horizontal alignments on constant design slopes exceeding a twenty percent (20%) grade, offset cut stakes shall be placed at intervals not to exceed twenty-five (25) feet.
- For horizontal curves with radius less than five hundred (500) feet, offset cut stakes shall be placed at the beginning of curve (BC), end of curve (EC), and at intervals not to exceed twenty-five (25) feet.
- For horizontal curves with radius equal to or greater than five hundred (500) feet, offset cut stakes shall be placed at the beginning of curve (BC) end of curve (EC), and at maximum intervals of fifty (50) feet.

- For vertical curves, offset cut stakes shall be placed at the beginning of curve (BVC), end of curve (EVC), and at intervals not to exceed twenty-five (25) feet.

Any cut stakes that are removed, damaged, and/or relocated before they have been used to set the grade of the sewer shall be replaced by the Job Engineer or Surveyor prior to the installation of the sewer.

7-03 CUT SHEETS

After cut stakes have been placed, and prior to the issuance of a permit for construction of the job, the Job Engineer or Surveyor shall submit complete Cut Sheets for CCCSD review on a form identical to the example shown in Figure 7-1. An Excel™ version of the cut sheet form is available for download at CCCSD's website (www.centrialsan.org).

Cut sheets shall include the ground elevation and the depth of cover at the sewer centerline for each station and shall demonstrate that the minimum required cover will be achieved at the time that the sewer is installed.

CCCSD will conduct a field check of the cut stakes and cut sheets and will either accept the staking or return marked-up cut sheets to the Job Engineer or Surveyor for correction and/or restaking. Once the cut stakes and cut sheets have received favorable CCCSD review and the Owner and Contractor have met all other requirements for permit issuance, the Contractor shall obtain a permit prior to commencing the work.

7-04 EASMENT STAKING

See Section 5 – Plan Preparation for easement staking requirements.



CENTRAL CONTRA COSTA SANITARY DISTRICT CUT SHEET FOR SEWER

FOR JOB ENGINEER'S USE				DISTRICT DATA	
PREPARED BY: KED	SHEET: 1 of 1		JOB # 2005		
OWNER: MJP Developers	CONTRACTOR: Jones & Co., Inc		REVIEWED BY JMM		
DATE: 08/05/2010	ENGR JOB# Engr 05-00026	SUB # 5125	DATE: 8/12/2010		

LINE Smith Rd., SS Line 'A'						STATION 0 + 00 to 4 + 23				
STATION	PIPE DIAMETER (in.)	STRUCTURE	SEWER SLOPE (ft/ft)	OFF SET	OFF SET STAKE ELEV.	FIL ELEV (invert)	OFF SET CUT	REMARKS	* C/L GROUND ELEV.	* C/L COVER
0 + 00.00	8.00	Ex. MH		8' LT	108.00	100.00	8.00	Start	104.33	5.00
			0.0077							
0 + 25.00	8.00		0.0077	8' LT	107.36	100.19	7.17		105.00	5.47
0 + 50.00	8.00		0.0077	8' LT	107.22	100.39	6.84		105.21	5.49
0 + 65.70	8.00	Lat. Rt.	0.0077	8' LT	107.30	100.51	6.79		105.33	5.49
0 + 75.00	8.00		0.0077	8' LT	107.24	100.58	6.66		105.65	5.74
1 + 00.00	8.00	MH # 1	0.012	8' LT	107.41	100.77	6.64		105.99	5.89
1 + 25.00	8.00		0.012	8' LT	108.71	101.07	7.64		106.39	5.99
1 + 48.40	8.00		0.012	8' LT	109.03	101.35	7.68	BC	106.68	6.00
1 + 57.40	8.00	11 1/4° Coupling	0.012	8' LT	109.15	101.46	7.69		107.13	6.34
1 + 62.00	8.00	Lat. Rt.	0.012	8' LT	109.15	101.51	7.64		107.19	6.34
1 + 75.40	8.00	11 1/4° Coupling	0.012	8' LT	109.22	101.67	7.55		107.31	6.30
1 + 93.40	8.00	11 1/4° Coupling	0.012	8' LT	109.43	101.89	7.54		107.43	6.21
2 + 11.40	8.00	11 1/4° Coupling	0.012	8' LT	109.65	102.11	7.54		107.55	6.11
2 + 29.40	8.00	11 1/4° Coupling	0.012	8' LT	109.87	102.32	7.55		107.89	6.23
2 + 38.40	8.00		0.012	8' LT	108.97	102.43	6.54	EC	108.15	6.39
2 + 50.00	8.00		0.012	8' LT	109.33	102.57	6.76		108.39	6.49
2 + 75.00	8.00		0.012	8' LT	109.43	102.87	6.56		109.39	7.19
3 + 00.00	8.00		0.012	8' LT	110.03	103.17	6.86		109.99	7.49
3 + 25.00	8.00		0.012	8' LT	110.36	103.47	6.89		110.49	7.69
3 + 50.00	8.00		0.012	8' LT	110.48	103.77	6.71		110.89	7.79
3 + 75.00	8.00		0.012	8' LT	110.75	104.07	6.68		110.99	7.59
4 + 00.00	8.00		0.012	8' LT	111.15	104.37	6.78		111.49	7.79
4 + 23.00	8.00	MH # 2		8' LT	112.27	104.65	7.62	End	111.97	7.99

Figure 7-1 Cut Sheet for Sewer

- END OF SECTION -

SECTION 8

PROPERTY RIGHTS FOR WASTEWATER FACILITIES

8-01 GENERAL

Title 7 of the CCCSD Code, defines and establishes the property rights needed for existing sewers, structures, appurtenances, and appliances. When new installations of public trunk or main sewers are proposed, the Job Owner shall obtain, on behalf of CCCSD, the property rights necessary for construction, alteration, replacement, repair, maintenance and operation of the new sewers in accordance with the requirements of this Section.

A. Width of Required Rights of Way

Easements for public sewers ten (10) inches in diameter or smaller, or where the depth from the ground surface to the flow line (invert elevation) of the sewer is nine (9) feet or less, shall have a minimum width of fifteen (15) feet. Easements for sewers twelve (12) inches in diameter or larger, or where the depth is greater than nine (9) feet shall have a minimum width of twenty (20) feet. If new sewers will be installed across properties where existing improvements are adjacent to the new sewers and will remain in place, the easement width may be reduced at the sole discretion of CCCSD, but in no case, shall the width be less than ten (10) feet.

B. Use of Sewer Easements

Except for fences and utility, storm drain and retaining wall crossings described below, exclusive sewer easements shall be used only for purposes of constructing, altering, replacing, repairing, maintaining, and operating sanitary sewer pipes, appurtenances, and appliances.

Surface uses of sanitary sewer easements shall be limited to paving and general landscaping, not including trees. The planting of trees, or construction of permanent structures including, but not limited to, houses, garages, car ports, outbuildings, swimming pools, fountains, ponds, parallel drainage swales, artificial streams, retaining walls or other structures is not permitted within or over the easement area.

Surface structures (manholes, rodding inlets, etc.) within easements shall not be covered by earth or other material and shall remain in an exposed and accessible condition at all times for routine and/or emergency maintenance that may be necessary to protect adjacent properties.

C. Utility, Storm Drain, Retaining Walls and Fences

Utility pipes and conduits, storm drains, retaining walls and fences may only cross CCCSD subsurface easements at angles between forty-five degrees (45°) and ninety degrees (90°) to the centerline of the easement, and at elevations that will not conflict with any sanitary sewer or appurtenance. The following improvements will not be permitted in CCCSD sanitary sewer easements without CCCSD's explicit written Special Approval:

- Utilities, storm drains, retaining walls or fences parallel to or with crossings at angles less than forty-five degrees (45°) to the centerline of the easement;
- Utilities, storm drains, retaining walls or fences, or any part or appurtenance of these, within six (6) inches wall-to-wall of existing or planned sanitary sewers or appurtenances at any point;
- Retaining walls three (3) feet or greater in height (i.e., those which require engineered design and building permits) or having pier foundations or spread footings greater than eighteen (18) inches wide by twelve (12) inches thick will not be permitted without CCCSD's written Special Approval.

D. Acceptable Documents for Property Rights Required for Public Sewers

The following documents are generally acceptable for establishing the property rights required for installation of public sewers:

- Existing Grants of Easements to CCCSD for sewer purposes.
- Irrevocable Offers of Dedication (IOD) to CCCSD of easements for sewer purposes.
- Easements dedicated to CCCSD for public sanitary sewer purposes on filed subdivision maps.
- Existing private access and/or utility easements appurtenant to the property of the Job Owner that specifically cite "sewers" or "utilities" as uses, and where it is reasonably foreseeable that extension of the sewer will not be necessary to serve properties beyond those properties having appurtenant rights in the easements at some time in the future.

The following documents are generally not acceptable to establish the property rights required for installation of public sewers:

- Nonexclusive easements for all utilities, "PUE."
- Private access and/or utility easements appurtenant to the property of the Job Owner where it is reasonably foreseeable that extension of the sewer

will be necessary to serve properties beyond those properties having appurtenant rights in the easements at some time in the future.

8-02 IRREVOCABLE OFFERS OF DEDICATION BY SEPARATE DOCUMENT

The following procedures shall be followed when separate instruments for Irrevocable Offers of Dedication (IOD) in favor of CCCSD are proposed to establish the property rights required for installation of public sewers:

A. Submittals

The Job Engineer shall submit two (2) copies of a legal description and "Right-of-way Map for Sewer" (plat) for each easement proposed no later than the time he/she submits plans to CCCSD for second preliminary design review. After these documents have been reviewed, one (1) copy of each, marked with CCCSD's comments and required revisions, will be returned to the Job Engineer. The Job Engineer shall respond to comments, make required revisions and submit original wet-stamped and signed legal descriptions and plats no later than the time he/she submits plans to CCCSD for final construction plan review. Once the documents are favorably reviewed by CCCSD, it will prepare an IOD document for each easement and send it to the Job Engineer for execution by the Property Owners. Original properly executed and notarized IOD document shall be returned to CCCSD for recording prior to issuance of the permit for construction.

B. Legal Descriptions

A legal description for each proposed easement in the form shown on Figure 8-1 shall be prepared for CCCSD review by the Job Engineer or Land Surveyor. As a general rule, easements shall be described by a centerline, sideline, or perimeter metes and bounds description (as appropriate). The Point of Beginning and the terminus of the description shall each be descriptively tied to at least two (2) found monuments of record. Complete recording or filing information for any lot, parcel or map mentioned in the description shall be included. If the easement follows the boundary of any particular parcel, tract or right-of-way, the relationship of the boundary and the easement shall be fully qualified in the description. All points where an easement crosses or contacts a parcel or right-of-way boundary shall be fully referenced in the description.

The legal description shall be entitled "Exhibit A", and shall include the easement CCCSD-assigned parcel number, the Assessor's Parcel Number (APN) and CCCSD job number in the upper right hand corner. The description shall also make reference to the accompanying plat (Exhibit B), by which reference it shall be made a part of the Legal Description.

C. Right-of-Way Map for Sewer (Plat)

A Right-of-Way Map for Sewer (plat) in the form shown on Figure 8-2 shall be prepared for CCCSD review by the Job Engineer or Surveyor for each proposed easement on a form identical to the example shown in Figure 8-1. The plat shall show the entire area offered for the easement. The plat shall be entitled "Exhibit B", and shall be drawn so that the north arrow points toward the top of the sheet. When necessary for clarity, a separate plat shall be prepared for each easement parcel showing all necessary survey ties, courses, and distances along the easement. Whenever possible, adjacent roads shall be shown to facilitate locating the subject easement area. The CCCSD job number, easement parcel number, and the last name of the grantor shall also appear on each right-of-way plat.

D. After acceptance of the job by CCCSD, the Board of Directors will consider formally accepting the IOD for each sewer easement.

8-03 IRREVOCABLE OFFERS OF DEDICATION ON SUBDIVISION MAPS

The following procedures shall be followed when property rights required for installation of public sewer are proposed to be established by dedication of public streets or irrevocable offer of dedication of easements in favor of CCCSD on a subdivision map.

A. Certificate Sheet Requirement on Subdivision Final Maps

The following paragraphs shall be made part of the Owner's Certificate when easements are offered for dedication to CCCSD:

"The area marked "Sanitary Sewer Easement," or "SSE" is offered for dedication to the Central Contra Costa Sanitary District (CCCSD) or its successors or assigns in gross, as an exclusive subsurface easement (or as a nonexclusive subsurface easement, where indicated) and nonexclusive surface easement for the right to construct, reconstruct, renew, alter, operate, maintain, replace (with the initial or other size) and repair such sewer line or lines as CCCSD shall from time to time elect for conveying sewage or recycled water, and all necessary maintenance access structures, laterals and appurtenances thereto, over and within such easement area, together with the free right of ingress, egress, and emergency access to said easement over and across the remaining portion of the Owner's property, provided that said rights of ingress, egress and emergency access shall be limited to established roadways, pathways, avenues or other routes to the extent possible and as reasonably necessary for the proper use of the rights granted herein. This offer of dedication also includes the right to clear obstructions and vegetation from the easement as may be required for the proper use of the other rights granted herein.

The Owner reserves the right to landscape or make such other use of the lands included within the easements which are consistent with CCCSD's use; however, such use by the Owner shall not include the planting of trees or construction of permanent structures, including but not limited to houses, garages, outbuildings, swimming pools, tennis courts, retaining walls, decks, patios, engineered drainage facilities (bio-swales) or other activity which may interfere with CCCSD's enjoyment of the easement rights granted herein.

Maintenance access structures (manholes, rodding inlets, etc.) constructed within the easement shall not be covered by earth or other material and shall remain in an exposed and accessible condition at all times for routine and/or emergency maintenance that may be deemed necessary by CCCSD from time to time.

CCCSD, and its successors or assigns, shall incur no liability with respect to such offer of dedication, and shall not assume any responsibility for the offered easements or any improvements thereon or therein, until such offer has been accepted by the appropriate action of CCCSD, or its successors or assigns. Further, the Owner shall indemnify, defend, save and hold harmless CCCSD from any liability with respect to the easements, prior to the formal acceptance of said easements by appropriate action of CCCSD."

B. Commencing Work Prior to Filing of Map

When sanitary sewer easements are to be created by dedication on subdivision maps, and the subdivision map cannot be filed prior to the commencement of sewer construction, permission may be granted by CCCSD to proceed with the sewer work. In this case, the subdivision map shall be filed, recorded and submitted to CCCSD prior to the acceptance of the public sewer.

C. After acceptance of the job by CCCSD, the Board of Directors will consider formally accepting Offers of Dedication.

8-04 APPURTENANT EASEMENTS

The following procedures shall be followed when property rights required for installation of public sewer are proposed to be established in existing private access and/or utility easements appurtenant to the property of the Job Owner:

A. Submittals

The Job Engineer shall submit copies of all deeds for properties having appurtenant rights for each easement proposed no later than the time he/she submits plans to CCCSD for second preliminary design review. These deeds shall demonstrate that each property has an appurtenant right for the installation of sewers. The deeds shall be submitted with a summary document and map delineating the location of each Owner's property and its appurtenant rights.

B. Road Maintenance and Access Agreements

For sewers proposed within private roads where appurtenant access and utility easements are used to establish the property rights necessary for installation of public sewers, the Owner shall execute a road maintenance, repair and access agreement in CCCSD's standard form. The agreement shall ensure that the road is maintained in good repair by the Owner, and other property owners whose properties are connected to public sewer through appurtenant easement rights in the road, in a condition fully adequate for routine and emergency access by CCCSD's all-weather heavy-duty sewer inspection and cleaning vehicles.

EXHIBIT "A"

**CCCSD Job No. 4950B
Parcel 1
APN 374-171-008**

PERMANENT EASEMENT

REAL PROPERTY in city of Martinez, county of Contra Costa, state of California, described as follows:

Portion of Lot 284 as shown upon LaSalle Heights — Unit No. 8 filed on November 16, 1949 in Book 38 of Maps at Page 31, Contra Costa County records (38 M 31) being also the parcel of land described in the Grant Deed to Firas Jandali and Ameena Kamal Jandali, husband and wife of Elizabeth A. Shebesta, a married woman as her sole and separate property, all as Joint Tenants, recorded on September 2, 2006 as Recorder's Document 2006-0300449, said county records described as follows:

Commencing at a found railroad spike stamped "LS 3874" as said spike is shown upon the Record of Survey filed on November 15, 1990 in Book 96 of Land Surveyors Maps at Page 41, said county records (96 LSM 41); thence south 52° 56' 30" west 97.15 feet (96.68 feet per 96 LSM 41) along the centerline of Harbor View Drive to a found railroad spike stamped "LS 3874" as shown upon said map; thence leaving saide centerline north 08° 41' 57" west 146.57 feet to a point on the northwesterly line of a 5' Sanitary Easement the southeasterly line of which is coincident with the southeasterly line of herein above referenced Lot 284, said point being the POINT OF BEGINNING, said POINT OF BEGINNING bears north 58° 11' 12" east 50 feet from the westerly corner of said easement; thence from said POINT OF BEGINNING north 45° 46' 31" east 45.01 feet; thence north 65° 20' 47" west 67.34 feet to the northwest line of said Lot; thence along said line north 43° 13' 41" east 10.55 feet; thence south 65° 20' 47" east 69.69 feet; thence north 69° 06' 51" east 54.97 feet to the northerly corner of said 5' Sanitary Easement; thence south 58° 11' 12" west 109.43 feet along the northwesterly line of said easement to the POING OF BEGINNING.

Containing an area of 1,294 square feet, more or less.

Attached hereto is a plat entitles Exhibit "B" and by this reference made a part hereof.



DP 4950B pcl 1
Page 1 of 1

APN 374-171-008
9/13/2007

Figure 8-1 Legal Description

EXHIBIT "B"
 CENTRAL CONTRA COSTA SANITARY DISTRICT
 RIGHT OF WAY MAP for SEWER

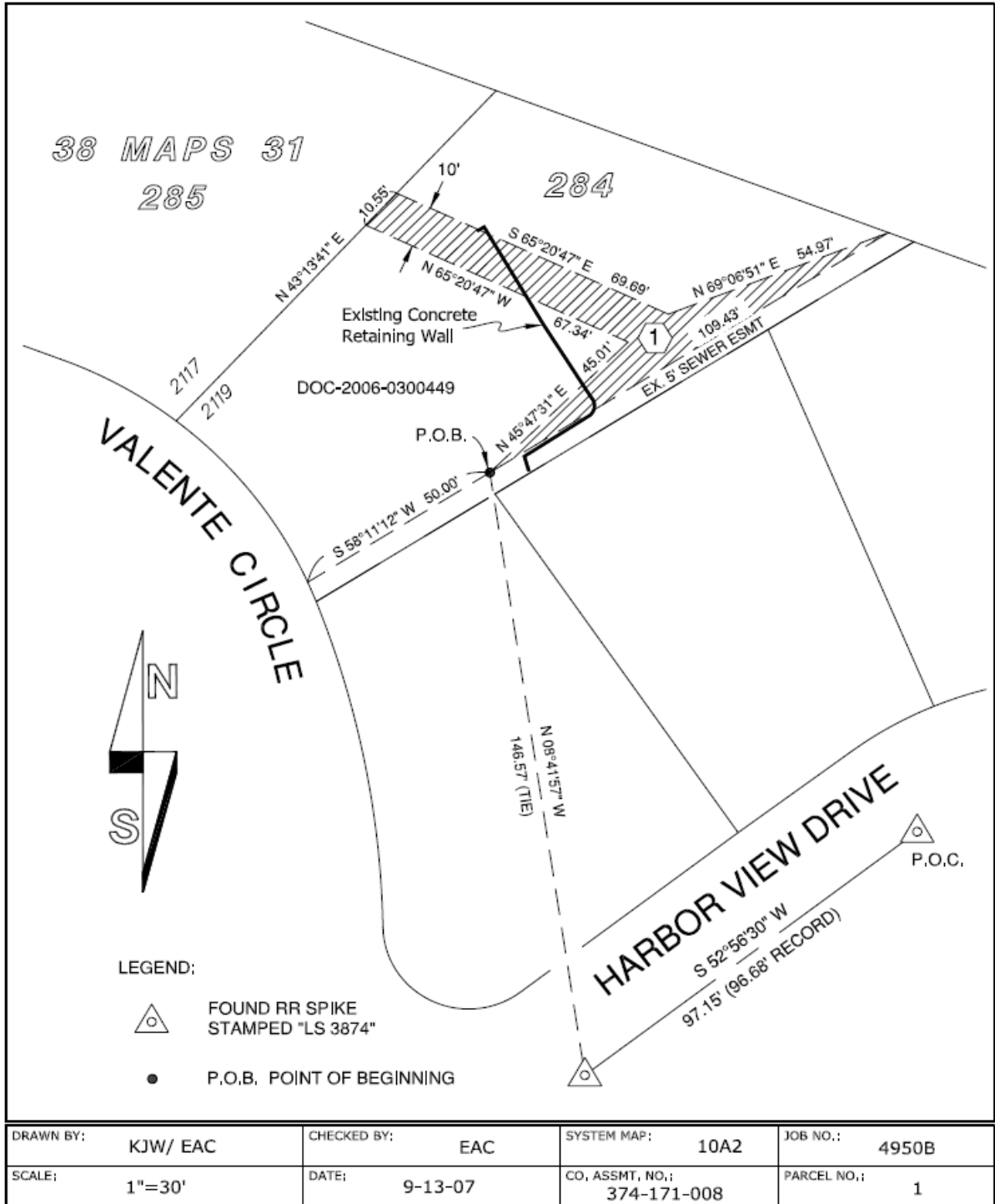


FIGURE 8-2 Right-of-Way Map
- END OF SECTION -

SECTION 9

SOURCE CONTROL

9-01 GREASE, OIL AND/OR SOLIDS REMOVAL DEVICES

CCCSD may require any non-domestic user to install a grease, oil and/or solids removal device according to guidelines set forth below and in Title 10 of the CCCSD Code in order to prevent grease, sand, flammable liquids, and other substances which are likely to restrict the flow or create a hazard from entering the sanitary sewer system.

A. Food Service Facilities

Any commercial establishment with common food preparation facilities shall have a grease interceptor and/or grease trap(s) installed, as specified by CCCSD. The size of all grease interceptors and/or grease traps will be determined by CCCSD on a case by case basis using objective criteria such as the size and type of facility, volume of business or operation, plumbing fixtures, and cooking fixtures and estimated flow rate (reference Uniform Plumbing Code, latest edition). Standards for grease traps and grease interceptors for food service facilities are presented below.

1. Grease Interceptors (Gravity Grease Interceptors per UPC)

The term "grease interceptor" shall mean a prefabricated or cast-in-place grease interceptor with a minimum capacity of one thousand (1,000) gallons conforming to ANSI Z1001-2007, American National Standard for Prefabricated Gravity Grease Interceptors, and DWG-37 of the Standard Drawings.

All grease interceptors shall be installed in accordance with Section 15.03400 of these Specifications as well as with the manufacturer's specifications.

All non-domestic drain inlets including, but not limited to, floor drains, floor sinks, sinks, mop sinks and drains serving dishwashers, wash areas, trash enclosures and/or trash compactors, shall be plumbed to the grease interceptor.

All domestic waste inlets shall be plumbed separately from non-domestic waste inlets and connected either to the building side sewer downstream of the grease interceptor or directly to the main sewer.

Systems to add enzymes, microbes, or other materials intended to remove grease from a grease interceptor are prohibited. Use of such material to treat drain lines served by a grease interceptor are acceptable provided

that the dosage is appropriate for drain line cleaning and not removal of grease from the grease interceptor.

The grease interceptor shall be installed in a location that is readily accessible for periodic cleaning, inspection, and/or sampling. Typical installations of grease interceptors are outside of the building. Proposals for installations within the interior of the building will be considered on a case-by-case basis subject to the approval of the Contra Costa County Health Services Department.

If the grease interceptor is located in an area subject to vehicle traffic, the grease interceptor shall be designed with a minimum of an H-20 traffic rating. Alternatively, an appropriately designed traffic cover shall be installed over the grease interceptor in accordance with DWG-39 of the Standard Drawings.

A sampling structure shall be installed immediately downstream of the grease interceptor in accordance with DWG-40 of the Standard Drawings.

Grease interceptors shall be filled with clean water after installation and refilled with clean water after each cleaning for the purpose of minimizing odors.

2. Grease Traps (Hydromechanical Grease Interceptors (HGI) per UPC)

The term "grease trap" shall mean a rust/corrosion resistant grease removal device conforming to ASME A112.14.3 and/or ASME A112.14.4.

Grease traps shall be installed in accordance with the manufacturer's specifications with a minimum grease containment capacity of forty (40) pounds and minimum flow rating of twenty (20) gallons per minute (gpm).

The grease trap shall be connected to specific plumbing fixtures or drains as required by CCCSD.

Dishwashers shall not be plumbed to a grease trap.

Garbage disposals/grinders shall not be plumbed to a grease trap and are prohibited in any commercial establishment with common food preparation in which the kitchen plumbing is not served by a grease interceptor.

Domestic waste shall not be plumbed to a grease trap.

The inlet pipe to the grease trap shall be equipped with a flow control fitting. The flow control fitting shall be designed so that the flow through the fitting does not exceed the designed input rate of the grease trap. The flow control fitting shall be installed to be readily accessible for inspection, cleaning and maintenance, including in-ground installations. A flow control fitting that has adjustable or removable parts is prohibited.

Systems to add enzymes, microbes, or other materials intended to remove grease from a grease trap are prohibited. The use of such material to treat drain lines served by a grease trap is prohibited. The installation of a grease draw-off valve on a grease trap is prohibited.

The grease trap shall be installed in a location that is readily accessible for periodic cleaning, inspection, and/or sampling.

3. Automated Grease Traps (Grease Removal Devices (GRD) per UPC)

The term “automated grease trap” shall mean a device that is designed to remove grease from wastewater using mechanisms that do not rely on gravity to achieve the separation. All of the requirements specified above for grease traps, except for the prohibition on grease draw-off valves, shall apply to automated grease traps.

The installation of an automated grease trap requires Special Approval from the CCCSD Source Control Section.

B. Other Commercial Businesses

Any commercial establishment that has the potential to discharge waste and/or wastewater which may contain oil, grease, and/or prohibited solids (e.g., vehicle service, heavy or light industrial, car washes, engine washings, etc.) shall have a sand-oil interceptor and/or separator(s) installed, as specified by CCCSD. Standards for sand-oil interceptors and separators are presented below.

1. Sand-Oil Interceptors:

The term “sand-oil interceptor” shall mean a prefabricated or cast-in-place grease, oil, and/or solids removal device with a minimum capacity of three hundred twenty (320) gallons as shown on DWG-38 of the Standard Drawings.

The sand-oil interceptor shall be designed in accordance with the following performance-based standards:

- The interceptor shall have the capacity for a thirty (30) minute retention time, based on the maximum influent flow rate.
- The interceptor shall be designed to reduce turbulence of the flow through the unit.
- The interceptor shall provide for the removal of floatables and settleables from the wastewater to the maximum extent practicable using multiple sedimentation chambers, pipe elbows installed between chambers, and/or other pretreatment design elements.

Alternative designs of sand-oil interceptors may be submitted to CCCSD for consideration. The specifications, operation, and effectiveness for the proposed application of the alternative design must be certified by a licensed professional engineer prior to approval by CCCSD.

All plumbing fixtures which may discharge wastewater containing oil, grease, and/or solids to the sanitary sewer system including, but not limited to, floor drains, service sinks, mop sinks, and drains serving wash areas and/or trash enclosures shall be connected to the sand-oil interceptor.

All domestic waste inlets shall be plumbed separately from non-domestic waste inlets and connected either to the building side sewer downstream of the sand-oil interceptor or directly to the main sewer.

Systems to add enzymes, microbes, or other materials intended to remove grease or oil from a sand-oil interceptor are prohibited without the Special Approval from CCCSD. Use of such material to treat drain lines served by a sand-oil interceptor are acceptable provided that the dosage is appropriate for drain line cleaning and not for the removal of grease from the sand-oil interceptor.

The sand-oil interceptor shall be installed in a location that is readily accessible for periodic cleaning, inspection, and/or sampling. Typical installations of sand-oil interceptors are outside of the building. Proposals for installations within the interior of the building will be considered on a case-by-case basis.

If the sand-oil interceptor is located in an area subject to vehicular traffic, the sand-oil interceptor shall be designed with a minimum of an HS-20 traffic rating. Alternatively, an appropriately designed traffic cover shall be installed over the sand-oil interceptor in accordance with DWG-39 of the Standard Drawings.

A sampling structure shall be installed immediately downstream of the sand-oil interceptor in accordance with DWG-40 of the Standard Drawings.

2. Separators

The term "separator" shall mean a rust/corrosion resistant grease, oil, and/or solids separation device, with a minimum flow rating of twenty (20) gallons per minute (gpm).

The design, specifications, operation, and effectiveness of the separator for the proposed application must be certified by a licensed professional engineer prior to approval by CCCSD.

The separator shall be connected to specific plumbing fixtures or drains as required by CCCSD.

Sanitary waste shall not be plumbed to a separator.

The inlet pipe to the separator shall be equipped with a flow control fitting. The flow control fitting shall be designed so that the flow through the fitting does not exceed the designed input rate of the separator. The flow control fitting shall be installed to be readily accessible for inspection, cleaning and maintenance, including in-ground installations. A flow control fitting that has adjustable or removable parts is prohibited.

The inlet to the separator shall be equipped with a solids capturing device (e.g. screen or basket).

Systems to add enzymes, microbes, or other materials intended to remove grease or oil from a separator are prohibited. Use of such material to treat drain lines served by a separator is also prohibited.

The separator shall be installed in a location that is readily accessible for periodic cleaning, inspection, and/or sampling.

The discharge from a separator shall have a sampling location installed as follows:

- A sample valve shall be installed on the effluent line from the separator for above-ground installations.
- A sampling structure shall be installed on the effluent line from the separator for in-ground installations in accordance with DWG-40 of the Standard Drawings.

3. Hair Traps

Barbershops, beauty salons, pet groomers, animal care facilities, and any other commercial facility that discharges wastewater containing significant amounts of hair and/or fibers shall install a hair trap or other pretreatment device as specified by CCCSD.

4. Clay/Ceramic/Granite/Marble Traps

Classrooms, manufacturing or any other commercial facilities that discharge wastewater containing significant amounts of clay, ceramic, granite, marble or other similar material residuals shall install a trap or other pretreatment device as specified by CCCSD.

5. Dental Practices

Amalgam Separators - Dental practices that generate amalgam wastes shall install an amalgam separator on the effluent line of the vacuum system(s) serving the facility. The amalgam separator shall meet the ISO 9003 standards that are effective at the time of installation. The discharge from an amalgam separator shall have a sampling location installed as follows:

- The effluent line from the separator shall discharge to a floor sink, or,
- A sample valve shall be placed on the effluent line from the amalgam separator.

Plaster Traps - Dental practices that discharge wastewater containing plaster residuals shall install a plaster trap.

9-02 SAMPLING STRUCTURES

- A. Sampling structures, or other required sampling locations shall be installed immediately downstream of all grease interceptors, sand-oil interceptors, separators, and other pretreatment devices as specified in this Section and in accordance with DWG-40 of the Standard Drawings.
- B. Sampling structures may also be required by CCCSD on a case-by-case basis for the following additional applications:
1. Process waste lines and/or immediately downstream of any pretreatment units (e.g., silver recovery system, pH adjustment system).
 2. Sanitary sewer laterals serving a shell building constructed in an area zoned for light or heavy industrial use.
 3. A business operation classified by CCCSD as a Permitted Industrial User (reference Title 10 of the CCCSD Code). Contact CCCSD's Source Control Section for specific requirements.

9-03 SEWER CONNECTIONS IN OUTDOOR AREAS

A. General Requirements

To avoid dedicating wastewater collection and treatment capacity to handling of clean water, Title 10 of the CCCSD Code prohibits the discharge of unpolluted water, including, but not limited to rainwater and storm water run-off to sanitary sewers. Standards for the connection of outdoor areas to the sanitary sewer are as follows:

1. Any outdoor area with a drain to the sanitary sewer shall be bermed, raised, and/or sloped to prevent the introduction of storm water.

The outdoor area shall be roofed or equipped with a cover to prevent rainwater from entering the sanitary sewer system. Roof leaders shall not discharge to the sanitary sewer.

2. The enclosed outdoor area shall be secured from public access to prevent the illicit dumping of restricted materials to the sanitary sewer. CCCSD will consider waiving this requirement on a case-by-case basis when securing the outdoor area drain from public access is not feasible.
3. CCCSD may consider an alternative positive storm water control method in lieu of a fixed roof or cover for an outdoor area on a case-by-case basis. The business shall provide CCCSD with detailed design drawings, equipment specifications, and operation descriptions, including standard operation and maintenance procedures, for the proposed alternative positive storm water control method. In all cases, CCCSD has the authority to either approve, or disapprove a proposed alternative positive storm water control method.
4. The installation of a positive storm water control method other than a fixed roof/cover or a complete wastewater recycling system may subject the business operation to the monitoring and reporting requirements of an Industrial User Permit, including the payment of permit fees and additional oversight by CCCSD.
5. Area drains shall not discharge to the sanitary sewer. It is recommended that area drains be discharged to landscape and/or on-site drainage areas.

B. Wash Areas

1. Outdoor wash areas shall be adequately sized to capture all of the wastewater generated by the washing operations performed in that area.
2. All sanitary sewer drains in the outdoor wash area shall discharge to an appropriately designed and sized grease, oil, and/or solids removal device as specified by CCCSD.

C. Trash Enclosures

1. All sanitary sewer drains in an outdoor trash enclosure located on property zoned and/or used for food service facilities shall discharge to a grease interceptor or grease trap as specified by CCCSD and as shown on DWG-41 of the Standard Drawings.
2. All sanitary sewer drains in an outdoor trash enclosure located on property zoned for light/heavy industrial use, vehicle service, or used by any facility that may generate wastes containing oil, grease, flammable liquids, or other restricted materials shall discharge to an appropriately designed and sized grease, oil, and/or solids removal device as specified by CCCSD.

D. RV/Trailer Holding Tank Dump Station

1. The installation of a centralized RV/Trailer holding tank dump station at a commercial location may subject the business to the assessment of additional CCCSD Sewer Service Charges and to the monitoring and reporting requirements of a CCCSD Industrial User Permit, including the payment of fees and additional oversight by CCCSD.
2. The RV/Trailer holding tank dump station drain shall be installed per the requirements of DWG-36 of the Standard Drawings and be kept capped at all times unless being used for the disposal of RV/Trailer holding tank waste. No other types of waste shall be discharged to the drain.

E. Outside Utility Equipment Areas

1. All discharges of polluted water from outside utility equipment areas (roof ventilation systems, boiler blowdown, etc) shall be discharged to a raised floor sink or similarly raised floor drain to prohibit the discharge of unpolluted water (rainwater, storm water run-off) to the sanitary sewer.
2. The discharge of air conditioner condensate to the sanitary sewer is prohibited.

9-04 PARKING STRUCTURES

Standards for the connection of parking structures to the sanitary sewer system are as follows:

- A. Drainage from uncovered areas that are exposed to rainwater and/or storm water run-off shall be directed into the storm drainage system. This includes, but is not limited to, trench drains placed at the entrance and/or exit of parking structures.
- B. All interior floor drains and/or catch basins which are plumbed to the sanitary sewer shall be connected to an appropriately designed and sized sand-oil interceptor as specified by CCCSD.
- C. Sand-oil interceptors for parking structures shall be filled with clean water after installation and refilled with clean water after each cleaning for the purpose of minimizing odors.

9-05 SWIMMING POOLS, SPAS AND FOUNTAINS

- A. A swimming pool or spa connected to the public sewer shall be equipped with a two-inch (2") maximum diameter discharge pipe and an approved air gap separation to prevent the backflow of sewage into the swimming pool or piping system.

- B. The draining of water from swimming pools, spas and/or fountains to the sanitary sewer shall only be conducted under a special permit issued by CCCSD. The discharge shall be controlled with a valve and/or the use of an approved temporary connection such as a hose into a sanitary sewer clean-out.
- C. The valve for direct connections shall be kept in the closed position at all times unless a permit is obtained to discharge the water.
- D. The discharge of pool, spa and/or fountain water is restricted to a flow rate of twenty gallons per minute (20 gpm) or the capacity of the sewer line, whichever is less, in order to avoid surcharge at any portion of the sewer system. A flow restrictor or valve shall be installed on the discharge piping of the system to maintain the required flow rate.
- E. Passive overflow drains shall not be connected to the sanitary sewer system, but rather shall be discharged to landscaped areas.
- F. Filter Backwash

All filter backwash media shall be prevented from entering the sanitary sewer system.

- 1. Diatomaceous Earth Filters - Wastewater from the backwash of diatomaceous earth filters shall pass through a solids separation system approved by CCCSD prior to discharge to the sanitary sewer system.
 - 2. Sand Filters - Wastewater from the backwash of sand filters shall pass through a sump or similar device approved by CCCSD to capture any sand prior to the discharge to the sanitary sewer system.
- G. Outdoor Shower Areas
 - 1. Any outdoor shower area with a drain to the sanitary sewer shall be bermed, raised and/or sloped to prevent the introduction of storm water.
 - 2. The outdoor shower area shall be roofed or equipped with a cover to prevent rainwater from entering the sanitary sewer system.

- END OF SECTION -

SECTION 10

PERMITS, CONTRACTOR'S LICENSES, INSURANCE AND OWNER'S SEWER IMPROVEMENT AGREEMENTS

10-01 PERMITS

All sewer work within the boundaries of the Central Contra Costa Sanitary District (CCCSD), except for waste plumbing inside buildings, requires a permit issued by CCCSD. The Contractor or Property Owner shall have a valid CCCSD permit on hand at the jobsite available for review by the Inspector during prosecution of the work. The various types of standard permits issued by CCCSD are as follows:

A. Permit Classifications

1. Contractor's Permits - A Contractor proposing to perform any construction, excavation, repair, rebuilding, alteration or reconstruction of any public or private sewer, or proposing to connect any private sewer to a public sewer shall obtain a CCCSD Contractor's Permit.
2. Property Owner's Permit - Any owner of a property proposing to perform any construction, excavation, repair, rebuilding, alteration or reconstruction of the private side sewer on their property may obtain a CCCSD Property Owner's Permit. All work done under a Property Owner's Permit shall be personally performed by the owner or by his or her direct employees (contractors are not employees). If a Contractor is engaged for any portion of the work, the Contractor shall obtain a CCCSD Contractor's Permit. Property Owners will not be issued permits for sewer work in public streets or roads, or on any public sewer.

B. Sewer Extension Permits

Sewer Extension Permits are required for construction of main and trunk sewers, manholes, rodding inlets, special structures and laterals installed as part of sewer extension jobs.

C. Side Sewer Permits

A CCCSD side sewer permit is required for the following work:

1. Tap and Lateral - For the installation of taps, tees or wyes at the public main sewer and private lateral sewers. Laterals constructed as part of main sewer extension jobs are included in the permit for the main sewer job.

2. Building Connection - For connection of buildings to existing or proposed side sewers.

A building connection permit will not be issued until: 1) the main sewer is completed and accepted by CCCSD; and 2) the building rough plumbing system, including the installation of permanent vents through the roof, has been inspected and signed off by the local building code enforcement agency. Applicable connection fees and charges shall be paid prior to the issuance of a building connection permit.

A building connection for a 4" residential connection may be issued prior to roof completion and rough plumbing if applicant requests and complies with the following requirements:

1. The Owner shall pay all applicable Central Contra Costa Sanitary District (CCCSD) fees and secure CCCSD and City/County permit(s) required for the connection of the building(s).
2. The Contractor shall arrange for inspection of the proposed building connection(s) a minimum of 24 hours prior to performance of the work.
3. The Contractor shall be responsible for the placement of plugs in all manholes downstream of the building connection(s). Plugs may not be removed without approval of the CCCSD Inspector.
4. All rough sewer piping within each building pad shall be capped to prevent debris and rain water from entering the sanitary sewer system. The sewer caps may be removed only to complete the rough plumbing through the roof.
5. The entire sanitary sewer system for this mainline project, including laterals, shall be ball and flushed prior to CCCSD acceptance of the new sanitary sewer main. A second T.V. test and/or air test may also be required by CCCSD inspection at the owner's expense.
6. The Contractor and Owner hereby accept and assume all liability that may arise from this process, including, but not limited to, liability for damage to the sewer work on the job and/or damage to CCCSD facilities.

This does not apply for 6" residential or non-residential connections.

3. Repairs and Alterations - For work on existing side sewers.

Repair and alteration permits include, but are not limited to repairs, alignment modifications, new branch side sewers and cleanout installations.

4. Extension - For extension of an existing side sewer to accommodate site construction prior to the connection of a new building. A Special Approval is required and all applicable connection fees shall be paid prior to issuance of a side sewer extension permit.

D. Miscellaneous Permits

A CCCSD permit is required for the following work:

1. Dye Test - To determine whether buildings on a particular property are connected to the public sewer main.
2. Grease and/or Sand-Oil Interceptor - For construction of outdoor grease interceptor and/or sand-oil interceptors.
3. Trash Enclosure - For connection of a trash enclosure with or without a grease trap to the sanitary sewer system.
4. Air Test/TV Inspection - To determine the condition of existing side sewers.
5. Abandonment/Temporary Cap - To abandon side sewers at the public main or to install a temporary cap on the lateral.
6. Private Pump Systems - For construction of private sanitary sewer pump systems outside of the building envelope.
7. Encroachment Verification - When site improvements are to be constructed near existing CCCSD sewers and/or rights of way.

E. Effective Period of Permits

CCCSD permits are effective for a period of six (6) months from the date of issuance, unless otherwise stated on the permit. Permits may be renewed upon the Contractor's or Owner's written application accompanied by the payment of applicable fees and charges, for up to two (2) additional six (6) month periods.

F. Unpermitted Work

A Contractor or Property Owner who commences sewer work without first obtaining a CCCSD permit as required in this Section and the CCCSD Code will be subject to an administrative fee in addition to all other applicable fees and charges. At the sole discretion of the Inspector, the Contractor or Property Owner may be required to uncover work for inspection and/or conduct television inspection of the work to demonstrate that it meets the requirements of these Specifications. Where work is found to be out of compliance with the requirements of these Specifications, the Contractor or Property Owner shall correct all deficiencies, or shall remove the nonconforming work and replace it with work that complies in all respects with the requirements.

10-02 CONTRACTOR'S LICENSES, EXCAVATION PERMITS AND INSURANCE

All Contractors doing sewer work within the CCCSD service area must be registered with CCCSD and shall be properly and actively licensed in accordance with the provisions of Division 3, Chapter 9, Business and Professional Code, of the State of California as amended. Contractors shall present evidence of licensing to CCCSD upon registration.

A. License Classification

Work on main sewer jobs and private side sewers shall be performed only by Contractors in the following classifications:

- A (General Engineering);
- C-34 (Pipeline); or
- C-42 (Sanitation Systems)

However, a Contractor properly and actively licensed in the C-36 (Plumbing) specialty may work on private side sewers, excluding installation of taps, wyes, or other work on public sewers.

B. Excavation Permit

A Contractor with employees shall have its Cal/OSHA Excavation Permit on file with CCCSD prior to applying for any CCCSD permit where the depth of excavation will be five (5) feet or greater or where soil conditions in the field may pose a hazard of cave-in for shallower excavations.

C. Insurance

Contractors registered with CCCSD shall obtain and maintain workers' compensation insurance as required by California law, and general and automobile liability insurance, as set forth in Title 5 of the CCCSD Code. Neither this section, nor Title 5 of the CCCSD Code, nor any predecessor section is or was intended to create or impose any responsibility upon CCCSD to ensure that the Contractor obtains and maintains this insurance, such responsibility being solely that of the Contractor. CCCSD may, however, investigate a Contractor's insurance coverage at any time. Failure of a Contractor to obtain and maintain required insurance may cause the denial, suspension and/or revocation of permits, at the sole discretion of CCCSD.

D. Encroachment Permits

Whenever performing sewer installations or repair work within a public street or right-of-way, the Contractor shall obtain an encroachment permit from the local public works jurisdiction (County, City or Town), and have a copy of the permit

available at the jobsite for review by the Inspector at all times while performing work.

10-03 OWNER'S SEWER IMPROVEMENT AGREEMENTS

A. Owner's Sewer Improvement Agreement

Prior to the issuance of a CCCSD permit for a main sewer extension job, the Job Owner (Installer) shall submit a properly executed CCCSD standard form "Owner's Sewer Improvement Agreement" in accordance with Section 6 of these Specifications.

B. Project Security Deposit

Prior to the issuance of a CCCSD permit for a main sewer extension job, the Job Owner (Installer) shall post a refundable Project Security Deposit with CCCSD. Acceptable forms of security include any of the following:

1. A cashier's check, payable to CCCSD, in the amount of one hundred percent (100%) of the construction cost for the public portion of the Job. If the security deposit will be used to have CCCSD issue progress payments to the Contractor, the cashier's check shall be in the amount of one hundred ten percent (110%) of the construction cost for the portion of the work for which payments will be made by CCCSD in order to reserve ten percent (10%) of the construction cost for project security during the warranty period. Project payments on any particular job will be made no more frequently than bi-weekly.
2. Two (2) Certificates of Deposit (CDs), payable to CCCSD, the first for ninety percent (90%), and the second for ten percent (10%), of the construction cost. The first CD (90%) should mature upon project completion; the second CD ten percent (10%) should mature one (1) year later, at the end of the warranty period. Interest earned by both CDs shall be payable to the Owner.
3. An irrevocable letter of credit or "set-aside" letter in the amount of one hundred percent (100%) of construction cost from an established financial institution and in a form acceptable to CCCSD. The letter of credit amount may be reduced to ten percent (10%) of the construction cost for the one (1) year warranty period following CCCSD acceptance of the job.
4. A Corporate Surety Bond issued by a surety acceptable to CCCSD and authorized to issue such surety bonds in California, for one hundred percent (100%) of the construction cost of the Job. The CCCSD standard form for an acceptable "Owner's Sewer Improvement Security Bond" is shown in Figure 10-1. The surety bond amount may be reduced to ten percent (10%) of the construction cost for the one (1) year warranty period following CCCSD acceptance of the job.



**Agreement for
Sewer Improvement Security Bond
(Performance, Guarantee and Payment)**

1. OBLIGATION. _____
as Principal, and _____
a corporation organized and existing under the laws of the State of _____ and
authorized to transact surety business in California, as Surety, hereby jointly and severally bind ourselves, our heirs, executors,
and administrators, successors, and assigns to the Central Contra Costa Sanitary District to pay for itself or any assignee under
the below cited contract any and all such sums which may arise in consequence of breach of said contract by Principal, said sums
not to exceed _____ (\$ _____) Dollars.

2. RECITAL OF AGREEMENT. The Principal has contracted with the District to construct, install and complete and warrant
sewers as required by District Job # _____ and by the District Ordinance Code and Specifications. Principal shall cause said
improvement to be completed on or before the expiration date of the issued permit in accordance with accepted construction
practices and in a manner equal or superior to the requirements of the District Ordinance Code and Specifications provided there
under.

3. CONDITION. If the Principal performs all things required of him according to the terms and conditions of said contract and
improvement plans and improvements agreed on by him and the District, then this obligation as to performance labor and material
shall become null and void, immediately after the District's acceptance of the work as complete except that the warranty
guarantee continues for a one-year period after acceptance of the original work or on correction of deficient work during the
warranty period; and this obligation may be reduced to ten (10) percent of the full amount upon acceptance of the original work by
the District; otherwise this obligation remains in full force and effect.

No alteration of said contract or any plans or specifications of said work agreed to by the Principal and District shall relieve any
Surety from liability on this bond; and consent is hereby given to make such alterations without further notice to or consent by
Surety; and the Surety hereby waives the provisions of California Civil Code #2819, and holds itself bound without regard to and
independently of any action against Principal whenever taken and agrees that if District sues on this bond, Surety will pay
reasonable attorney fees fixed by court as costs and included in the judgment.

SIGNED AND SEALED ON ____/____/____

PRINCIPAL:

SURETY:

By _____

Address

City State Zip

Phone

State of California)
County of _____) SS.

(ACKNOWLEDGMENT BY NOTARY)

On _____ the person(s) whose names is/are signed above for Surety and who is/are known to me to be
the Attorney(s)-In-Fact for this Corporate Surety, personally appeared before me and acknowledged to me that ___ he ___ signed
the name of the corporation as Surety and his/hers/their own names(s) as its Attorney(s)-in-Fact.

Notary Public for Said County and State

Figure 10-1 Security Bond

- END OF SECTION -

SECTION 11

CONTROL OF THE WORK

11-01 AUTHORITY OF THE CCCSD INSPECTOR

- A. The Inspector shall decide all questions that arise in the field regarding the quality or acceptability of materials and/or equipment, completed work and/or the interpretation of the plans and/or these Specifications. The Inspector's decision shall be final.
- B. The Inspector may suspend a Contractor's work under a CCCSD permit, completely or in part, for such periods as he/she may deem necessary, due to unsuitable weather, such other conditions as he/she considers unfavorable for the suitable prosecution of the work, or due to the failure on the part of the Contractor to carry out directions given, or to perform any provision of the permit. The Contractor shall immediately comply with the Inspector's order to suspend the work. The work may be resumed when conditions are suitable and the Contractor is willing and able to properly resume work, as determined by the Inspector.
- C. In the event that a suspension of work is ordered as provided above, the Contractor shall do all work necessary to provide for safe, smooth and unobstructed passage for public traffic through the construction zone during the period of the suspension of work, or at the end of each work day.
- D. No decisions rendered, nor directions given by the Inspector shall relieve the Contractor, the Job Owner or the owner's surety of their obligations or responsibilities to diligently prosecute the job, or establish any contingent liability on the part of CCCSD.
- E. Should the Contractor fail to act promptly or diligently in the prosecution of work done under a CCCSD permit, or should the urgency of a particular situation require that repairs or replacement be made before the Contractor can be notified or can respond to notification, CCCSD may make or cause the necessary repairs or replacements to be made or perform the necessary work, and the Contractor shall be charged and shall pay to CCCSD the cost of such work plus the current CCCSD overhead rate to compensate CCCSD for administration of work (CCCSD Code Chapter 5.10).

11-02 PLANS

- A. No changes shall be made in any plan or drawing after it has received favorable "Final Review for Construction" by CCCSD, except with CCCSD's written concurrence.
- B. The Contractor shall keep copies of the CCCSD-stamped final plans for the project, these Specifications and all other governing agency specifications incidental to the work at the jobsite during prosecution of the work, and shall make the copies available to the Inspector upon request. The Plans, these Specifications and required supplementary documents are considered requirements of the work, and the Contractor shall familiarize itself and fully comply with as such requirements.
- C. Submittal of shop drawings and/or other information not included in the Plans is required under various subsections of Section 15 of these Specifications. These submittals may include, but are not limited to schedules, fabrication detail drawings, certifications that materials comply with the specification, evidence of worker's special qualifications, and information regarding proposed alternate materials, methods and/or equipment. The Contractor shall provide the required submittals, and receive favorable review prior to commencing work involving these workers, materials, methods or equipment.
- D. Review of the Contractor's submittals by CCCSD shall not relieve the Contractor of its responsibility for the accuracy of dimensions and details or for completion of permitted work in compliance with these Specifications.

11-03 CONFORMITY WITH THE PLANS AND ALLOWABLE DEVIATIONS

- A. Finished surfaces shall conform to the lines, grades, cross-sections, and dimensions shown on the Plans. Only deviations from the Plans and working drawings as may be required by the constraints of construction and approved in advance by CCCSD will be allowed.
- B. CCCSD reserves the right to order such alterations, deviations, additions to, or deletions from the Plans and Specifications covered by any permit or agreement, as it may determine during the progress of the work to be necessary and advisable for the proper completion or subsequent operation of the improvements being constructed.

11-04 COORDINATION OF PLANS AND SPECIFICATIONS

- A. These Specifications, the Plans, and all required supplementary documents are each an essential part of the permit or agreement, and a

requirement cited in one is as binding as though cited in all. Each component document is intended to be coordinated with the others, and to describe and provide for properly completed improvements.

- B. The requirements of these Specifications shall govern over citations on the Plans, unless deviation from the Specifications is specifically authorized by CCCSD in writing. The permit for work under signed Plans stamped "Final Review for Construction" shall expire three (3) months from the date affixed on the stamp, unless work has begun within that period.

11-05 INTERPRETATION OF PLANS AND SPECIFICATIONS

- A. The Contractor shall request clarification, additional information or direction from CCCSD if it believes that the work to be done is not sufficiently clear, detailed or explained in the Plans and/or these Specifications. Upon receipt of such a request, CCCSD will render a determination as expediently as is practical, and the determination made shall be final.
- B. In the event of a discrepancy between the graphical representation and the words or figures written on a drawing, the words and figures shall be taken as correct.
- C. In the event that a Property Owner, Developer, Job Engineer, Contractor or other person fails to comply with these Specifications, the CCCSD Code, or a specific instruction of the Inspector relative to any work under a CCCSD permit or agreement, CCCSD may suspend or revoke the permit or agreement until such differences or deficiencies are resolved.

11-06 SUPERINTENDENCE

- A. The Contractor, or a representative of the Contractor who is authorized to make field decisions, shall be present at the jobsite at all times when work is in progress. The Inspector will communicate any needed determinations or instructions to the Contractor or its authorized representative. Any determination or instruction given by the Inspector that is not otherwise required by these Specifications or the CCCSD Code to be in writing will, on request of the Contractor, be given or confirmed by CCCSD in writing.
- B. Prior to being issued a CCCSD permit, the Contractor shall submit the names of its authorized representative(s), business address and telephone number(s), as part of the CCCSD Contractor Registration process. Delivery of correspondence or notices to this address by hand

delivery, courier service, express carrier or U.S. Mail shall be deemed sufficient service.

11-07 LINES AND GRADES

- A. When the Contractor requires stakes or marks, it shall notify the Job Engineer of the requirements in advance of starting operations that require such stakes or marks. The Contractor shall request utility marking from U.S.A. prior to staking, and favorable review by the Inspector of stakes in the field is required prior to the commencement of work. If, in the judgment of the Inspector, the stakes or marks suggest that the new work may conflict with existing improvements, the Contractor shall pothole the existing improvements to determine whether redesign of the work is required.
- B. Stakes and marks shall be carefully preserved by the Contractor. If any such stakes and marks necessary to complete construction are destroyed or damaged, the Contractor shall arrange for such stakes and marks to be replaced.
- C. All distances and measurements will be made in a horizontal plane. Grades are given from the top of hubs or nails or other points designated by the Job Engineer.

11-08 EMERGENCY WORK

- A. When a Contractor is contacted by one of its customers for immediate response to clear or repair a blocked line at any time outside of CCCSD regular inspection hours (see below), the work may be done as an “emergency” response only to the extent required to restore sewer service. The Contractor may proceed with emergency work only after leaving a message stating the location and nature of the work required on CCCSD’s Inspection voicemail system. Excavations for repair work shall not be backfilled until favorable CCCSD inspection is received; however, excavations shall be properly protected with four feet (4’) x eight feet (8’) sheets of one and one-half (1-1/2) inch thick plywood in non-traffic areas or with trench plates in traffic areas, to ensure public safety whenever work is not in progress. The Contractor shall apply for a CCCSD permit for the work on the first CCCSD working day following any emergency response, and shall obtain the permit prior to requesting inspection of the work.

11-09 INSPECTION

- A. The Inspector shall have access to the work at all times during construction, and the Contractor shall provide proper and safe facilities for

such access and for inspection. The Inspector shall be furnished with every reasonable facility for ascertaining that the materials and the workmanship are in accordance with the requirements and intentions of the Plans and these Specifications. All work done and all materials furnished shall be subject to inspection. The Contractor shall submit properly authenticated documents or samples of materials demonstrating the Contractor's compliance with the requirements of these Specifications at any time so requested by CCCSD.

- B. In the event that the Inspector determines that any work completed or in-progress does not comply with the requirements of the Plans or these Specifications, or any applicable rules and regulations, the Inspector may order that the noncompliant work be corrected, or removed and replaced, so as to fully comply with the requirements. If the Contractor fails to comply with any order made under the provisions of this article within a reasonable time, CCCSD may have the defective work corrected or removed and replaced at the Contractor's expense.
- C. The Contractor shall call to arrange for CCCSD inspections required by these Specifications a minimum of one (1) business day prior to the commencement of work. No work shall begin prior to scheduling of an inspection. The Contractor's customer or the Property Owner may choose to be present during inspections, including during required pre-permit TV inspections. The Contractor shall notify the Inspector of any changes in work schedule affecting inspections as soon as possible to allow time for rescheduling.
- D. All inspection work performed by CCCSD during hours other than between 7:30 a.m. and 4:00 p.m. on regular working days shall be considered as overtime inspection work. The fees for overtime inspection established by CCCSD shall be charged to and paid by the Contractor. If amounts owed for such services are not paid within thirty (30) days from the date of billing, no permits for additional work will be issued until the amounts owed plus delinquent charges are paid.

11-10 WORKERS

- A. The Contractor shall employ a sufficient number of competent workers or subcontractors to produce the work required. If, in the judgment of the Inspector, an employee of the Contractor or any subcontractor is incompetent, appears to be under the influence of alcohol or illegal drugs, or acts in an unsafe, disorderly, or improper manner, the Contractor shall remove that person from the work immediately upon the receipt of notice from the Inspector. However, nothing contained in this paragraph shall be construed to shift the responsibility for supervision of employees of the Contractor or any subcontractor from the Contractor or subcontractor to

CCCSD, or to require CCCSD to take any action with regard to any employee of the Contractor or subcontractor.

11-11 EQUIPMENT

- A. The Contractor shall provide adequate and suitable equipment (including, but not limited to, Personal Protective Equipment, shoring, trench plates, traffic cones, etc.) needed to produce the quality of work required prior to commencing each day's work and, when ordered by the Inspector, shall remove unsuitable equipment from the work.
- B. Each machine or piece of equipment shall be operated by a person experienced in handling the particular make of machine or piece of equipment in use, at a speed or rate of production not to exceed that recommended by the manufacturer.

11-12 NOTICE TO ADJACENT PROPERTY OWNERS AND RESIDENTS

- A. The Contractor or Job Owner shall provide written notice to property owners and/or residents who may be impacted by main sewer extension or private side sewer work. The notice shall describe the CCCSD-permitted sewer installation or repair work to be done and the tentative schedule for the work. For main sewer extension jobs, this notice shall be made and a copy including a list of addressees shall be provided to CCCSD prior to the final construction plan review submittal. For private side sewer work on property owned by someone other than the Contractor's customer, the notice shall be made at minimum of two (2) working days prior to the beginning of any work.

11-13 PUBLIC CONVENIENCE

- A. The Contractor shall provide for the safe passage of traffic, including emergency response vehicles, through the work during construction if work is located in or affects traffic in any public or private road, right-of-way or access easement. The attention of the Contractor is directed to the encroachment permit requirements of Caltrans and/or Contra Costa County and/or cities within the County with regard to the Contractor's responsibility for providing for the convenience of the public in connection with its operations.
- B. The Contractor shall conduct its operations so as to pose the least possible obstruction and inconvenience to public traffic, and it shall have under construction no greater length or amount of work than it can prosecute properly with due regard to the rights and convenience of the public. Attention is directed to Section 15.02205, Part 3 - 3.3.D. regarding maximum length of open pipe trench. Where existing roads are not

available for use as detours, all traffic shall be permitted to pass through the work with as little inconvenience and delay as possible. Spillage resulting from hauling operations along or across the traveled way shall be removed immediately.

- C. Convenience of abutting Property Owners along the road or sewer shall be provided for as far as practicable. Convenient access to driveways, houses and buildings along the line of the work shall be maintained and temporary approaches to crossings or intersecting highways shall be provided and kept in good condition. It is the Contractor's responsibility to provide adequate prior notice of start of construction to owners affected by such construction.
- D. Right is reserved to cities, local and county authorities, and to water, gas, telephone, cable and electric power transmission utilities to enter upon any public highway, road or right-of-way for the purpose of making repairs and changes that have become necessary by the reason of the sewer installation.
- E. All fences subject to interference shall be maintained by the Contractor until the work is completed, at which time they shall be restored to the condition existing prior to starting the work.
- F. Excavation and backfill shall be conducted in such a manner as to provide a reasonably smooth and even surface satisfactory for use by public traffic at all times. When possible, sewer construction shall be conducted on one-half the width of the traveled way at a time and that portion of the traveled way being used by public traffic shall be kept open and unobstructed until the opposite side of the traveled way is completely ready for use by traffic.
- G. While trenching and paving operations are under way, Contractor shall ensure that traffic can use the shoulders and the side of the roadbed opposite the one under construction. When sufficient width is available, a passageway wide enough to accommodate two (2) lanes of traffic shall be kept open at all times at locations where construction operations are in active progress.
- H. Bridges designed by a Registered Professional Engineer and approved by CCCSD shall be installed and maintained across the trench at all crosswalks, intersections, and at such other points where, in the opinion of the Inspector, traffic conditions make it advisable for the convenience of public pedestrian traffic.
- I. In order to expedite the passage of public traffic through or around the work and where ordered by the State, municipal, local, and/or county

authorities having jurisdiction and/or the Inspector, the Contractor shall install signs, lights, flares, barricades, and shall furnish a pilot car and driver and other facilities for the sole convenience and direction of public traffic. Whenever the Contractor's operations create a hazardous condition or where directed by the State, municipal, local, and/or county authorities having jurisdiction, the Contractor shall provide and station competent flaggers whose sole duties shall consist of directing the movement of public traffic through or around the work.

- J. In addition to the requirements specified for furnishing facilities and flaggers to expedite the passage of public traffic through or around the work, the Contractor shall furnish and erect, within or adjacent to the limits of the work, such warning and directional signs as may be required by the previously named agencies having jurisdiction.

11-14 MAINTENANCE OF ACCESS AND DETOURS

- A. The Contractor shall maintain an adequate number of trench plates on the jobsite to effect immediate access for emergency vehicles and reasonable access for property owners affected by the work. If required, the Contractor shall construct, maintain, and remove detours to direct both pedestrian and vehicular traffic through or around the jobsite, as shown on the Plans, or as directed by the Inspector or other public agency having jurisdiction.
- B. At the end of each work day, the Contractor shall ensure that excavations are properly secured, shored and covered with trench plates so as to provide for public safety and unobstructed safe access for vehicular and pedestrian traffic
- C. Where the Contractor's operations are not being satisfactorily controlled or maintained by the Contractor for safe passage of public traffic, the Inspector and/or other public agencies having jurisdiction may order the Contractor to correct any unsafe conditions, and the Contractor shall comply with such orders.
- D. The failure or refusal of the Contractor to properly provide emergency or Property Owner access, or to employ, control or maintain detours shall be sufficient cause for suspension of the work until proper access and/or detours are provided by the Contractor.

11-15 CLEANLINESS OF JOBSITE

- A. The Contractor shall keep the jobsite reasonably clean and orderly and shall sweep streets affected by the work daily. During and upon completion of work, the Contractor shall promptly remove unused tools and equipment, surplus materials, rubbish, debris, and dust and shall

leave areas affected by work in a neat and clean condition. Adjacent structures shall be cleaned of dust, dirt, and debris resulting from demolition or construction operations, as directed by CCCSD or other local jurisdictions, and adjacent areas shall be returned to the condition existing prior to start of work.

11-16 WATER QUALITY PROTECTION

- A. The Contractor shall employ best management practices for control of erosion and jobsite runoff, pollution prevention and protection of water quality as specified in the CCCSD Field Management Practices for Protection of Water Quality, latest edition.

11-17 FINAL INSPECTION

- A. When the work covered by a CCCSD permit or agreement has been completed, including correction of any deficiencies, the Inspector will, upon request by the Contractor, make the final inspection of the work.
- B. Final inspections for private developments such as subdivisions, tracts, townhouses, condominiums and commercial centers will be made only after the installations of all other utilities and permanent structural site improvements such as roadway surfacing, curbs, gutters, sidewalks, etc.
- C. Before final inspection of the work, as provided above, the Contractor shall clean all roadways, rights of way, and all ground used in connection with the work, of all rubbish, excess materials, falsework, temporary structures, and equipment, and all parts of the work shall be left in a neat and presentable condition. Nothing herein, however, shall require the Contractor to remove warning and directional signs prior to acceptance by CCCSD, but the Contractor must do so immediately after acceptance.

11-18 ACCEPTANCE AND WARRANTY OF WORK

- A. Acceptance of the work will be made in writing by CCCSD only after the following requirements have been met:
 - 1. The final inspection has been made in accordance with Section 11-17 of these Specifications;
 - 2. The Job Engineer, if applicable, has been notified in writing by the Contractor that the work has been completed; and
 - 3. Manufacturer's guarantees, instructions, and parts lists have been delivered to CCCSD.
- B. Immediately upon acceptance of the work by CCCSD, a one (1) year warranty period on all work shall commence. During the one (1) year

warranty period, the District at its sole discretion may perform internal closed circuit television inspections or make any other inspections needed to determine the condition of the main and/or trunk sewers installed as part of the Job.

- C. Any defective materials, faulty workmanship, and/or deficiencies which are discovered within the warranty period shall be corrected and/or replaced by the Contractor. The warranty period shall be extended for an additional one (1) year after acceptance of such correction or replacement.
- D. The one (1) year warranty shall be in addition to and not in limitation of any other guarantee of marketability or warranty/guarantee required by law.

- END OF SECTION -

SECTION 12

CONTROL OF MATERIAL

12-01 CONTRACTOR FURNISHED MATERIALS

The Contractor shall furnish all materials required to complete the work. The Contractor shall ensure that materials needed on a particular day are on the jobsite prior to commencing that day's work.

12-02 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

Only materials listed on the current Approved Materials List shall be used in the work. Alternative materials conforming to the requirements of these Specifications and favorably reviewed by CCCSD will be added to the Approved Materials List and may be used in the work. All materials proposed for use may be inspected or tested by CCCSD at any time during their preparation and use. If it is found that sources of supply which have been approved do not furnish a uniform product, or if the product from any source proves unacceptable at any time, the Contractor shall furnish material from other sources on the current Approved Materials List. No material, which after approval has in any way become unfit for use, shall be used in the work.

12-03 LOCAL MATERIALS

The Contractor shall satisfy itself as to the quantity of acceptable material which may be produced at or obtained from local sources.

12-04 ACQUISITION OF MATERIALS

The Contractor shall have on hand, at the time construction starts on any section of the work, all materials necessary to complete that particular section of the work in a reasonable time period.

12-05 STORAGE OF MATERIALS

Materials shall be stored in an approved staging area so as to ensure the preservation of their quality and fitness for the work. When determined to be necessary by the Inspector, materials shall be covered and/or placed on wooden platforms or other hard, clean surfaces and not on the ground. Stored materials shall be located so as to facilitate prompt inspection.

12-06 DEFECTIVE MATERIALS

Materials that do not conform to the requirements of these Specifications shall be deemed defective. Such defective materials, whether in place or not, shall be rejected and removed immediately from the site of the work, unless otherwise permitted by the Inspector. CCCSD may remove and replace defective material should the Contractor fail to comply promptly with any order made under the provisions of this paragraph. Any cost incurred by CCCSD will be charged to the Contractor and/or owners.

12-07 TRADE NAMES AND ALTERNATIVES

For convenience, certain equipment or materials may be designated on the Plans in these Specifications, or in the Approved Materials List by trade name or manufacturer citing model and/or part numbers. The use of alternative equipment and/or materials that are of equal quality and of the required characteristics for the purpose intended may be permitted in accordance with the following requirements:

- A. All information necessary for evaluation of proposed alternative equipment or materials shall be submitted on the CCCSD-standard form a minimum of thirty (30) days prior to the date that the equipment or materials must be ordered by the Contractor to ensure that there is no unacceptable delay in the work. This information shall include: the names of the manufacturer and supplier of the item, the manufacturer's model or part number, trade name or other item identification, the manufacturer's published application, installation and/or operation manuals and any guarantees, warranties, catalog cuts, data sheets, and certification of compliance with standards testing agency specifications or other test procedures used for product quality assurance.
- B. Within thirty (30) days of its receipt of a complete request for consideration of proposed alternative equipment and/or materials, CCCSD will render a determination regarding the suitability of the proposed alternative for addition to the Approved Materials List, and its determination shall be final.

If the Contractor does not submit timely requests for consideration of proposed alternative equipment and/or materials, it shall use only equipment and/or materials that are specifically named in these Specifications, shown on the Plans or listed in the current Approved Materials List in the work.

12-08 TESTING MATERIALS

- A. Whenever reference is made in these Specifications to a test designation of the American Society for Testing and Materials (ASTM), or any other

recognized national testing or standards organization, it is to be understood that the most current test method in use on the date of these Specifications shall prevail.

- B. Whenever abbreviations are used in these Specifications or on the Plans in connection with a reference to material or work requirements or test methods, such abbreviations shall be construed as set forth under Section 2 of these Specifications.
- C. When requested by the Inspector, the Contractor shall furnish samples of materials proposed for use in the work. Materials may be tested at any time during the progress of the work. Material found to be defective shall be rejected.

12-09 INSPECTION AT SOURCE OF SUPPLY

CCCSD may inspect equipment and/or materials proposed for use in the work at the source of supply or manufacture. Representatives of CCCSD shall be provided reasonable access to such parts of production facilities that are related to the manufacture or production of equipment and/or materials proposed for use in the work. CCCSD assumes no obligation to inspect materials at the source of supply.

12-10 CERTIFICATES OF COMPLIANCE

- A. CCCSD may permit the use of equipment and/or materials without sampling and testing if the equipment and/or materials are accompanied by a Certificate of Compliance stating that the equipment and/or materials comply in all respects with the requirements of these Specifications. The certificate shall be signed by an authorized representative of the manufacturer of the equipment and/or materials.
- B. All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements of the Plans and Specifications and any such material not conforming to such requirements will be subject to rejection whether in place or not.

- END OF SECTION -

SECTION 13

**** NOT USED ****

- END OF SECTION -

SECTION 14

**** NOT USED ****

- END OF SECTION -

TECHNICAL SPECIFICATIONS

SECTION 15.01100

SAFETY

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall be responsible for and shall have the duty to ensure safety on the jobsite and all areas affected by job-related activities. The Contractor and its subcontractors shall comply with all applicable federal, state and local safety rules, regulations, requirements and orders in the performance of the work. In addition, the Contractor and its subcontractors shall comply with all requirements and procedures of this Section. The Contractor shall take any additional precautions it deems necessary to prevent injury to people (employees, subcontractors and the public) and damage to property (both public and private).
- B. The Contractor shall be responsible for informing its employees, subcontractors, and suppliers of the safety requirements on its jobsite, and shall enforce these requirements. The Contractor shall not allow employees or subcontractors to begin work on jobs under CCCSD permits without a safety orientation specific to the potential hazards of the job.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 11 - Control of the Work
- B. Section 15.02160 - Shoring, Excavation Support and Protective Systems

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. State of California Department of Transportation: “Manual of Traffic Controls for Construction and Maintenance Work Zones” (latest edition)
- B. Cal/OSHA Construction Safety Orders
- C. California Code of Regulations General Industry Safety Orders

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 GENERAL

- A. Use of alcoholic beverages and/or illegal drugs shall be strictly prohibited on the jobsite. Workers who use prescription and non-prescription drugs that may interfere with their ability to work safely shall be prohibited from the jobsite.
- B. The Contractor shall maintain all portions of the jobsite in a safe, neat, clean and sanitary condition at all times.
- C. Toilets shall be furnished by the Contractor for use of its employees, and their use shall be strictly enforced.

3.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

- A. The Contractor shall be responsible for providing and assuring the use of PPE including but not limited to hard hats, eye and face protection, hearing protection, respirators and foot protection.
- B. The Contractor's personnel shall wear hard hats and appropriate foot protection at all times while on the jobsite, except in offices or vehicles.
- C. Proper eye and/or face protection shall be worn whenever there is a risk of exposure to airborne particulates, liquids, or compressed gases.

3.3 POWER TOOLS

- A. Electric powered hand tools shall be protected by approved ground fault circuit interrupters, or shall be double insulated.
- B. Fixed electric power tools such as table saws, pipe threaders, etc. shall be properly wired and grounded.
- C. Pneumatically driven power tools shall be disconnected from air lines when not in use. Air lines shall be properly clipped together.
- D. Powder actuated tools shall be used only by licensed personnel who have a valid license in their possession.

3.4 TRAFFIC CONTROL

- A. The Contractor shall provide for the traffic safety of its workers, CCCSD personnel and the public during construction. Traffic shall be permitted to pass through the work zone safely and with minimum delay.
- B. The Contractor shall comply with the State of California Department of Transportation's "Manual of Temporary Traffic Controls for Construction and Maintenance Work Zones" (latest edition), and any applicable local agency encroachment permit requirements when work is done in streets, roadways, or similar thoroughfares subject to vehicular traffic. No work may be performed in any public right-of-way without first obtaining an encroachment permit from the agency having local jurisdiction (i.e., local traffic engineering, public works department, and/or police).
- C. When a job requires that work be done in streets or roads, the Contractor shall submit a detailed traffic safety plan for rerouting and/or restricting traffic to CCCSD for review and to the local agency having jurisdiction for approval before any work is started. The traffic plan shall show locations of signs, flaggers, traffic control devices and barriers relative to the working area. Flaggers shall be properly trained as required by Cal/OSHA.
- D. If the Contractor needs to employ detours, other traffic rerouting or restrictions to facilitate its work, it shall acquire a written permit from the state local agency having jurisdiction. No detours, traffic restrictions or reroutings shall be initiated prior to the Inspector's receipt of a copy of the permit and compliance by the Contractor with all permit conditions.
- E. Contractors doing work in public streets or public right-of-ways shall:
 - 1. Obtain all necessary permits.
 - 2. Provide timely notification to all affected agencies including:
 - a) Police
 - b) Fire
 - c) Public Works
 - d) Bus and Transit
 - e) Local Hospitals
 - f) Postal Service
 - g) Schools

- h) Garbage Service
- 3. Coordinate the work with all affected agencies.
- 4. Provide timely notice to occupants of abutting properties and local residents of access limitations made necessary by the work.
- 5. Install and maintain required traffic control devices.
- 6. Provide trained and appropriately equipped flag persons when required.
- 7. Schedule and expedite the work to cause the least inconvenience to the public.
- 8. Provide adequate safeguards for workers, CCCSD personnel and the general public.
- 9. Assure that employees working in or adjacent to a traveled roadway wear vests or jackets of an approved color. For night work, the vests or jackets shall be affixed with approved reflecting stripes.
- 10. Regularly inspect the jobsite to ensure that all traffic control devices are in place and operate as intended at all times.
- 11. Remove traffic control devices when they are no longer needed.

3.5 TRENCHING/EXCAVATIONS

The Contractor shall comply with the requirements of Section 15.02160 - Shoring, Excavation Support and Protective Systems, whenever any excavation or trenching work is done.

3.6 FIRST AID

The Contractor shall provide first aid and medical treatment for its employees and comply with the first aid requirements of the Cal/OSHA Construction Safety Orders.

3.7 FIRE PREVENTION

- A. The Contractor shall follow the requirements in California Code of Regulations, Title 8, Construction Safety Orders, Article 36 and General Industry Safety Orders, Article 88.
- B. When work is being performed that generates sparks or open flame, the Contractor shall provide an adequate number of fire extinguishers of the appropriate types at the work site. All employees shall be trained to use fire extinguishers.

3.8 CONFINED SPACE ENTRY

- A. The Contractor shall comply with the provisions of California Code of Regulations General Industry Safety Orders, Title 8, Chapter 4, Subchapter 7, Group 106, Article 108 for confined spaces. In addition, the Contractor shall comply with the requirements contained herein.
- B. The following paragraphs contain minimum requirements for project work. CCCSD or the Contractor may impose stricter requirements dictated by specific conditions. A written copy of the Contractor's confined space operating and rescue procedures shall be kept at the site and be available for review by the CCCSD representative at all times. The Contractor shall be responsible for ensuring that only properly trained employees perform confined space work.
- C. Scheduling

The Contractor shall schedule any confined space entry at least one (1) working day prior to the planned entry and at that time, shall submit a plan for the entry including the exact location of the space to be entered, the nearest cross street, exact house or business address, CCCSD grid coordinate, or site map, and a list of the Contractor's personnel that will be working on the confined space entry. If there is any change in the plan prior to the entry, the Contractor shall provide the updated information to the Inspector before the actual entry takes place.

- D. Communications
 - 1. The Contractor shall notify the Inspector and ensure that communication devices are functioning properly immediately prior to the actual entry. Generally, cellular phones are the only approved method of emergency communication. The Contractor shall note that 911 may not be readily accessible by cellular phones in certain areas of CCCSD. The Contractor shall verify and confirm

that phone contact with emergency responders is accessible before the confined space entry, and shall establish an alternative method of communication if necessary to ensure the safety of its personnel.

2. A fully charged cellular phone with a back-up battery or vehicle adaptor shall be available prior to the entry. The phone shall be positioned immediately adjacent to the point of entry so that emergency assistance can be summoned directly. If this equipment is not available, no entry into the space shall be made. If the cellular phone becomes inoperative during a confined space entry, the entry shall be terminated and rescheduled. This practice does not, however, relieve the Contractor of his/her responsibility to immediately notify the Inspector of any unusual occurrence at the confined space entry site.

E. CCCSD Right to Cancel

CCCSD may deny a planned confined space entry or cancel an in-progress confined space entry if conditions (e.g., noncompliance with procedures, inclement weather, unacceptable interruptions to operating systems, etc.) so dictate.

F. Pre-entry Procedures

1. Entry Permit: The Contractor may submit its own confined space entry permit form for approval, or may use the CCCSD's form. The Contractor shall provide the Inspector with a complete entry permit form at least one (1) working day prior to commencing a confined space entry. Immediately prior to the confined space entry, the form shall be signed by the Contractor and the Inspector. The Confined Space Entry Permit shall be kept at the job-site, and shall be returned to the Inspector when the confined space entry has been completed.
2. Blocking or Plugging Sewers: The Contractor shall obtain the Inspector's permission prior to blocking or plugging any sewers.
3. Gas Detection Meters: Gas detection meters shall be acceptable to the CCCSD representative and shall have sensing elements capable of detecting and monitoring flammable gas, vapor or mists; oxygen; hydrogen sulfide; and carbon monoxide. Physical properties to be monitored include:
 - flammable gas, vapor, or mists lower flammable limit (L.F.L.) - (10 percent L.E.L. maximum)
 - oxygen - (19.5 percent minimum, 23.5 percent maximum)

- hydrogen sulfide concentration - (10 ppm maximum)
- carbon monoxide concentration - (25 ppm maximum)

Although flammables, hydrogen sulfide, oxygen deficiency, and carbon monoxide are of primary concern, other gas detection equipment may be required if other contaminants are suspected.

Meters shall have digital readout displays for the sensing elements. Alarms shall be both audio and visual. Meters shall have lights or other visual means of warning of sensor failure or when batteries need recharging. The Contractor shall calibrate the gas detection equipment according to manufacturer's specifications. Equipment shall provide a means for remote sensing.

4. Testing: The Contractor shall test the air with properly calibrated and maintained gas detection equipment. The Contractor shall check gas detection equipment daily for proper operation including verifying that the equipment is electrically functional and has been tested with the calibration gas. The Contractor shall make a written record of the daily maintenance check. The Contractor shall record pre-entry air monitoring results on the permit and shall continue to record air monitoring results on the permit at intervals not to exceed fifteen (15) minutes.
5. Retrieval Systems (Side Entry): Each Contractor's employees working in a confined space where entry is made through a side opening such as a pipeline or tunnel shall wear a safety harness with line attached which meets the requirements of Cal/OSHA.
6. Retrieval Systems (Vertical Entry): Each Contractor's employee working in a confined space where entry must be made through a top opening shall wear a safety harness with line attached. The harness and line shall meet the requirements of Cal/OSHA. A hoisting device such as a tripod and winch that meets the requirements of Cal/OSHA shall be provided for lowering and lifting employees out of the space.
7. Equipment and Training: Prior to commencing any confined space entry, the Contractor shall provide workers associated with confined space entries with the appropriate equipment and adequate training. Rescue and emergency personnel shall be CPR/First Air trained and respirator qualified. Attendance records of training sessions shall be maintained by the Contractor. These records shall be available to CCCSD upon request.

8. Non-permit Confined Spaces: Certain projects may include work on existing manholes where complete bypassing is used and sewer inlets and outlets are plugged, newly constructed sanitary sewers, or newly constructed manholes where existing sewers have not been broken into and no coatings are being applied. If the Contractor complies with the following minimum requirements, these newly constructed sanitary sewers and manholes will be considered non-permitted confined spaces and the following procedures shall be employed:
 - a. The atmosphere's air quality in the manhole or sewer shall be initially checked prior to entry using an acceptable gas detection meter to ensure that a safe atmosphere exists.
 - b. The air quality in the manhole or sewer shall be continuously monitored using gas detection meters with readings on the meter being regularly monitored at intervals not to exceed fifteen (15) minutes.
 - c. Continuous mechanical ventilation shall be provided into manholes or sewers throughout the duration of the entry.

9. Minimum Number of Workers Required:
 - a. **Entry Permit**: The Contractor shall assign a minimum of three (3) workers to Confined Space work where an Entry Permit is required: at least one (1) worker to enter and work in the Confined Space at least one (1) worker to continually observe and supervise the work from outside the space; and at least one (1) worker assigned to provide the required continuous communications duties.
 - b. **Non-Permit**: A minimum of two (2) workers shall be assigned to work in Non-Permit Confined Spaces: at least one (1) worker to enter and work in the Non-Permit Confined Space; and at least one (1) worker to continually observe, supervise the work and provide the required continuous communications duties from outside the space.

- END OF SECTION -

SECTION 15.01200

WATER QUALITY PROTECTION

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall:

- A. Maintain all portions of the jobsite in a safe, neat, clean and sanitary condition at all times.
- B. Not impair the work of the operations of existing utilities (including storm drains and channels).
- C. Implement controls to prevent the discharge of sediment and pollutants from various sources to waterways.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 11 – Control of the Work
- B. Section 15.02140 – Excavation Dewatering
- C. Section 15.02205 – Excavation, Bedding and Backfill
- D. Section 15.02270 – Erosion Control (VEGETATIVE)

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Field Management Practices for Water Quality Protection – Sewer and Utility Improvement Projects (CCCSD).
- B. California State Water Resources Control Board (SWRCB) and California Regional Water Quality Control Board – San Francisco Bay Region (RWQCB).

PART 2 – PRODUCTS

2.1 EROSION CONTROL

- A. Stabilizing Materials
 - 1. Vegetable fibers (straw, hay)

2. Wood bark chips
3. Hydraulic mulches made from wood or recycled fiber
4. Bonded fiber matrices
5. Geotextile blankets (combinations of straw and/or coconut fiber in 6'x50' rolls)

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. Due to the ability of natural ground cover to filter sediment and pollutants and regulate the volume of runoff from land surfaces to adjacent storm drains and/or streams, land disturbance should be minimized to the extent practical.
- C. The Contractor shall follow all applicable federal, state, and local regulations for disposing of contaminated storm water, groundwater and contaminated soils resulting from or discovered during excavation.

3.2 DRILLING (TUNNELING) OPERATIONS

- A. Regardless of whether construction activity occurs in wet or dry weather, the Contractor shall implement controls for the large quantities of water encountered in dewatering and used in microtunneling operations to reduce sediment and associated pollutants transported by splash, wind and vehicle tracking.
- B. Slurry from drilling and microtunneling operations which contain additives (such as Bentonite or Polymer solution) is unsuitable for discharge from the site. The wastewater shall be treated through a liquid/solid separation process and the clarified effluent recycled back to the microtunneling operation.
- C. All excess slurry liquid from the microtunneling liquid/solid separation process tank shall be discharged into a three (3)-compartment Baker Tank prior to off-hauling by a tank truck for proper disposal. An overflow line

from the separation process tank and from the Baker Tank shall be piped to the jacking pit to prevent overflow to the ground surface. Dewatered solids may be required to be managed as regulated waste and hauled to a designated disposal site.

3.3 STOCKPILING EXCAVATED MATERIALS

- A. Regardless of wet or dry weather season, stockpiles of excavated materials shall be contained in bermed areas and covered with tarps or erosion control blankets to prevent wind or splash erosion and/or runoff.
- B. Soils which are not contaminated shall be contained with a berm of sand/gravel bags, silt fencing or staked-in fiber roll(s) provided that they are placed a minimum of two (2) feet from the base of the stockpiled materials.
- C. The Contractor shall immediately cease any and all work at the location upon the discovery of contaminated soil or materials.
- D. Stockpiled soils shall be protected from rain infiltration, erosion and runoff. Contaminated soils shall be contained to prevent contact with runoff by placing the pile in a debris box or on top of plastic and covering it with roofing, tarps or erosion control blankets.
- E. If flows come in contact with contaminated soils, that water shall be considered as a regulated waste and managed as such. In such cases, the Contractor shall provide for disposal in a manner acceptable to the San Francisco Bay RWQCB.

3.4 DEWATERING

- A. Dewatering operations shall be managed to prevent injury to the public health and private property. The Contractor shall dewater the trench and provide a dry construction site. Discharge of any material with the potential to degrade water quality or adversely impact or threaten fish or wildlife is prohibited. In general, only clear, uncontaminated water may be discharged from a project to a storm drain, waterway or sanitary sewer.
- B. Discharging sediment-laden water from a dewatering site into any storm drain, waterway or sanitary sewer without proper settling and/or filtration is prohibited. As such, proper dewatering procedures as specified in Section 15.02140 – Excavation Dewatering shall be used before construction begins.

- C. For fine particles such as clay colloidal suspensions, a more aggressive dewatering strategy including secondary filtration shall be necessary.
- D. If work is conducted within an area of known groundwater contamination or if contamination is found, water from dewatering operations shall be tested prior to discharge. If the water quality meets RWQCB standards and is approved by Engineer, it may be discharged to a storm drain or creek. If not, the water shall be hauled off site for proper disposal.
- E. Dewatering facilities shall be inspected by the Contractor daily during operation and maintained, repaired or replaced once sediment build-up decreases their efficiency. The Contractor shall remove sediment and pollutants from dewatering flows prior to discharge into storm drains or drainage channels. If the dewatering water becomes polluted, the water shall not be discharged to storm drains or streams.

3.5 RESTABILIZATION

- A. The Contractor shall cover exposed soils with temporary pavement, final pavement, gravel, topsoil or hydromulch/seed as soon as backfilling is complete to prevent erosion. Backfill shall be furnished and installed in conformance with the requirements set forth in Section 15.02205 – Excavation, Bedding and Backfill.
- B. Disturbed soils shall be stabilized by repaving. A temporary pavement, known as a “cut-back”, shall be placed over exposed soils to allow traffic to resume. Cut-back is made from asphalt which remains pliable in most situations but may leach oil when in contact with water. The use of cut-back shall be minimized during the rainy season. Cut-back pavement shall be replaced by final pavement to match existing pavement sections as soon as possible.
- C. Disturbed soils shall be stabilized using one of the following controls unless specified otherwise: hydroseeding, erosion control blankets, or mulch (straw/wood chips/bark). Disturbed areas shall be completely covered.

3.6 EROSION CONTROL

- A. Disturbed soils shall be temporarily or permanently stabilized and protected against erosion as necessary dependent on slope steepness, accessibility, weather conditions and desired longevity as follows, unless otherwise specified. Erosion control materials shall be installed in

conformance with the requirement set forth in Section 15.02270 – Erosion Control (VEGETATIVE) and in the following manner:

1. Apply seed and fertilizer to the bare soil (optional)
2. Apply loose hay or straw (preferred) over the top of the seed at a rate of four thousand five hundred (4,500) kg/ha (2 tons/ac) either by machine or by hand distribution until soil is completely covered
3. Anchor the mulch in place by using a tackifier (100 to 300 lbs/acre) such as garden sprayed glue, netting, or crimp it into the soil mechanically (Note: Crimping requires wet soils).

3.7 EROSION CONTROL BLANKETS AND GEOTEXTILES

- A. Blankets are recommended to protect slopes steeper than 2:1, disturbed areas in sensitive areas (such as streams, wetlands), and in channels with flow velocities no greater than 0.6 m/s.
- B. Blankets shall be installed according to manufacturer's recommendations, generally as follows:
 1. Begin at the top of the slope and anchor the blanket in a six (6) inch deep by six (6) inch wide trench.
 2. Backfill trench and tamp earth firmly.
 3. Unroll blanket down slope in the direction of water flow, not horizontally.
 4. Lay blankets loosely to maintain direct contact with the soil. Do not stretch.
 5. If more than one blanket is required, overlap the edges of adjacent parallel rolls fifty (50) mm (2 in) to seventy-five (75) mm (3 in) and staple every one (1) m (3 ft).
 6. Staple blankets as specified.
- C. The Contractor shall inspect blankets after installation and before and during significant rain events. Failures shall be repaired immediately. If washout, mat undermining or breakages occur, the Contractor shall determine the source of failures, correct it and repair damage to the slope or channel (rills, gullies etc.) before re-installing and re-anchoring blankets.
- D. Plastic sheeting does not decrease runoff and, as such, shall be limited to covering stock piles or very small graded areas as a temporary measure

and for only short periods of time. Plastic sheeting shall be disposed of at a landfill.

3.8 INLET PROTECTION AND ENERGY DISSIPATION

- A. To maintain the function of the storm drain, storm drain inlet grates shall not be covered with filter fabric or with solid barriers, such as metal inlet covers. Storm drains shall be protected using temporary sediment control and energy dissipation practices, as allowed by local encroachment permit requirements, constructed along the flow path and around storm drains to improve the quality of water being discharged to inlets or catch basins. Inlet protection and energy dissipation devices shall be removed when no longer required. The Contractor shall be cautious when utilizing any device which may result in a public hazard.
- B. To be effective, controls shall slow water, pond sediment-laden runoff, and increase settling time. Ponding shall not encroach into highway traffic or onto eroded surfaces and/or slopes.
- C. If high flow conditions are expected, the Contractor shall stabilize slopes and treat disturbed areas with erosion controls (such as geotextile blankets, fiber rolls, mulch), in addition to providing inlet protection.
- D. The Contractor shall provide frequent maintenance of inlet protection devices to minimize short-circuiting and to remove silt deposits and buildup. Sediment shall be collected and usually can be disposed of on site. Excess sediment, which could become re-suspended in a rain event, shall be removed immediately and disposed of off site.

3.9 INLET PROTECTION – SAND/GRAVEL BAG BARRIERS

- A. Gravel bag barriers are applicable when heavy rains are expected, when construction is conducted in wet weather, and when the drain inlet is the lowest point for discharge.
- B. For drainage areas larger than one(1) acre, runoff shall be routed to a sediment-trapping device designed for larger flows.
- C. Inlet protection shall be used only when ponding will not encroach into traffic lanes or onto erodible surfaces or slopes. The Contractor shall use traffic barricades to maintain the integrity of inlet protection.
- D. Frequent Contractor maintenance shall be provided to remove silt deposits and buildup and to minimize short-circuiting and overtopping.

3.10 SEDIMENT CONTROL/ENERGY DISSIPATION

- A. Controls to divert flow, slow flow velocity, and pond and filter runoff shall be implemented in flow areas.
- B. Every attempt should be made to stabilize disturbed soils at the source. If sediment or polluted water is making its way into the drain inlet, the Contractor shall locate the source and contain it using appropriate controls.
- C. A check dam constructed of sand or gravel bags will slow flow velocity, pond water and allow sediment to settle. Check dams are appropriate in small open channels draining ten (10) acres or less.
- D. The Contractor shall maintain check dams by removing trapped sediment to prevent its re-suspension in subsequent storms. The Contractor shall inspect check dams after significant rain events and replace loosed materials (rocks, gravel bags) as necessary.

3.11 FIBER ROLL DIKES

- A. Fiber rolls shall be entrenched and anchored according to the following installation specifications:
 - 1. Fiber rolls may be used for small areas or short slopes (3:1 or flatter) with low surface flows not to exceed one (1) cfs:
 - a) Along the face of exposed and erodible slopes to shorten slope length.
 - b) At grade breaks where slopes transition to a steeper slope.
 - c) In drainage swales to slow flows.
 - d) Along stream banks to assist stabilization and re-vegetation (wattles favorable for plant establishment).
 - e) Behind sidewalks or curbs.
- B. Contractor shall inspect and maintain fiber rolls to maintain performance. Split, torn, unraveling or slumping rolls shall be repaired or replaced as necessary.

3.12 SILT FENCING

- A. Silt fencing may be used along the perimeter of the site, along (not across) streams and channels, and around temporary stockpiles. Silt fence material shall be entrenched a minimum of four (4) inch to six (6) inch. The Contractor shall not anchor silt fencing without first entrenching it.
- B. Use of a silt fence shall be limited to locations suitable for temporary ponding or deposition of sediment. Silt fences shall not be used to divert flow and shall be placed along the contour.
- C. Silt fencing shall be routinely inspected by the Contractor, and all undercutting, split, torn or slumping material immediately repaired. The Contractor shall remove silt fencing when no longer necessary for sediment control.

3.13 STABILIZED CONSTRUCTION ENTRANCE

- A. At an unpaved site (for example: an unpaved microtunneling or pump station site or contractor staging area), the point of ingress/egress shall be stabilized to minimize the tracking of mud and dirt onto public roads by construction vehicles according to the following specifications:
 - 1. Design the entrance to support the heaviest vehicles which will use it.
 - 2. Grade the entrance to prevent runoff from the construction site.
 - 3. The rock egress pad shall be twenty (20) feet wide x forty (40) feet long x eight (8) feet deep consisting of six (6) inch to eight (8) inch diameter fractured stone aggregate placed over a geotextile fabric.
 - 4. Mud grates and/or a tire wash shall be used at the intersection of paved roadways and access roads for construction sites adjacent to creek areas.
 - 5. The Contractor shall require that all employees, subcontractors, and suppliers utilize the stabilized construction entrance.
 - 6. The Contractor shall inspect for damage and remove and replace aggregate of egress pad, as necessary, and repair the structure when needed.

3.14 STORAGE/MAINTENANCE YARD AND DISPOSAL SITES

- A. If the Contractor enters into separate agreements with property owners for use of parcels for a Contractor's yard for any of the purposes listed below

– those sites will not be under the control of CCCSD. However, the Contractor shall that there are no adverse environmental impacts related to use of parcels where CCCSD has no control.

1. Defined as any area to be used for:
 - a) Loading or unloading
 - b) Materials storage
 - c) Vehicle and equipment maintenance
 - d) Concrete truck washout
 - e) Temporary storage of excess materials or debris
 - f) Storage or disposal of spoil materials (such as excess construction material and excavated material not suitable for use as backfill material).

- B. In cases in which the Contractor enters into agreement with a property owner, the Contractor shall submit a separate Notice of Intent (NOI) to comply with the National Pollutant Discharge Elimination System General Permit to the SWRCB.

- C. In compliance with the General Permit, the Contractor shall prepare a separate Storm Water Pollution Prevention Plan (SWPPP) for the disposal site in accordance with the requirements of the California State Water Resources Control Board and local agency ordinance, unless the site has a separate SWPPP or a separate discharge permit from the SWRCB. The SWPPP shall be signed by both the Contractor and the property owner. A copy of the Contractor's SWPPP shall be submitted to CCCSD prior to any activities in the site. If the Contractor's SWPPP is revised during work progress, all revisions shall be submitted to CCCSD.

- D. Permit application fees and costs incurred in preparing and/or amending the SWPPP developed for the site shall be at the expense of the Contractor.

3.15 SOLID AND DEMOLITION WASTE MANAGEMENT

- A. Upon approval of Inspector, only clean, uncontaminated water may be discharged to the storm drain, waterway, or sanitary sewer. Non-hazardous, solid demolition wastes shall be managed according to the following specifications:
 1. Waste collection areas shall be located away from streets, gutters, and storm drains.

2. Dumpsters shall be secured at night and during rain events.
3. Leaky dumpsters shall be replaced and returned for cleaning as necessary.
4. Arrangements for disposal shall be made to ensure dumpsters do not overflow.

B. Examples of Non-Hazardous Materials:

1. Drilling fluid additives
2. Wood, framing, etc.
3. Concrete, brick, cement mortar
4. Asphalt
5. Cleared vegetation, tree trimmings, plant material
6. Dry paint/non-hazardous paint chips/dust from stripping and sand blasting of non-hazardous paint
7. Absorbent material (rags, mats) used to absorb non-hazardous spills (materials used to absorb oil-based spills shall be disposed of as hazardous waste)
8. Steel and metal scraps
9. Pipe, conduit and wire cuttings
10. Ground and/or broken paving materials
11. Domestic solid wastes (containers, cans, cups, etc.)

3.16 HAZARDOUS WASTE AND MATERIALS MANAGEMENT

A. The Contractor shall manage hazardous wastes and materials according to the following specifications:

1. Chemical and/or hazardous materials storage and handling areas shall be located away from watercourses and storm drains.
2. Secondary containment shall have capacity to contain twice the contents of the largest container, and large enough to capture any accidental releases.
3. Leaks or spills shall be cleaned up immediately, including within the secondary diked area.
4. Contractor shall ensure that trailers carrying hazardous materials are covered during transit (Illegal transit of hazardous waste is a violation subject to fine and/or jail time).

5. Hazardous waste shall be disposed of only at authorized treatment, storage, and disposal facilities (Illegal dumping of hazardous waste is a violation subject to fine and/or jail time).
 6. Contractor shall use only a licensed company to transport and dispose of contaminated materials.
- B. If storm water runoff enters the storage area or otherwise comes in contact with construction material, the Contractor shall determine if the storm water has become contaminated. Only clean, uncontaminated rain water shall be discharged to a storm drain, waterway, or the sanitary sewer.
- C. If the storm water runoff has come in contact with the construction materials, the Contractor shall provide an appropriate collection system for disposal of the storm water runoff in a manner acceptable to the RWQCB. The Contractor shall use only a licensed hazardous waste handling company to clean up large spills.
- D. Major contamination, large spills, and other serious hazardous waste incidents will require initial containment and immediate response from specialists. Spills of any material (e.g. sediment-laden wastewater) hazardous or not, shall be reported immediately. Contractor shall notify the Inspector, the Office of Emergency Service (OES) at 800-852-7550, the RWQCB at 510-622-2300, and the County Health Department when a hazardous spill occurs. If there is indecision as to whether water quality will be impacted, the Contractor shall contact the RWQCB to discuss the situation. If long-term remedial action is necessary, the RWQCB may issue enforcement orders to assure proper cleanup. Failure to report a spill resulting in discharge to a storm drain or waterway will result in greatly increased cleanup costs and enforcement action by the RWQCB.
- E. Example of Hazardous Waste Materials:
1. Drilling fluid additives
 2. Petroleum products, such as oil, fuel, and grease
 3. Asphalt products
 4. Concrete curing compounds
 5. Herbicides and pesticides
 6. Chemical additives
 7. Septic wastes
 8. Paints, thinners, and solvents
 9. Materials used to absorb hazardous spills

10. Acids, lime, glues, and curing compounds
 11. Any other material considered a hazardous waste by the State of California
- F. The following pre-existing site conditions may make contamination likely:
1. Areas of previous commercial or industrial activity.
 2. Sites with a history of illegal dumping on the site or on adjacent properties.
 3. Sites subject to Superfund, state or local cleanup order.
 4. Ponded storm water, groundwater, or dewatering areas, which exhibit an oily sheen or smell of petroleum.
 5. Soils which appear discolored, smell of petroleum, or exhibit other unusual properties.
 6. Sites where abandoned storage tanks, drums, or other buried debris are encountered during construction activity.

3.17 PAVEMENT MANAGEMENT

- A. Concrete, asphalt, and seal coat shall be applied during dry, appropriately temperatured weather to prevent contaminants from coming in contact with storm water runoff. Storm drain inlets, catch basins, and manholes shall be covered while applying seal coat, tack seal, slurry seal, fog seal or similar materials. Paving machines shall consistently be placed over drip pans or absorbent materials since they tend to drip continuously.
- B. Unless approved by the Inspector, during wet weather or when rain is forecast within twenty-four (24) hours, the Contractor shall not pave or oil the street. If rain occurs during paving, the Contractor shall arrange for a container to be delivered to the site to intercept rain water.
- C. The Contractor shall not sweep or wash down excess sand (placed as part of a sand seal or to absorb excess oil) into gutters, storm drains, or creeks. The Contractor shall either; collect the sand and return it to the stockpile or dispose of it in a trash container.
- D. The Contractor shall prevent saw cut slurry from entering catch basins and storm drains. The slurry should be removed using a wet vacuum. The area over which the slurry may spread should also be limited.
- E. When making saw cuts, Contractor shall not allow saw-cutting water to enter a storm drain, waterway, or sanitary sewer under any conditions. Water use should as little as possible.

- F. Contractor shall protect the drain inlet by covering it completely with filter fabric and containing the slurry by placing barriers around the catch basin (bag/gravel bag dams). The Contractor shall also shovel, absorb, or vacuum the slurry residue from pavement or gutter as necessary and remove from site at the end of the day/job.

3.18 CONCRETE MANAGEMENT

- A. The Contractor shall perform concrete washout in a designated area where the water will flow into a temporary pit or bermed area in the dirt area from where it can be pumped or disposed of by a hazardous waste disposal program. The water may not be discharged to storm drain, waterway, or sanitary sewer.
- B. The Contractor's concrete wash water pit shall be located away from watercourses and storm drains and shall be sized large enough to hold the maximum volume of waste expected. The Contractor shall drain wash water of exposed aggregate concrete to a dirt area or onto stockpiles of aggregate base or sand. Water shall be allowed to percolate into the soil and hardened concrete disposed of in a trash container. If a suitable dirt area is not available, the Contractor shall collect the waste water into a steel, leakproof debris box.

3.19 VEHICLE AND EQUIPMENT SERVICES

- A. The Contractor shall use secondary containment, such as a drip pan, to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured, and shall clean up leaks and spills of vehicle or equipment fluids immediately and dispose of the waste and cleanup materials as a hazardous waste.
- B. The Contractor shall inspect vehicles and equipment arriving on site for leaking fluids and shall promptly repair leaking vehicles and equipment. Drip pans shall be used to catch leaks until repairs are made. The Contractor shall perform maintenance and fueling of vehicles or equipment in areas that will not allow run-on of storm water or runoff of spills to storm drains and provide for confined clean-up. The Contractor shall not contaminate the soils or groundwater with such maintenance and fueling activities. The Contractor shall encourage fueling and major maintenance/repair and washing off site whenever possible.
- C. Water from equipment washing shall not be allowed to be discharged to a storm drain, waterway, or the sanitary sewer. The Contractor shall perform

vehicle or equipment cleaning with water only in a designated, bermed area that will not allow rinse water to run off site into streets, gutters, storm drains, or creeks. Soaps, solvents, degreasers, steam-cleaning equipment, or equivalent methods will not be allowed. Sumps associated with the wash areas shall be serviced regularly.

3.20 SECONDARY CONTAINMENT

- A. Wet and dry building materials with the potential to pollute runoff shall be handled and delivered with care and stored under cover and/or surrounded by berms to prevent contact with runoff.
- B. The Contractor shall also include containment areas and provide for proper disposal of these materials, their containers, and materials or soil that may be contaminated with these materials.
- C. Perimeter controls, containment structures, and covers shall be repaired as necessary to ensure their proper functioning.
- D. The Contractor shall maintain the site in a neat and clean and well organized condition.
- E. Potential pollutants include:
 - 1. Pesticides and herbicides
 - 2. Fertilizers
 - 3. Detergents
 - 4. Asphalt and concrete compounds
 - 5. Petroleum products, such as fuel, oil, and grease
 - 6. Acids, lime glues, adhesives, curing compounds, etc.
 - 7. Paints and solvents
- F. All hazardous materials shall be labeled and stored according to local, state, and federal regulations and according to fire code requirements. The Contractor shall keep an inventory of hazardous material for use in emergency and shall post proper storage instructions at all times in an open and conspicuous location. The Contractor shall use mats during transport and storage and shall not apply hazardous chemicals outdoors during wet weather.
- G. The Contractor shall immediately clean up all spills, including but not limited to: Slurry from boring operations, excess concrete and grout,

coatings, controlled low-strength material, concrete curing compounds, lubricants and paint.

3.21 PAINT MANAGEMENT

- A. Only clean rain water shall be discharged to storm drains and/or waterways. The Contractor shall remove as much excess paint as possible from brushes, rollers, and equipment before starting cleanup. The Contractor may discharge very small amounts of cleaning wastes from brushes, rollers, buckets, and tools contaminated with latex (water-based) paints to the sanitary sewer system provided they do not contain certain additives which are pollutants of concern (mercury, tributyltin). Brushes, rollers, and tools containing latex paints may be washed over a sink with plenty of water. Buckets containing latex paints shall first be emptied into the original can or discarded as above.
- B. For water based paints, paint out brushes to the maximum extent possible and rinse to a drain leading to the sanitary sewer (indoor plumbing). Where not possible, clean with water, disperse wash water over soil, and spade in.
- C. For oil-based paints, paint out brushes to the extent possible; filter and reuse thinner/solvents.
- D. Dried latex paint, old brushes, rollers etc. shall be disposed of as non-hazardous waste. The Contractor shall dispose of thinner, solvent, sludge from cleaning equipment and tools, and excess oil and water-based paint as a hazardous waste. Hazardous materials that are not recyclable shall be disposed of by a licensed hazardous waste hauler.
- E. Hazardous and non-hazardous paint-related materials, paint wastes, adhesives and cleaning fluids shall be recycled when possible and disposed of properly to prevent contact with stormwater and discharge into storm drains / watercourses. Contractor shall designate an area for cleaning of painting equipment and tools. Contractor shall ensure that clean brushes or rinse containers are not washed into street gutters, storm drains or waterways.

- END OF SECTION -

SECTION 15.02051

CLEARING, GRUBBING, DEMOLITION, ABANDONMENT, REMOVAL, DISPOSAL AND SALVAGE

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish all tools, equipment, materials, supplies and labor required for the clearing, grubbing, demolition, abandonment, removal, disposal, and salvage of structures, pavement, improvements, utilities, vegetation, and facilities from the sewer right-of-way, roadways, and other construction areas along with the protection of existing fences, vegetation, structures, and associated improvements, streets, and utilities adjacent to the construction area.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02145 – Bypassing Wastewater
- B. Section 15.02160 – Shoring, Excavation Support and Protective Systems
- C. Section 15.02205 – Excavation, Bedding and Backfill
- D. Section 15.02515 – Asphalt Concrete Pavement and Base Restoration
- E. Section 15.03600 – Grout
- F. Section 15.15000 – Piping, General

1.3 CONTRACTOR SUBMITTALS

The Contractor shall submit a map identifying the location of any construction staging areas to be utilized, unless shown on the plans. The Contractor shall also submit written authorization from each site owner.

PART 2 – PRODUCTS

2.1 SAFETY AND NOISE BARRIERS

Proximity of existing structures or trees will require construction of an appropriate safety barrier such as temporary fencing, berms, acoustic barriers, or similar facilities. The Contractor shall submit drawings defining the type and extent of proposed safety measures prior to any construction activity.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. All clearing, grubbing, demolition, abandonment, and salvage work shall comply with applicable local, state, and federal statutes, ordinances, codes, standards, rules, procedures, regulations and safety orders. The Contractor shall obtain required permits and file required reports in a timely manner.
- C. CCCSD assumes no responsibility for actual condition of the facilities to be abandoned or demolished. The Contractor shall visit the site and inspect all facilities to become familiar with all existing conditions and utilities. Before beginning any cutting, trenching, abandonment or demolition work, the Contractor shall carefully survey existing facilities and improvements.
- D. The Contractor shall take all necessary precautions to prevent damage to existing facilities and improvements that are to remain in place. Any damage to street improvements, building elements, and other existing facilities to remain, caused by the Contractor's operations shall be repaired or replaced. Damaged items shall be repaired or replaced with new materials as required to restore damaged items or surfaces to their original condition or better to that at the start of work.
- E. The Contractor shall carefully consider all bearing loads and capacities for placement of equipment and material. The Contractor shall construct and provide shoring, bracing, and supports, as required. The Contractor shall insure that structural elements are not overloaded and shall be responsible for increasing structural support or adding new support as a result of any cutting, abandonment, removal or demolition work. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, the Contractor shall at its own expense consult with a registered professional engineer and notify CCCSD prior to the placement of such equipment or material. The Contractor shall remove all temporary protection when authorized by the Inspector.

3.2 ABANDONMENT

- A. For sewer main and trunk abandonment, the Contractor shall cut back and remove the pipe to be abandoned for a distance of five (5) feet from any connecting structures (manhole rodding inlet, etc.) or other pipes. Holes at existing structures shall be repaired per paragraph 3.2.D below. The remaining pipe to be abandoned shall be completely filled with abandonment grout (as specified in Section 15.03600 - Grout) and capped at both ends prior to backfilling the access excavations.
- B. Lateral sewers shall be abandoned at the point of connection to the public main sewer. The Contractor shall use the following methods for lateral abandonment:
1. Where the end of the lateral does not protrude into the public main sewer, and where the tap, tee or wye is intact and in good condition as determined by the CCCSD Inspector, an approved cap or plug may be installed at the tap, tee or wye.
 2. Where the end of the lateral protrudes into the public main sewer or where the tap, tee or wye is damaged, a main sewer repair shall be required. The Contractor shall make the repair employing the following procedures:
 - a. If necessary, wastewater in the main sewer shall be bypassed around the location of the repair in accordance with the requirements of Section 15.02145 Bypassing Wastewater.
 - b. Excavate and properly support an access hole large enough to allow removal of a minimum five (5) foot long section of the main sewer including the tap, tee or wye in accordance with Section 15.02160 Shoring, Excavation Support and Protective Systems.
 - c. Remove the section of existing main sewer including the tap, tee or wye.
 - d. Place bedding; replace the section of main sewer and backfill the excavation in accordance with Section 15.02205 Excavation, Bedding and Backfill, and Section 15.15000 Piping, General.
 - e. If in paved area, restore pavement structural section in accordance with Section 15.02515 Asphalt Concrete Pavement and Base Restoration.
- C. Sewer manholes to be abandoned shall have the top block, cover, frame, grade rings and the cone section removed. A minimum of two (2)

perforations, at least two (2) inches in diameter each, shall be made at the bottom of the lowest barrel section to allow drainage. The remaining structure shall be backfilled and compacted per the requirements for structure backfill in Section 15.02205 - Excavation, Bedding and Backfill with Class II aggregate base and compacted to a minimum of ninety-five (95) percent maximum density. Compaction tests are required.

- D. When existing piping is removed from an existing structure to remain in service, the Contractor shall fill all resulting holes in the structures with non-shrink grout and reinforcement as required, or as shown. The repair shall be watertight and the finished rehabilitated structure shall appear as a new homogeneous unit.
- E. No sewer facility shall be abandoned until replacement facilities have been accepted by CCCSD and placed in operation.

3.3 DEMOLITION

- A. The Contractor shall minimize the extent of the demolition.
- B. Asphalt pavement and concrete curbs and gutters shall be removed as necessary to perform the required work and shall be saw cut at the limits of removal.
- C. Existing reinforcement to remain in place shall be protected, cleaned and extended into new concrete. Existing reinforcement not to be retained shall be cut-off as follows:
 - 1. Where new concrete joins existing concrete at the removal line, reinforcement shall be cut-off flush with the concrete surface at the removal line.
 - 2. Where the concrete surface at the removal line is the finished surface, the reinforcement shall be cut back two (2) inches below the finished concrete surface, the ends painted with epoxy paint and the remaining holes patched with non-shrink grout.

3.4 BELOW-GRADE DEMOLITION

- A. Footings, foundation walls, below-grade construction and concrete slabs on grade shall be demolished and removed to a depth so as not to interfere with new construction, but not less than three (3) feet below existing ground surface or future ground surface, whichever is lower.

- B. Below-grade areas and voids resulting from demolition of structures shall be completely filled. All fill and compaction shall be in accordance with Section 15.02205 - Excavation, Bedding and Backfill.
- C. After backfilling and compaction, surfaces shall be graded to meet adjacent contours and provide flow to surface drainage structures.

3.5 DISPOSAL OF DEMOLITION DEBRIS

- A. Demolition and removal of debris shall be conducted to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Alternate routes shall be provided around closed or obstructed traffic ways.
- B. Site debris, rubbish, and other materials resulting from demolition operations shall be removed and disposed of legally.
- C. The use of burning for the disposal of refuse, debris, and waste materials is not permitted.

3.6 SALVAGE

The Contractor may salvage and reuse such items as fences, gates, street signs, retaining walls, road barriers, guardrails, and other similar items when in reasonably good condition and approved by CCCSD. Items not in salvageable condition shall be, removed, and replaced.

3.7 DUST AND POLLUTION CONTROL

- A. The Contractor shall employ water sprinkling, temporary enclosures, chutes, and other suitable methods acceptable to CCCSD and the local agency having jurisdiction shall be used to limit dust and dirt rising from and scattering beyond the area of construction.
- B. Water shall not be used when it creates hazardous or objectionable condition such as mud, flooding, or pollution.
- C. The Contractor shall employ best management practices for control of erosion and jobsite runoff, pollution prevention and protection of water quality as specified in the CCCSD Field Management Practices for Protection of Water Quality, latest edition.

3.8 PROTECTION

- A. Safe passage of persons around the area of the work shall be ensured. Operations shall be conducted to prevent injury to people or damage to adjacent buildings, structures, or other facilities.
- B. Structure and excavation shoring, bracing, or supports, per Section 15.02160 - Shoring, Excavation Support and Protective Systems, shall be provided to prevent movement, settlement or collapse of structures to be demolished, or damage to adjacent facilities to remain.
- C. Existing landscaping materials, structures and appurtenances, which are not to be demolished, shall be protected.

3.9 CLEARING, GRUBBING AND STRIPPING

- A. All construction areas shall be cleared of grass and weeds to at least a depth of six (6) inches and cleared of structures, concrete, or masonry debris, pavement, trees, logs, upturned stumps, loose boulders, and any other objectionable material of any kind that would interfere with the performance or completion of the work, create a hazard to safety, or impair the work's subsequent usefulness or obstruct its operation. Loose boulders within ten (10) feet of cut lines shall be incorporated in landscaping or removed from the site. Trees and other natural vegetation outside the actual lines of construction shall be protected from damage with chain link fencing or straw bale barricades during construction.
- B. Within the limits of clearing, the areas below the natural ground surface shall be grubbed to a depth necessary to remove all stumps, roots, buried logs, and all other objectionable material. Underground structures, debris, or waste shall be totally removed if they are found on the site. All objectionable material from the clearing and grubbing process shall be removed from the site. Trees, shrubs, fences, and all other improvements that are removed to permit construction, shall be replaced (not including native trees under three (3) inches in diameter at the base and native brush) by the Contractor in kind and size or with substitutes acceptable to the property owner. Native trees larger than three (3) inches in diameter at the base shall not be removed without CCCSD's consent.
- C. Any trees, shrubs, fences or other improvements outside of sewer easements or rights of way deemed necessary to be removed by the Contractor, shall not be removed without the consent of the Property Owner, and shall be replaced if required.

3.10 CLEANING

- A. The Contractor shall clean and sweep streets daily.
- B. During and upon completion of work, the Contractor shall promptly remove unused tools and equipment, surplus materials, rubbish, debris and dust and shall leave areas affected by work in a neat and clean condition.
- C. Adjacent structures shall be cleaned of dust, dirt and debris resulting from demolition or construction operations, as directed by CCCSD or governing authorities and adjacent areas shall be returned to the condition existing prior to start of work.

- END OF SECTION -

SECTION 15.02140

EXCAVATION DEWATERING

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall:

- A. Secure and comply with the provisions of permits required for dewatering operations, including permits from the Contra Costa County Environmental Health Division for exploration, construction and abandonment of dewatering wells. No water shall be discharged into existing sanitary sewers, or new sanitary sewers constructed unless a Special Discharge Permit is obtained from CCCSD.
- B. Provide all labor, materials, and equipment necessary to adequately dewater excavations so that pipe and structures that are installed in excavations are free from standing, flowing or boiling groundwater, surface water, storm water, precipitation, or wastewater; filter soil; and prevent loss of ground from dispersion or erosion.
- C. Drawdown the groundwater level a minimum of two (2) feet below the trench bottom and beyond excavation sidewalls where shoring is not designed to resist hydrostatic pressures.
- D. Control the rate and effect of dewatering so as to avoid settlement, subsidence or damage to structures or facilities adjacent to areas of proposed dewatering.
- E. Provide adequate standby equipment to ensure efficient dewatering and maintenance of dewatering operations during power failure.
- F. Be fully responsible and liable for all damages that result from failure to adequately keep excavations dewatered, and shall repair, restore and/or replace facilities or structures damaged as a result of dewatering operations.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02205 - Excavation, Bedding and Backfill
- B. Section 15.02730 - Pipeline Cleaning, Testing and Televising

1.3 CONTRACTOR SUBMITTALS

The Contractor shall submit a plan for all excavation dewatering procedures to the Inspector. The dewatering plan shall include the following:

- A. Location(s) where water is to be disposed.
- B. Scale drawings showing locations of dewatering systems.
- C. Details of dewatering systems, such as:
 - 1. Drilled hole and well casing diameter, slotted and solid lengths;
 - 2. Sand packer gradation;
 - 3. Size and capacity of pumps.

1.4 QUALITY ASSURANCE

- A. Where structures, utilities and/or facilities exist adjacent to areas of proposed dewatering, the Contractor shall establish reference points and shall survey these reference points daily to quickly detect any settlement, subsidence or damage that may develop during or following dewatering operations.
- B. If disposal of water to the sanitary sewer is allowed, televising and cleaning of downstream sewers may be required at the Inspector's discretion, and shall be done per the requirements set forth in Section 15.02730 - Pipeline Cleaning, Testing and Televising.

PART 2 – PRODUCTS

2.1 EQUIPMENT

Dewatering, where required, may include the use of wells, well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, standby pumps and/or generators, and other means.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including

the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

- B. The Contractor's dewatering operations shall not interfere with vehicle or pedestrian traffic. Under no circumstances shall dewatering water be allowed to flood streets or cause hazardous conditions for traffic. Dewatering pump noise shall be mitigated, especially at night, as required by the applicable local jurisdiction (City or Contra Costa County).
- C. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall continue until water can be allowed to rise without affecting structures, piping, and other project features.
- D. Site grading shall promote drainage. Surface runoff shall be diverted prior to it entering excavations to maintain the bottom of the excavation free from standing water.
- E. Dewatering shall be conducted so as to preserve the undisturbed bearing capacity of the subgrade soils at the proposed bottom of excavation, filter soil particles and prevent loss of ground due to dispersion and erosion. Dewatering shall lower the water outside the excavation, if necessary to insure that seepage and migration of soil particles does not occur through openings in the shoring.
- F. If subgrade soils are disturbed or loosened by the seepage or flow of water, the affected areas shall be excavated and replacement backfill placed in accordance with Section 15.02205 - Excavation, Bedding and Backfill.
- G. The Contractor shall prevent pipeline and/or structure flotation by maintaining a positive and continuous removal of water.
- H. If dewatering wells are used, they shall be adequately spaced to provide the required dewatering, and the Contractor shall use sand packing and/or other means to prevent pumping of soil particles (e.g., fine sand) from the subsurface. The Contractor shall continuously monitor the dewatering water discharge to ensure that subsurface soil is not being removed by the dewatering operation.
- I. The demobilization of dewatering operations shall be performed so as to allow groundwater to rise to its ambient (static) level without disturbing natural foundation soils or compacted backfill, and prevent flotation or movement of structures, pipelines, and sewers.

- J. The Contractor is advised that it is possible that sand, silty sand and/or gravel strata inter-bedded with less permeable clay and silty clay materials varying in depth, thickness and location may exist in the project area. These potentially water-bearing strata may represent areas of increased trench dewatering difficulty. The Contractor shall carefully consider the possibility of encountering these strata, and plan dewatering operations accordingly.

- K. The Contractor shall properly dispose of water without nuisance or damage to adjacent property, in accordance with its Storm Water Pollution Prevention Plan. Water shall be settled or filtered using an approved method to remove sand, silt and fine soil particles before disposal into any storm drainage or sanitary sewer system, including but not limited to the use of a debris trap as shown on DWG-29 of the Standard Drawings. The Contractor shall remove and dispose of any material that accumulates in the drainage systems used for water discharge as a result of dewatering operations.

- END OF SECTION -

SECTION 15.02145

BYPASSING WASTEWATER

PART 1 – GENERAL

1.1 THE REQUIREMENT

When work on a job requires that an existing sewer be taken out of operation to ensure that the work can be safely and efficiently completed without overflow or spillage of wastewater from the sewer, the Contractor shall:

- A. Secure and comply with the provisions of permits required for wastewater bypassing operations, including encroachment permits for equipment and piping from the applicable local jurisdiction (City or Contra Costa County).
- B. Furnish all labor, materials, tools, equipment and supplies required to convey wastewater from a point upstream to a point downstream of the work.

1.2 CONTRACTOR SUBMITTALS

The Contractor shall submit the following to CCCSD, and receive favorable review prior to installation of sewage bypass equipment:

- A. A plan for bypassing wastewater, which shall identify the type, size, and quantity of all service and standby pumps, motors, and power equipment; the type and size of all piping, fittings, and connections; the proposed location of bypass pumps and pipes; and the proposed schedule for bypass operation.
- B. A unique Emergency Action Plan for each bypass location. The plan shall include the restoring of normal sewage flows, resumption of the bypass pumping operation, and the reporting and clean-up of any spills.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02730 – Pipe Cleaning, Testing and Televising.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. Flow in existing sewers shall not be dammed or otherwise restricted for any period of time without the approval of the Inspector. All wastewater facilities shall remain in continuous operation during construction.
- C. Bypassing of wastewater to surface water or drainage courses is prohibited. The Contractor shall adhere to all applicable local jurisdiction restrictions regarding the transport and conveyance of wastewater.
- D. All pumps and piping shall be adequately sized to convey the flows anticipated at each bypass location. The bypass system shall be watertight; no leakage from bypass equipment, hoses, or pumps onto private property, gutters, streets, sidewalks, or into storm drains or creeks will be allowed.
- E. Prior to commencing bypassing operations at a particular location, all workers, materials, fittings, supports, equipment, and tools shall be staged at that location.

3.2 TEMPORARY PUMPING

- A. Bypassed sewage shall be contained in an enclosed hose or pipe and shall be redirected into the sanitary sewer system. Dumping, overland or open channel flow of sewage is strictly prohibited. Flushing of sewage from spills or from bypass equipment leakage into storm drains or creeks is also prohibited. Any spill or leakage shall be immediately contained and conveyed to a sanitary sewer or hauled to the Wastewater Treatment Plant without undue delay per the Contractor's Emergency Action Plan.
- B. Where bypass pipelines are required to cross traffic lanes, the piping and fittings shall be buried a minimum of four (4) inches below the pavement surface and backfilled with temporary asphalt concrete surfacing unless otherwise allowed by the local agency and CCCSD. Traffic lane closure will be at the sole discretion of the agency with jurisdiction.

- C. Temporary ramps may be constructed over pipelines six (6) inches in diameter, or less, to allow access to driveways. Pipelines larger than six (6) inches in diameter crossing driveways shall be buried a minimum of four (4) inches below the existing ground or pavement surface and backfilled with temporary asphalt concrete surfacing. **No driveway access shall be blocked without the written authorization of the affected property owner.**
- D. Air and vacuum relief valves shall be provided at the high point in each section of elevated piping.
- E. Pumped bypass systems shall be continuously monitored.
- F. After the work necessitating bypassing is completed, flow shall be restored to normal, all equipment shall be removed from the sewer system, and all pipes or structures modified or damaged during the bypass operations shall be restored to their original condition.
- G. Televising of main line and downstream sewer cleaning may be required at the Inspector's discretion and shall be done per the requirements set forth in Section 15.02730 - Pipeline Cleaning, Testing and Televising.

- END OF SECTION -

SECTION 15.02160

SHORING, EXCAVATION SUPPORT AND PROTECTIVE SYSTEMS

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. Competent Person

A Competent Person shall be designated by the Contractor for any job that requires any individuals to enter into a trench or other excavation regardless of depth. A Competent Person is an individual who has been specifically trained in, and is knowledgeable about, soils evaluation, the use of protective systems and the requirements of the applicable regulations regarding the safety of excavations. The Competent Person shall be responsible for identifying existing or predictable hazards in the surroundings or working area, and shall have the authority to stop the Contractor's operations, order individuals to evacuate the excavation and take measures to eliminate the hazards.

B. Excavations less than five (5) feet in depth

Protective systems are not required for excavations less than five (5) feet in depth unless the Contractor's designated Competent Person has evaluated the soil and trench and determined that there is an indication that a potential for cave-in of the trench or excavation exists.

C. Excavations greater than five (5) feet and less than twenty (20) feet in depth

Protective systems designed by a professional engineer registered by the State of California shall be required for all excavations greater than five (5) feet and less than twenty (20) feet in depth unless an Aluminum Hydraulic Shoring protective system is used in strict conformance with the system manufacturer's tabulated data approved and stamped by a registered professional engineer. Tunneling or undermining adjacent to any trench or excavation is strictly prohibited.

D. Excavations greater than twenty (20) feet in depth

A protective system designed by a professional engineer registered by the State of California shall be required for any trench or other excavation deeper than twenty (20) feet.

E. Soil Classification/Testing

Consideration of soil classification, as well as the depth of the trench or other excavations is necessary to determine the appropriate type of protective system to be used. All soil classification and testing shall comply with OSHA Regulations, 29 CFR Part 1926 Subpart P – Excavations.

F. Underground Utilities

Prior to any excavation, it is the Contractor's responsibility to determine the location of all utility installations including, without limitation, pipes, conductors and conduits for electricity, gas, water, telephone, cable TV, sewage, storm drainage that could be encountered during excavation. At least forty-eight (48) hours prior to commencing any excavation, the Contractor shall notify ***Underground Service Alert (USA) by calling 1-800-227-2600, or 811***, in accordance with California state law. Regardless of whether utilities have been marked, the Contractor shall proceed with caution in areas of utility facilities and structures. The Contractor shall expose existing utilities by hand-excavation or by other methods acceptable to the utility owner when excavating within two (2) feet of any field markings of utility location.

G. Excavated Material

All stockpiled excavated or imported backfill material shall be stored at least two (2) feet away from the edge of any trench or other excavation when employees are working in the trench. At the discretion of the Competent Person, retaining devices may be used to prevent material from rolling or falling into the excavation.

H. Surcharge Loads

The excavation slope configuration and/or shoring system design shall include surcharge loads (e.g., excavation spoils, stockpiles, equipment, traffic and adjacent foundations).

I. Access/Egress

When personnel are working in trenches or other excavations of five (5) feet of depth or more; stairways, ladders, ramps, or other safe means of access/egress shall be located within a maximum of twenty-five (25) feet of lateral travel from each person in the excavation.

J. Stability of Adjacent Structures

Systems for support of structures adjacent to excavations are to be provided when the stability of such structures is threatened by excavation operations. Sidewalks, pavement and other structures shall not be undermined unless an appropriate protective system is provided to protect from collapse.

K. Water Accumulation

Proper dewatering procedures as specified in Section 15.02140 - Excavation Dewatering shall be used in excavations where water accumulates.

L. Inspections

The Competent Person designated by the Contractor shall conduct daily inspections of excavations, adjacent areas, dewatering and protective systems. Inspections shall be conducted prior to the start of work and as needed throughout the workday. If evidence of a hazardous situation is encountered by the Competent Person, work shall be stopped and all personnel evacuated from the excavation until remedial measures have been taken and the Competent Person has determined that it is safe to re-enter the excavation.

M. The Contractor shall be responsible for repairing or replacing existing utilities, pavement, structures or other improvements damaged as a result of failure to adequately support excavations.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02140 - Excavation Dewatering
- B. Section 15.02205 - Excavation, Bedding and Backfill
- C. Section 15.01100 - Safety

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. California Labor Code.
- B. Occupational Safety and Health Administrative Code.
- C. Cal/OSHA, State of California Administrative Code, Title 8; Industrial Relations, Chapter 4, Subchapter 4, Construction Safety Orders.

- D. Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR Part 1926, Subpart P.

1.4 QUALITY ASSURANCE

- A. Designs of protective systems for shoring or other excavation support systems shall be prepared by a Civil or Structural Engineer who is registered in the State of California.

1.5 DESIGN CRITERIA

- A. Protective Systems

The Contractor shall provide adequate protective systems that will allow safe and expeditious construction of sewers and structures without movement or settlement of the ground and in a manner, which will prevent damage to, or movement of, adjacent structures, utilities, or other facilities, and prevent cave-ins and other potential hazards of excavations. Protective systems shall comply with applicable provisions of the State of California Administrative Code, Title 8; Industrial Relations, Chapter 4, Subchapter 4, Construction Safety Orders, and the federal Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR Part 1926 Subpart P – Excavations, and may include:

1. Sloping and/or benching;
 2. Timber shoring;
 3. Manufactured aluminum hydraulic shoring systems;
 4. Shields and/or trench boxes;
 5. Systems designed by a Registered Professional Engineer.
- B. The excavation protective systems shall be designed and installed to support anticipated earth pressures, utility loads, equipment, applicable traffic and construction loads, and other surcharge loads in accordance with generally accepted professional engineering practice. The Contractor shall implement the recommendations of a geotechnical engineering report, if one is available. The design of protective systems shall include consideration of the effects of dewatering.
 - C. The lowest level of the protective systems shall extend to a depth below the main excavation adequate to prevent lateral and vertical movement of ground both inside and outside of excavation and excessive inflow of water.

- D. The excavation protective systems shall provide the required free excavated space for workers and groundwater control systems and to accommodate the permanent structures to be constructed.
- E. The excavation protective systems shall be designed to accommodate staged installation and removal as required to accommodate construction and backfill sequences.
- F. Timber shoring, except lagging, shall be employed only for utilities and minor structures. No timber supporting members or lagging shall be left in place.

1.6 CONTRACTOR SUBMITTALS

- A. The Contractor shall submit drawings and supporting calculations for excavation protective systems prepared and stamped by a civil or structural engineer registered in the State of California. The submittals shall include details, arrangements, and method of construction for the proposed systems including levels of struts and shores and permissible depth to which the excavation may be carried before supports are installed, and sequence for removal of shoring systems.
- B. The Contractor shall submit a copy of its current annual OSHA Excavation Permit to the CCCSD Permit Counter. No CCCSD permits will be issued to a Contractor unless a current OSHA Excavation Permit is on file.
- C. The Contractor shall designate a Competent Person who shall conduct daily or more frequent site inspections as appropriate. The designated Competent Person shall possess a current certification.

PART 2 – PRODUCTS

2.1 MATERIALS

All manufactured aluminum hydraulic shores and appurtenances, and timber and structural steel to be used for protective systems, whether new or used, shall be sound and free from defects that may impair their strength.

PART 3 – EXECUTION

3.1 INSTALLATION REQUIREMENTS

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including

the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

- B. The Contractor shall install or construct protective systems in accordance with accepted shop drawings and in a manner that provides support of excavation sidewalls and meets the requirements of Part 1 of this Section.
- C. No part of the excavation protective systems shall be placed or allowed to deflect within the limits of permanent structures.
- D. Refer to OSHA Regulations, 29 CFR part 1926 Subpart P, for slope configurations and maximum allowable slopes. Sloping and benching shall be done in accordance with the soil type determined. In the case that the soil type is unclear, the support system design shall be based on "Type C" soil with the following Cal/OSHA exceptions:
 - 1. Excavation slope shall be less steep than the maximum allowable slope when there are signs of distress (See Cal/OSHA Article 6, Section 1541.1, Appendix B, Item 1541.1 (C) (3) (B)).
 - 2. When surcharge loads (e.g., excavation spoils, stockpiles, equipment, traffic and adjacent foundations) are present, the Competent Person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope (See Cal/OSHA Article 6, Section 1541.1, Appendix B, Item 1541.1 (C)(3)(C)).

3.2 REMOVAL OF EXCAVATION SUPPORT SYSTEMS

- A. Remove the shoring system in a manner that will not disturb or damage adjacent structures, construction, or utilities. Fill voids immediately with lean concrete or with approved backfill compacted to the relative compaction for the location specified in Section 15.02205 - Excavation, Bedding and Backfill.
- B. The Contractor shall repair damage to new or existing structures resulting from removal of excavation support systems.

- END OF SECTION -

SECTION 15.02205

EXCAVATION, BEDDING AND BACKFILL

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall provide all labor, materials, and equipment necessary to perform all excavation, bedding, backfill and grading operations required for construction of the work.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02051 - Clearing, Grubbing, Demolition, Abandonment, Removal, Disposal and Salvage
- B. Section 15.02160 - Shoring, Excavation Support and Protective Systems
- C. Section 15.03330 - Controlled Low Strength Material (CLSM)
- D. Section 15.02275 - Geotextile Fabric
- E. Section 15.02900 - Protection of Trees and Restoration of Landscaping

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM D 1556	Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D 1557	Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2,700 kN-m/m ³))
ASTM D 2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregates
ASTM D 2487	Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 6938	Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D 4253	Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table

1.4 CONTRACTOR SUBMITTALS

Compaction testing of bedding and backfill materials shall be required for all main sewer extensions and laterals in public streets. Compaction testing of bedding and backfill for side sewer work on private property may be required at the discretion of the Inspector. The required compaction testing shall be conducted under the direction of a Civil or Geotechnical Engineer registered by the State of California. As a condition of CCCSD's acceptance of complete project work, a Certification Report indicating that compaction results meet or exceed the requirements of the CCCSD Standard Specifications shall be submitted by the engineer in responsible charge of the compaction testing. Compaction testing shall be completed prior to the acceptance televising of the sewer and installation of final paving.

1.5 QUALITY ASSURANCE

- A. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with ASTM D 1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D 4253 and D 4254. Field density in-place tests will be performed in accordance with ASTM D 1556, ASTM D 6938, or by such other means acceptable to CCCSD. At a minimum, compaction tests shall be conducted for each fifty (50) feet of trench and for each two (2) feet of trench depth, unless otherwise specified by the agency with jurisdiction for the roadway.
- B. If a first test and a subsequent re-test of the bedding or backfill show non-compliance with the density required under this Section, the Contractor shall remove and re-compact the material represented by the test/retest as necessary to ensure compliance.
- C. The Contractor shall provide access in the excavation for the soil compaction testing technician or Inspector. This shall include providing site-specific safety equipment and temporary shoring to enable compaction testing at each required level within the excavation. Should the Contractor have backfilled to an elevation above that required to be tested, he shall excavate the backfill down to the necessary level for

testing and provide shoring at his cost. Subsequent backfilling shall also be at the Contractor's cost.

PART 2 – PRODUCTS

2.1 SUITABLE BEDDING AND BACKFILL MATERIAL

- A. Bedding and backfill material shall be selected or processed clean, free from grass, roots, brush, other vegetation, debris, refuse or other deleterious material of any kind.
- B. The following types of bedding and backfill materials are designated and defined as follows:
 - 1. Type I Bedding and Backfill Material (Class 2 Aggregate Base): Shall be newly quarried or recycled material (not mined alluvial material), and shall be certified by the quarry or recycler as complying with the provisions of Caltrans Specifications Section 26 (Class 2 Aggregate Base) for three-quarter (3/4) inch maximum grading.
 - 2. Type III Bedding and Backfill Material (native material from trench excavation): Shall be free from vegetable matter, debris and refuse, shall contain no concrete, stones or clods larger than four (4) inches in any dimension and shall contain sufficient fines so that all voids will be filled when compacted, and shall be so constituted that compaction requirements can be met.
 - 3. Select Type III Bedding and Backfill Material (native material from trench excavation): Shall meet all requirements of the above described Type III Bedding and Backfill Material with the additional requirement that the maximum particle size shall be three-quarter (3/4) inch in diameter.
 - 4. Coarse Bedding Material (Drain Rock/Foundation Rock): Shall be crushed stone or gravel (not mined alluvial material), with a minimum of ninety-five percent (95%) crushed particles per CTM 205, durable and free from slaking or decomposition under action of alternate wetting and drying with minimum Durability Index of 40 per CTM 229. The material shall meet the following gradation requirements:

<u>Sieve Size</u>	<u>Percentage Passing</u>
2-inch	100
1-1/2-inch	90-100
3/4-inch	5-30
3/8-inch	0-5
No. 200	0-2

5. Controlled Low Strength Material shall conform to the requirements of Section 15.03330 - Controlled Low Strength Material (CLSM).

2.2 UNSUITABLE MATERIAL

- A. Unsuitable materials for bedding and backfill shall include soils, which when classified under ASTM D 2487 fall in the classifications of PT, OH, CH, MH, or OL. In addition, any soil that cannot be sufficiently compacted to achieve the percentage of maximum density specified for the intended use shall be considered unsuitable.
- B. Chemical testing for corrosivity shall be performed for all materials proposed for use as bedding and backfill for metallic or reinforced concrete pipe. The testing shall be in accordance with the requirements of CTM 417, CTM 422 and CTM 643. Bedding and backfill materials shall be considered unsuitable when the chloride concentration exceeds 500 ppm, sulfate concentration exceeds 1,500 ppm, resistivity is less than 2,000 ohm-cm or pH is less than 6.5. Testing shall be performed by a qualified laboratory approved by CCCSD, and the data shall be submitted to the Inspector for acceptance prior to use of the material in the work.
- C. Type III materials which are too wet to be compacted to specified compaction shall not be rejected solely because they are too wet for proper compaction. The Contractor may at its option, dry these materials in accordance with Paragraph 3.8.G of this section prior to compaction. Alternatively, the Contractor may remove the Type III materials and provide imported backfill material.
- D. Backfill placed within six (6) inches of any structure or pipe shall be free of rocks or unbroken clods of earth larger than four (4) inches in any dimension.
- E. All material that is determined to be unsuitable for use as bedding and backfill or that is in excess of the amount required shall be removed immediately and disposed of properly by the Contractor.

2.3 USE OF SUITABLE BEDDING AND BACKFILL MATERIAL

A. Backfill types shall be used in accordance with the following provisions:

1. Pipe zone backfill (bedding, haunching and shading), as defined under paragraph 3.6 Bedding and Backfill herein, shall be Type I Bedding and Backfill Material (Class 2 Aggregate Base) unless otherwise specified on the plans.
2. Trench zone backfill, as defined under paragraph 3.6 Bedding and Backfill herein, for pipelines in public and private streets and other paved areas shall be Type I Bedding and Backfill Material (Class 2 Aggregate Base).
3. Trench zone backfill in future roadway or street rights-of-way or in off road locations (e.g., easements) may be Type III Bedding and Backfill Material (native trench soil) so long as specified compaction is achieved.
4. Final Backfill as defined under "Pipe and Utility Trench Backfill" herein, for pipelines in public and private streets and other paved areas shall be Type I Bedding and Backfill Material (Class 2 Aggregate Base).
5. Backfill around structures, vaults, and valve boxes shall be Type I Bedding and Backfill Material (Class 2 Aggregate Base).
6. Backfill used to replace structure and pipeline trench over-excavation of wet or soft trench bottom conditions shall be Coarse Bedding and Backfill Material (Drain Rock/Foundation Rock) with a geotextile fabric envelope (minimum one-foot overlap) around the rock to prevent migration of fines.
7. Controlled Low Strength Material may be used for bedding, pipe zone backfill and trench zone backfill whenever pre-approved in writing by CCCSD or shown on the plans.
8. Trenches in landscaped or cultivated areas shall have the top twelve (12) inches backfilled with topsoil.

2.4 FILTER FABRIC

Filter fabric shall be as specified in Section 15.02275 - Geotextile Fabric.

2.5 TRENCH DAMS, AND PIPE ANCHORS

Trench Dams and Pipe Anchors shall be provided at the locations shown on the plans and shall be constructed as shown in the Standard Drawings as follows:

- Trench Dams: DWG-33
- Pipe Anchors: DWG-43

Trench dams shall be of the length and width dimensions shown in the detail, shall extend below finished grade as shown in the detail, and shall be constructed of controlled low strength material (CLSM) as specified in Section 15.03330 - Controlled Low Strength Material (CLSM).

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. Prior to any excavation and backfill work, the Contractor shall obtain and provide CCCSD with copies or other evidence of acquisition thereof, all required permits for the work, including but not limited to: County and/or City encroachment permits, CCCSD permits, Cal/OSHA excavation permit, and Competent Person certification.
- C. See Section 15.02515 - Asphalt Concrete Pavement and Base Restoration for saw-cutting requirements.
- D. Material to be used for backfill shall be laid alongside of the trench and kept trimmed so as to cause as little inconvenience as possible to public travel and the normal use of adjacent properties. However, stockpiled material shall be kept a minimum of two feet from the edge of the trench and the face of the stockpile shall be sloped as required in Section 15.02160 Shoring, Excavation Support and Protective Systems. Free access must be provided to all fire hydrants, water gates, meters, and private drives. Gutters or other drainage ways shall be kept clear unless other temporary provisions are made for maintaining drainage.
- E. In advance of placing sewer pipe or structures, material within the area where such pipe or structures are to be placed, which in the opinion of the

Inspector is unsuitable including, but not limited to vegetable matter, garbage, and junk piles, either on the surface or buried, shall be removed and disposed of in accordance with the provisions of Section 15.02051 - Clearing, Grubbing, Demolition, Abandonment, Removal, Disposal and Salvage.

- F. Water to control dust resulting from grading operations, excavation, backfill, and the passage of traffic through the work area shall be applied by means that will ensure a uniform application of water with no runoff.
- G. The Contractor shall remove and dispose of all excess excavated material at a suitable preferred site(s). The Contractor shall obtain all necessary fill and grading permits and a written release from property owners upon completion of use of said sites.

3.2 STRUCTURE EXCAVATION

- A. Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of these materials shall conform to the lines and grades shown on the plans or as directed by the Inspector. Unless otherwise provided, the entire construction site shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other measures required for the removal or exclusion of water, including storm water, groundwater, and wastewater reaching the site of the work from any source so as to provide dry working conditions and to prevent damage to the work or adjoining property. Excavations shall be benched, sloped, shored or otherwise supported in a safe manner in accordance with Section 15.02160 Shoring, Excavation Support and Protective Systems, applicable State safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).
- B. Excavation under structures, manholes, vaults and others: Except where otherwise specified for a particular structure or directed by the Inspector, excavation shall be carried to the grade of the bottom of the bedding. Where shown on the plans or directed by the Inspector, areas beneath structures shall be over-excavated. The exposed surface shall be scarified to a depth of six (6) inches, brought to optimum moisture content, and compacted to ninety-five percent (95%) Relative Compaction. Where over-excavation is directed by the Inspector to provide for the placement

of foundation rock over wet or soft soils, scarification and re-compaction shall not be performed.

3.3 TRENCH EXCAVATION

- A. Excavation for sewers shall be made only after pipe and other necessary materials are delivered on the site of the work. After such delivery, trench excavation shall proceed as rapidly as possible, and the pipe installed and the trench backfilled without undue delay. In public street areas, excavation and pipe installation shall be coordinated to the end that a minimum of interference with public traffic will result.
- B. Refer to table below for required trench widths according to nominal pipe size.

Nominal Pipe Size	2"	4"	6"	8"	10"	12"	14"	15"	16"	18"	24"
Trench Width	18"	18"	24"	24"	30"	30"	36"	36"	36"	36"	42"

- C. The pipe bedding shall be given a final trim, using a string line for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the bottom of the pipe. The Contractor shall excavate bell holes at pipe joints.
- D. For trenching in existing streets, excavation and pipe installation shall be coordinated so that no more than one hundred (100) linear feet of trench shall be open at any time. Backfilling operations shall closely follow pipe installation. In new subdivisions more than one hundred (100) feet of trench may be opened if allowed by the Inspector and if the excavation is properly shored, sloped or benched. All trenches shall be fully backfilled at the end of each day or, properly shored and covered by heavy steel plates adequately braced and capable of supporting HS-20 vehicle loads in those locations subject to traffic and with one and one-eighth (1-1/8) inch plywood in off road locations where it is impractical to backfill at the end of each day. Use of steel traffic plates is subject to the prior approval of the agency issuing the encroachment permit. Traffic plates shall be staked in place, with adjacent plates tack-welded together, and shall be provided with non-skid coating. Compacted cold mix asphalt shall be placed around the plate perimeter to provide a smooth transition from adjacent pavement.
- E. Where the bottom of the trench becomes soft or is unstable due to groundwater and/or movement of construction equipment, the Contractor shall over-excavate unsuitable material to a minimum depth of nine (9)

inches below the base elevation to establish a stable foundation for the bedding or to a depth as otherwise directed by the Inspector. Geotextile fabric shall be placed on the over-excavated trench bottom and staked to the trench walls, coarse bedding material in conformance with these specifications shall be placed on the fabric, and the fabric shall then be un-staked from the trench wall and wrapped over the coarse bedding material forming a closed envelope with a minimum one (1) foot overlap at the top edges of the fabric.

- F. Any over-excavation carried below the grade ordered, specified, or shown, shall be backfilled and compacted to the required grade with the specified material.

3.4 EMBANKMENT EXCAVATION

- A. The relative compaction of the natural ground area upon which embankments are to be constructed, for a depth of not less than two (2) feet below finished grade, shall be not less than ninety percent (90%) Relative Compaction.
- B. If finished grade is less than three (3) feet, above natural ground, the natural ground shall be excavated to a depth of not less than three (3) feet below finished grade and re-compacted to a relative compaction of not less than ninety percent (90%).
- C. When embankments are to be made and compacted on hillsides, or where new fill is to be compacted against existing embankments, the slopes of the original hillside, old or new fill, shall be cut into a minimum of six (6) feet horizontally as the work is brought up in layers. Material thus cut out shall be re-compacted along with the new fill. Fill shall be compacted to a Relative Compaction of not less than ninety percent (90%).

3.5 EXCAVATION IN VICINITY OF TREES

Trees shall be protected from injury during excavation and backfilling operations as required in Section 15.02900 - Protection of Trees and Restoration of Landscaping.

3.6 BEDDING AND BACKFILL

- A. Except for required foundation material (in an envelope of geotextile fabric) coarse bedding material being placed in over-excavated areas,

where water or soft ground is present, backfill shall not be placed until after all water is removed from the excavation.

- B. Pipe zone bedding and backfill operations shall be performed in accordance with the following requirements:
1. Type I Bedding and Backfill Material (Class 2 Aggregate Base) shall be placed and properly compacted in the pipe zone. The pipe zone is defined as that portion of the vertical trench cross-section lying between a plane four (4) to six (6) inches below the bottom surface of the pipe, i.e., the trench sub-grade, and a plane at a point twelve (12) inches above the top outside surface of the pipe. The sub-zones of the pipe zone are defined as follows:
 - a. "Bedding" is that portion of the Pipe Zone between the bottom of the trench or the top of required foundation material and the lowest point on the outside surface of the pipe barrel excepting bells;
 - b. "Haunching" is that portion of the Pipe Zone between the top of the Bedding and the horizontal centerline of the pipe;
 - c. "Shading" is that portion of the Pipe Zone between the top of the Haunching and a horizontal plane twelve (12) inches above the highest point on the outside surface of the pipe barrel excepting bells.
 2. Controlled Low Strength Material (CLSM) shall be provided in lieu of Type I Bedding and Backfill Material where indicated on the plans. Contractor shall provide a method to prevent pipe from floating during backfill. (The remaining portions of the trench shall be backfilled as specified elsewhere in this Section.)
 3. After compacting the bedding, the Contractor shall perform a final trim using a stringline for establishing grade, such that each pipe section when laid will be continually in contact with the bedding along the bottom of the pipe. The Contractor shall provide bell holes at each pipe joint.
 4. Backfill in trenches shall be placed uniformly on each side of the pipe to prevent displacement. The Contractor shall exercise care to prevent damage to the pipeline coating, cathodic bonds, or the pipe itself during the installation and backfill operations. The Contractor shall hand shovel slice the bedding along the sides of the pipe in order to ensure filling any voids under the pipe haunches.
- C. A colored detectable metallic foil core plastic tape, at least three (3) inches in width, shall be placed on top of the pipe zone backfill wherever sewers

are installed. The tape shall have printed on it the words "Caution: Sewer Buried Below." The warning tape shall be utilized for all pipes (mains and laterals).

- D. After the pipe zone backfill has been placed as specified above, and after all excess water has completely drained from the trench, backfilling of the trench zone may proceed. The trench zone is defined as that portion of the trench excavation between the top of the Shading and the ground surface in unpaved areas, and the horizontal plane at lowest point of the pavement structural section in paved areas.
- E. "Final Backfill" is that portion of the Trench Zone in paved areas between the top of the trench backfill and the lowest point of the pavement structural section.
- F. Joint utility trench excavations shall conform to the requirements shown on DWG-18 of the Standard Drawings.

3.7 PLACING AND SPREADING OF BACKFILL AND EMBANKMENT MATERIALS

- A. Backfill materials shall be placed and spread evenly in layers. The backfill layers shall be evenly spread so that each layer shall not exceed eight (8) inches in un-compacted thickness. Backfill layers greater than eight (8) inches but no more than twenty-four (24) inches may be used after the Contractor demonstrates by compaction testing as specified in Section 3.8 below, that required compaction levels will be achieved.
- B. During spreading, each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer. Pipe zone backfill materials shall be manually spread around the pipe so that when compacted, the pipe zone backfill will provide uniform bearing and side support.
- C. Where the backfill material moisture content is below the optimum moisture content, water shall be added before or during spreading until the proper moisture content is within the range where the specified compaction can be achieved.
- D. Where the backfill material moisture content is too high to permit the specified degree of compaction, the material shall be bladed, aerated or dried and/or mixed with dryer material until the moisture content is satisfactory.
- E. Whenever selection is possible, embankment material having a sand equivalent value of less than ten (10) shall be deposited in the lower

portions of embankments and no such material shall be placed within three (3) feet of planned finished grade.

- F. When the embankment material consists of large rocky material, or hard lumps such as hardpan or cemented gravel which cannot be broken readily, such material shall be well distributed throughout the embankment, and sufficient earth or other fine material shall be placed around the large material as it is deposited so as to fill the interstices and produce a dense compact embankment, but in no case shall any material exceed twenty-four (24) inches in any dimension.

3.8 COMPACTION OF BACKFILL AND EMBANKMENT MATERIALS

- A. Each layer of backfill material as defined herein, shall be mechanically compacted to the specified percentage of maximum density. Equipment that is consistently capable of achieving the required degree of compaction shall be used and each layer shall be compacted over its entire area while the material is at the required moisture content. Compaction at the top of the pipe zone shall be done using a plate compactor.
- B. Flooding, ponding, or jetting shall not be used.
- C. Equipment weighing more than ten thousand (10,000) pounds shall not be used within a horizontal distance equal to the depth of the trench. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.
- D. The following compaction requirements shall be in accordance with ASTM D 1557 except for free draining materials (i.e., Coarse Bedding Material/Drain Rock/Foundation Material), which shall be in accordance with ASTM D 4253 and D 4254 for cohesionless free draining type materials. Where other public agency, utility company or encroachment permit requirements govern, the highest compaction standards shall apply.

<u>Location or Use of Fill</u>	<u>Percent (%) Relative Compaction</u>
Pipe zone backfill including bedding and over excavated foundation zone.	90
Final backfill beneath paved areas or structures.	95
Trench backfill in unpaved easement or future street areas.	90

Trench Zone backfill.	90
Backfill under structures.	95
Backfill around structures under paved areas.	95
Backfill around structures in landscaped areas.	90
Embankment material	90

- E. The Contractor shall maintain the indicated trench cross section at a minimum of twelve (12) inches above the top of the pipe (the top of the “Pipe Zone”).
- F. Embankments shall be constructed as recommended by the geotechnical engineer in compacted layers of uniform thickness.
- G. At the time of compaction, the moisture content of embankment material shall be such that the relative compactions specified will be obtained and the embankment will be in a firm and stable condition. Embankment material which contains less than the required moisture content shall be watered and material which contains excessive moisture shall not be compacted until the material is dry enough to obtain the required compaction.

3.9 TEMPORARY PAVING

A minimum of two (2) inches of cold or hot mix temporary asphalt shall be placed in finished trenches and rolled to a smooth surface at the end of each day unless final paving can be completed or steel plates are used to cover trenches in paved streets. Traffic plates shall be subject to the requirements of Paragraph 3.3.D. The temporary asphalt shall be placed within one-quarter (1/4) inch of finished pavement grade.

- END OF SECTION -

SECTION 15.02270

EROSION CONTROL (VEGETATIVE)

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall provide erosion protection including fertilizing, seeding, and mulching for all disturbed areas that are not to be paved or otherwise treated, as specified, and other areas as shown on the plans.
- B. Erosion Control (Vegetative) may be used as temporary erosion protection of landscaped areas as approved by CCCSD. However, prior to final acceptance of landscaped areas Erosion Control (Vegetative) shall be replaced with the proper landscape material.
- C. Erosion Control (Vegetative) shall be supplemented by straw bales, jute netting, and other similar erosion protection methods until the vegetative growth has been established.
- D. An erosion control blanket shall be installed per manufacturer recommendations, in the following areas; non-landscaped areas, areas with slope gradients over 3:1, areas where mechanical compaction is not feasible, and areas parallel or perpendicular to drainage swales.
- E. Erosion control measures shall be included as an element of the Contractor's Storm Water Pollution Prevention Plan (SWPPP).

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Fertilizer shall be a commercial, chemical type, uniform in composition, free-flowing, conforming to state and federal laws and suitable for application with equipment designed for that purpose. Fertilizer shall have a guaranteed analysis showing no less than eleven percent (11%) nitrogen, eight percent (8%) available phosphoric acid, and four percent (4%) water-soluble potash.
- B. Seed shall be delivered in original unopened packages bearing an analysis of the contents. Seed shall be guaranteed ninety-five percent (95%) pure with a minimum germination rate of eighty percent (80%). Seed mix shall be equal parts by weight of fescue and perennial ryegrass

or perennial ryegrass and barley. Other mixes such as those specified by Caltrans or the local agency having jurisdiction may be proposed by the Contractor and used if approved by CCCSD.

- C. Mulch shall be a fibrous, wood cellulose product produced for this purpose. It shall be dyed green and shall contain no growth or germination inhibiting substances, and shall be manufactured so that when thoroughly mixed with seed, fertilizer, and water, in the proportions specified it will form homogenous slurry which is capable of being sprayed.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. Fertilizing, seeding, or mulching operations will not be permitted when wind velocities exceed fifteen (15) miles per hour or when the ground is frozen, unduly wet, or otherwise not in tillable conditions.
- C. The ground to be seeded shall be reasonably free of large rocks, roots, and other material which will interfere with the work.
- D. Fertilizer, seed, and mulch may be applied separately (Dry Method), or they may be mixed together with water and the homogeneous slurry applied by spraying (Hydraulic Method), except that all slopes steeper than three (3) units horizontal to one (1) unit vertical shall be stabilized by the hydraulic method.

3.2 DRY METHOD

- A. The fertilizer shall be spread uniformly at the rate of eight hundred (800) pounds per acre (approximately 1 lb per 55 square feet). The fertilizer shall be raked in and thoroughly mixed with the soil to a depth of approximately two (2) inches prior to the application of seed or mulch.
- B. The seed shall be broadcast uniformly at the rate of sixty (60) lbs/acre (approximately 1 lb per 730 sq ft). After the seed has been distributed it shall be incorporated into the soil by raking or by other approved methods.

- C. Mulch shall be applied at the rate of one thousand five hundred (1,500) pounds (air dried weight) per acre (approximately 1 lb per 30 sq ft).

3.3 HYDRAULIC METHOD

The hydraulic method consists of the uniform application by spraying of a homogeneous mixture of water, seed, fertilizer, and mulch. The slurry shall be prepared by mixing the ingredients in the same proportions as specified above. The slurry shall have the proper consistency to adhere to the earth slopes without lumping or running. Mixing time of materials shall not exceed forty five (45) minutes from the time the seeds come into contact with the water in the mixer to the complete discharge of the slurry onto the slopes; otherwise the batch shall be recharged with seed. The mixture shall be applied using equipment containing a tank, having a built-in continuous agitation and recirculation system, and a discharge system that will allow application of the slurry to the slopes at a continuous and uniform rate. The application rates of the ingredients shall be the same as those specified for the Dry Method. The nozzle shall produce a spray that does not concentrate the slurry nor erode the soil.

3.4 WATERING

Upon completion of the erosion control seeding, the entire area shall be soaked to saturation by a fine spray. The new planting shall be kept watered by a sprinkling system on the site during dry weather or whenever necessary for proper establishment of the planting until final project acceptance. At no time shall the planting be allowed to dry out. Care shall be taken to avoid excessive washing or ponding on the surface. Any damage caused by excessive washing or ponding shall be repaired by the Contractor. The Contractor shall provide his own water supply.

3.5 MAINTENANCE PRIOR TO FINAL ACCEPTANCE

The Contractor shall maintain the planted areas in a satisfactory condition until final acceptance of the project. Such maintenance shall include the filling, leveling, and repairing of any washed or eroded areas, as may be necessary and sufficient watering to maintain the plant materials in a healthy condition. CCCSD may require replanting of any areas in which the establishment of the vegetative ground cover does not appear to be developing adequately.

- END OF SECTION -

SECTION 15.02275
GEOTEXTILE FABRIC

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install geotextile fabric in accordance with the provisions of this Section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02205 - Excavation, Bedding and Backfill
- B. Section 15.02515 - Asphalt Concrete Pavement and Base Restoration

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM D 276	Test Methods for Identification of Fibers of Textiles
ASTM D 4354	Practice for Sampling of Geosynthetics for Testing
ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles
ASTM D 4533	Standard Test Methods for Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	Test Method for Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	Test Method for Determining Apparent Opening Size of a Geotextile
ASTM D 4833	Standard Test Methods for Index Puncture Resistance of Geomembranes and Related Products
ASTM D 4873	Guide for Identification, Storage and Handling of Geosynthetic Rolls and Samples
TxDOT 3099	Geotextile Asphalt Retention

PART 2 – PRODUCTS

2.1 GEOTEXTILE FABRIC FOR WRAPPING FOUNDATION ROCK

- A. Geotextile fabric wrapped around the foundation rock material shall be a high modulus woven fabric. The fabric shall be inert to commonly encountered chemicals, rot-proof, and resistant to ultraviolet light exposures, insects, and rodents. The fabric shall meet the following physical requirements:

Property	Requirement	Test Method
Grab/Elongation, lbs./%	160 x 160 / 150 x 50	ASTM D 4632
Trapezoidal Tearing Strength, lbs.	60 x 60	ASTM D 4533
Apparent Opening Size	US Sieve <70	ASTM D 4751
Puncture, lbs.	95	ASTM D 4833
Permeability, Sec-1/gpm/ft.	1.4/110	ASTM D 4491

- B. Geotextile fabric shall be as listed in the CCCSD Approved Materials List.

2.2 GEOTEXTILE FABRIC FOR PAVING

- A. Geotextile fabric for paving shall be a non-woven material consisting of at least eighty-five percent (85%) by weight of polyolefin, polyesters, or polyamides. The fabric shall be resistant to chemical attack, rot and mildew and shall have no tears or defects that will adversely alter its physical properties. The fabric shall be specifically designed for pavement application and be heat bonded on one side only to assist in preventing bleed through of tack coat and sticking of fibers to wheels of lay-down equipment. The fabric shall meet the following physical requirements:

Property	Requirement	Test Method
Tensile Strength, lbs.	80	ASTM D 4632
Elongation, percent	50	ASTM D 4632
Asphalt Retention, gal/sq yd	0.2	TxDOT 3099
Melting Point, degrees F	300	ASTM D 276
Surface Texture	Heat bonded on one side only	Visual inspection

Note: All numerical values shown above represent minimum average roll values. Test results from any sampled roll in a lot shall meet or exceed the minimum values shown. Lots shall be sampled in accordance with ASTM D 4354.

- B. Geotextile paving fabric shall be as listed in the Approved Materials List.

2.3 TACK COAT

The tack coat used to bond the fabric to the base pavement shall be in accordance with the requirements of Section 15.02515 - Asphalt Concrete Pavement and Base Restoration, except that the use of cutbacks or emulsions that contain solvents shall not be allowed.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. Geotextile fabric shall be provided in rolls wrapped with protective covering to protect the fabric from mud, dirt, dust, debris, ultraviolet radiation, and abrasion. The fabric shall be free of defects or flaws that significantly affect its physical properties. Each roll of fabric in the shipment shall be labeled in accordance with ASTM D 4873.
- C. Geotextile fabric shall be handled and placed in accordance with the manufacturer's recommendations.

3.2 INSTALLATION OF GEOTEXTILE FABRIC FOR FOUNDATION ROCK

- A. Geotextile fabric for foundation rock shall be installed as specified in the project plans and as specified in Section 15.02205 - Excavation, Bedding and Backfill. The geotextile fabric shall be wrapped entirely around the rock with a minimum twelve (12) inch overlap. Punctures in the geotextile fabric shall be covered with a twelve (12) inch square minimum patch.
- B. Geotextile fabric and foundation rock shall be provided beneath sanitary sewer manholes and structures where water or soft ground is present.

3.3 PAVEMENT SURFACE PREPARATION

The pavement surface shall be cleaned to remove all dirt, water, and oil from base pavement or aggregate base rock. Cracks one quarter (1/4) inch wide and

wider shall be cleaned and filled with suitable bituminous material or by a method approved by CCCSD and/or the local jurisdiction. Crack filling material shall be allowed to cure prior to geotextile placement. Where pavement is severely cracked, rutted, deformed, or otherwise distressed, a leveling course shall be placed as directed by CCCSD and/or the local jurisdiction.

3.4 TACK COAT

- A. Minimum air and pavement temperature shall be fifty degrees Fahrenheit (50°F) or higher for placement of asphalt and shall be sixty degrees Fahrenheit (60°F) or higher for placement of asphalt emulsion.
- B. The sealant material shall be spread by means of a calibrated pressure distributor truck. The asphalt sealant shall be uniformly spray-applied to the prepared dry pavement surface at the rate of 0.20 to 0.30 gallons per square yard or as recommended by the geotextile manufacturer and approved by CCCSD. When using emulsions, the application rate must be increased as directed by CCCSD to offset water content of the emulsion. Some underlying surfaces may require a higher application rate. Within street intersections, on steep grades, or in other zones where vehicle speed changes are commonplace, the normal application rate shall be reduced about twenty percent (20%) as directed by CCCSD but to no less than 0.20 gallons per square yard.
- C. For paving grade asphalt cements, the distributor tank temperature shall not be less than two hundred eighty five degrees Fahrenheit (285°F) nor exceed three hundred twenty five degrees Fahrenheit (325°F) to avoid damage to the geotextile. For asphalt emulsions, the distributor tank temperatures shall be maintained between one hundred thirty degrees Fahrenheit (130°F) and one hundred sixty degrees Fahrenheit (160°F).
- D. The target width of sealant application shall be geotextile width plus six (6) inches. The sealant shall be applied only as far as in advance of geotextile installation as is appropriate to insure a tacky surface at the time of geotextile placement. Fabric shall be placed the same day as the sealant. Traffic shall not be allowed on the sealant. Excess asphalt shall be cleaned from the road surface.

3.5 PLACEMENT OF GEOTEXTILE FABRIC FOR PAVING

- A. The geotextile shall be placed into the sealant using mechanical or manual laydown equipment capable of providing a smooth installation with a minimum amount of wrinkling or folding prior to the sealant cooling and losing tackiness. When asphalt emulsions are used, the emulsion shall be

allowed to cure properly, essentially with no moisture remaining prior to placing the geotextile and overlay. Wrinkles or folds in excess of one (1) inch shall be slit and laid flat. All transverse joints and slit folds or wrinkles shall be shingle-lapped in the direction of the paving operation. Brooming and/or pneumatic rolling will be required to maximize geotextile contact with pavement surface. Additional hand-placed sealant material may be required at laps and repairs as determined by CCCSD and/or the local jurisdiction.

- B. All areas with fabric placed shall be paved the same day. No traffic except necessary construction equipment and emergency vehicles shall be allowed to drive on the fabric. Turning of the paver and other vehicles shall be done gradually and kept to a minimum to avoid movement and damage to the geotextile. Abrupt starts and stops shall also be avoided. Damaged geotextile shall be removed and replaced with the same type of geotextile, and the overlaps shall be shingle-lapped in the direction of paving. Overlaps shall not exceed six (6) inches.

3.6 PLACEMENT OF OVERLAY OR TRENCH PATCH

- A. All areas in which fabric has been placed shall be paved during the same day. The temperature of the hot mix shall not exceed three hundred twenty five degrees Fahrenheit (325°F). Sealant bleeding through the geotextile shall be removed. Excess sealant can be removed by broadcasting hot mix or sand on the fabric. Excess sand or hot mix should be removed before beginning the paving operation. In the event of rainfall on the fabric prior to the placement of the asphalt overlay, the fabric must be allowed to dry completely before asphalt is placed. This will prevent the trapping of water (steam) under the hot asphalt that could induce cracking.
- B. Asphalt concrete pavement shall be placed over the geotextile fabric to a minimum thickness of two and one half (2-1/2) inches or the thickness required by the local jurisdiction, whichever is greater in accordance with the requirements specified in Section 15.02515 - Asphalt Concrete Pavement and Base Restoration.

- END OF SECTION -

SECTION 15.02330

HORIZONTAL DIRECTIONAL DRILLING (HDD)

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall furnish and install sewer pipe, complete and in place, by the horizontal directional drilling (HDD) method. All work shall be performed as indicated on the plans and as required in these Specifications and shall be supervised by personnel experienced in HDD pipe installation. Note that HDD installation of sewers will only be allowed where the design slope is at least three percent (3%; $S = 0.0300$).
- B. The HDD rig and tooling shall be of sufficient capacity to complete the pilot bore, reaming and pull-back of pipe.
- C. The drilling fluid mixing and delivery system shall be of sufficient capacity to successfully complete the HDD work.
- D. The Contractor shall provide all materials, labor, equipment and services necessary for bypass pumping and/or diversion of sewage flow (if required), installation of sewer pipe and testing of the completed pipe system.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02145 - Bypassing Wastewater
- B. Section 15.02160 - Shoring, Excavation Support and Protective Systems
- C. Section 15.02205 - Excavation, Bedding and Backfill
- D. Section 15.02730 - Pipeline Cleaning, Testing and Televising
- E. Section 15.15000 - Piping, General
- F. Section 15.15061 - Ductile Iron Pipe (DIP)
- G. Section 15.15064 - Polyvinyl Chloride (PVC) Pipe
- H. Section 15.15066 - High Density Polyethylene (HDPE) Pipe

1.3 CONTRACTOR SUBMITTALS

A. The Contractor shall submit the following no later than fourteen (14) days prior to the planned date for commencement of work:

1. Cut Sheets for field staking at twenty (20) foot intervals along the proposed centerline of the pipe alignment. No HDD work shall be started prior to CCCSD's field check of the stakes.
2. Site maps to scale indicating the locations proposed for pipe assembly work (e.g., butt-fusion welding), laydown areas, pipe and material storage areas, insertion and receiving pits, Pipe location monitoring grid, tanks, pumps, HDD rig and trailers.
3. Technical data for pipe and fittings, and pipe joining, drilling, reaming, pulling and locating equipment.
4. A proposed construction sequencing plan.
5. Procedure for handling and disposal of drilling fluids and cuttings including the locations of disposal sites.
6. Calculations of anticipated HDD installation loads demonstrating that the pipe and pipe fittings system is capable of withstanding the anticipated installation and operating loads with an appropriate factor of safety.
7. Calculations of minimum penetration rates for all reaming passes.
8. Contingency Plan for dealing with the potential for drilling fluids to surface (e.g., through hydrofractures).
9. Material Safety Data Sheets (MSDS) for all drilling fluids, lubricants, and other products used for the HDD drilling and pipe installation work.
10. A statement of the qualifications of the foreman, local operator and crew who will be responsible for HDD work. No Substitution of these personnel shall be made without the written acceptance of CCCSD.

B. The Contractor shall submit the following installation information daily:

1. Raw pilot hole data including all magnetic steering and surface monitoring readings.

2. The pitch and three (3) dimensional (x, y, z) coordinates of the probe for every drill rod length or thirty (30) feet, whichever is shorter length. Coordinates shall be referenced to the drilling entry pit coordinate taken as the origin (0, 0, 0).
3. A log of the maximum thrust, maximum torque, and maximum slurry flow during pull back at every drill rod length or thirty (30) feet whichever is shorter length.
4. Records of any hydrofracture encountered or other problems and correction measures taken.

1.4 QUALITY ASSURANCE

- A. The Contractor shall test and inspect the installed pipeline and shall conduct post-job television inspection in accordance with the requirements of Section 15.02730 - Pipeline Cleaning, Testing and Televising.
- B. All HDD work shall be done by a qualified Contractor with at least five (5) years experience with HDD and a minimum of three (3) projects of similar diameter, depth, and length.

PART 2 – PRODUCTS

2.1 PIPE

The Contractor shall provide restrained-joint Ductile Iron Pipe as specified in Section 15.15061, restrained-joint or thermo-fusion welded PVC Pipe as specified in Section 15.15064, or thermo-fusion welded High Density Polyethylene Pipe as specified in Section 15.15066.

2.2 HDD EQUIPMENT AND MATERIALS

- A. The drill unit shall be a remote-steerable tunneling system that is designed and is capable of accurately drilling (true to line and grade as specified on the drawings) through the ground conditions identified in the geotechnical report and in bedrock and in mixed bedrock and soil face conditions. The drilling system shall utilize a high-pressure, low-volume, slurry-assisted, mechanical excavation technology capable of installing pipelines of the diameter shown on the plans.
- B. The drilling slurry compound shall be totally inert.
- C. The Contractor shall provide and use an electronic detection system that

is capable of continuously locating the position of the drilling head to an accuracy of one percent (1%) of the depth in both the horizontal and vertical planes (e.g., within 0.1 feet when the drilling head is ten (10) feet deep), if the design slope of the sewer being installed by HDD is less than ten percent (10%; $S = < 0.010$ feet per foot). Where the design slope for the sewer being installed by HDD is equal to or greater than ten percent (10%), the electronic detection system shall be capable of continuously locating the drilling head to an accuracy of five percent (5%) of the depth in both the horizontal and vertical planes (e.g., within 0.5 feet when the drilling head is ten (10) feet deep).

- D. All drilling equipment shall have a permanent, inherent alarm system capable of detecting an electrical current. The equipment shall be grounded and shall be equipped with an audible alarm to warn the operator when the drill head nears electrified cable.
- E. All crews shall be provided with grounded safety mats, heavy gauge ground cables with connectors, hot boots and gloves.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. The Contractor shall protect all surface and subsurface site improvements, facilities, and utility pipelines, ducts and conduits from being damaged by the directional drilling operation.

3.2 PREPARATION

- A. Cut Stakes shall be provided at twenty (20) foot intervals along centerline to provide for monitoring of the drilling head.
- B. Easements shall be staked at fifty (50) foot intervals.
- C. Potholing shall be required for marked utilities within ten (10) feet of centerline.
- D. The Contractor shall walk the alignment to check for potential sources of interference that could affect the accuracy of the drilling head locating

system. The Contractor shall properly calibrate the locating system prior to beginning and regularly during the HDD operation as required to achieve the accuracy specified in Subsection 2.2.C of this Section.

3.3 BYPASS PUMPING

The Contractor shall provide bypass pumping and/or diversion in accordance with the requirements of Section 15.02145 - Bypassing Wastewater when required for acceptable completion of the pipe installation.

3.4 PIPE INSTALLATION

- A. The Contractor shall locate, design, construct, properly brace or shore, dewater, maintain, and restore insertion and receiving pits. Insertion and receiving pits shall be a minimum of four (4") feet by six (6") feet in horizontal cross section and shall be shored in accordance with Section 15.02160 - Shoring, Excavation Support and Protective Systems. Bracing shall be adequate to resist drilling and pull-back loads.
- B. The Contractor shall employ a slurry-assisted, mechanical excavation process for the HDD operation. The drilling slurry compound shall maintain boring stability and provide lubrication to reduce frictional drag while the pipe is being installed. The Contractor shall employ a mobile vacuum spoils recovery vehicle or drilling fluid recycling system to remove drilling spoils from the access pits. The Contractor shall collect, transport, and properly dispose of drilling spoils away from the jobsite. Disposal of drilling spoils to sanitary, storm or other public or private drainage systems or waterways is strictly prohibited. The Contractor shall immediately clean up any leakage or spillage of drilling fluids.
- C. Mechanical, pneumatic, or water-jetting methods are unacceptable due to the possibility of surface subsidence.
- D. After a pilot bore has been completed, a reamer shall be installed at the termination pit and the bore shall be reamed, as many times as necessary, for proper insertion of the pipe, before the pipe is pulled back to the starting pit. The reamer shall be capable of discharging drilling slurry compound to facilitate the installation of the pipe into a stabilized and lubricated tunnel.
- E. Prior to insertion of thermo-fusion welded PVC or HDPE pipe larger than six (6) inches in diameter, the Contractor shall properly remove all internal weld beads from the interior surface of the pipe.

- F. During insertion, the pipe shall be supported on roller supports to isolate the pipe from the ground or pavement and avoid damage to the pipe.
- G. During pull back operations, the maximum safe pulling load for the pipe shall not be exceeded.
- H. Prior to making connection at each end of an installed reach of HDPE or PVC pipe, the Contractor shall allow a minimum of six (6) hours to elapse to allow pipe to relax from the tension resulting from pulling the pipe into and for the pipe to equalize with ambient ground temperature.
- I. Upon completion of boring and pipe installation, the Contractor shall remove all spoils, debris and unsuitable material from the starting and termination pits. All pits shall be backfilled in accordance with the requirements of Section 15.02205 - Excavation, Bedding and Backfill.
- J. The installed pipeline shall be within six (6) inches horizontal and one (1) inch vertical of the alignment indicated in the Plans at all locations. In addition, for gravity sewers the pipeline shall be free-draining throughout.
- K. The Contractor shall repair, replace or compensate the respective Owners for any damage to property including, but not limited to, utilities, pavements, landscaping and other improvements.

- END OF SECTION -

SECTION 15.02340

BORING AND JACKING (STEEL CASING)

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall furnish and install steel casings and sewer pipelines, complete and in place at the specified alignment and grade using horizontal boring and jacking methods. All work shall be performed as indicated on the plans and required in these Specifications, and shall be supervised by personnel experienced in the installation of pipe by boring and jacking methods.
- B. The Contractor shall furnish all materials, labor, equipment and services necessary for bypass pumping, and or diversion of sewer flows, installation of casing and sewer pipes and testing of the completed system.
- C. The Contractor shall be responsible for any settlement of overlying improvements, heaving of the surface, displacement of underground utilities and structures or other damage that results from the boring and jacking operations.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02140 – Excavation Dewatering
- B. Section 15.02160 - Shoring, Excavation Support and Protective Systems
- C. Section 15.02205 - Excavation, Bedding and Backfill
- D. Section 15.02730 – Pipeline Cleaning, Testing and Televising
- E. Section 15.03600 - Grout
- F. Section 15.15070 - Steel Pipe

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:
 - ANSI/AWS D1.1 Structural Welding Code Steel

B. Codes:

1. Cal/OSHA, State of California Administrative Code, Title 8, Industrial Relations, Chapter 4, Subchapter 20, Tunnel Safety Orders.
2. Occupational Safety and Health Administration (OSHA) Regulations,
29 CFR Part 1926, Subpart S.

1.4 CONTRACTOR SUBMITTALS

A. Contractor shall submit the following a minimum of fourteen (14) days prior to the scheduled commencement of work:

1. Description of methods, procedures and equipment proposed for installation of the casing and carrier pipe, including methods used for checking the as-installed line-and-grade of the casing and the location of and procedures for muck disposal.
2. Casing installation schedules that address excavation, casing and carrier pipe installation and backfill operations.
3. Materials list and casing details including diameter, thickness, and class of steel, and fabrication drawings from the casing supplier.
4. Detailed locations, sizes and shoring design of all jacking and receiving pits.
5. Groundwater control methods, drawings, details and equipment information.
6. Procedures and methods for installation of the carrier pipe including pipe insulator details and spacing.
7. Grouting or sand placement equipment, procedures and proposed mixtures for grouting or filling the annular space between the casing and the carrier pipe.
8. Lists, catalog cuts and specifications for pipe insulators and end seals.
9. Site map to scale indicating locations and dimensions of jacking and receiving pits, pipe and material storage areas, cranes, trailers and other equipment.

10. Procedures for preventing uncontrolled loss of ground through the tunnel face and plan for closure of tunnel should uncontrolled loss of ground occur.
11. Boring and jacking personnel qualifications and welders certificates.
12. For bore and jack tunnel lengths greater than one hundred (100) linear feet, provide jacking force estimates and jacking pad (e.g., backstop) capacity calculations.

1.5 QUALITY ASSURANCE

- A. All boring and jacking work shall be done by a qualified Contractor with at least five (5) years of boring and jacking experience including a minimum of three (3) projects of similar in diameter, depth and length to the work to be done.
- B. The Contractor shall request a pre-construction meeting with the Inspector a minimum of one (1) day in advance of the start of boring operations.
- C. The Contractor shall perform all work in the presence of the Inspector, unless the Inspector has granted prior approval to perform such work when absent.
- D. All welding procedures used to fabricate steel casings shall be prequalified under the provisions of ANSI/AWS D1.1.
- E. The Contractor shall check line-and-grade using surveying methods, or other methods approved by CCCSD, from inside the casing at least every fifty (50) feet unless otherwise permitted by CCCSD. The following tolerances apply to the installation of the casing pipe:
 1. Horizontal (Line): 12 inches at the termination point.
 2. Vertical (Grade): 3 inches high at the termination point.
6 inches low at the termination point.

If, at any time during the boring and jacking operation, it becomes apparent that installation may not meet these tolerances, the Contractor shall propose and implement a modification of operations so as to meet the tolerance criteria. If one or both of the tolerance criteria is exceeded at the completion of the casing installation, the Contractor shall install a new casing. Subject to the approval of CCCSD, the Contractor may propose another method to correct the deficiency in line and or grade of the casing pipe. These methods may include modifying the insulator/skid

assemblies, or revising the design of upstream or downstream portions of the job, if adequate grade is available.

- F. All sewer pipe installed in bored and jacked casings shall be cleaned, tested and televised in accordance with Section 15.02730 – Pipeline Cleaning, Testing and Televising of these Specifications.

1.6 SAFETY

The Contractor shall obtain an underground classification from the State of California, Department of Industrial Relations, Division of Occupational Safety and Health Administration (Cal/OSHA). The Contractor shall perform work in conformance with all applicable federal, state and local safety requirements.

PART 2 – PRODUCTS

2.1 STEEL CASING

- A. The minimum interior diameter of metal castings shall be eight (8) inches greater than the maximum outside diameter of the sewer pipe barrel to be installed, not including bells.
- B. Casings shall be welded steel pipe no less than the minimum diameter and thickness shown on the plans. The Contractor may propose a greater casing diameter or thickness for the method of work, loadings involved, and site conditions, subject to the review and additional requirements of CCCSD. Such increases of the casing diameter shall not interfere with existing utilities.
- C. The steel casing pipe shall be furnished in accordance with Section 15.15070 - Steel Pipe, unless shown otherwise. Casing section joints shall be butt welded, lap welded, or welded using butt straps in the field. If butt welded, each end of the casing shall be prepared by providing a one-quarter (1/4) inch by forty-five degree (45°) chamfer on the outside edges. Casings larger than thirty-six (36) inches in diameter shall have at least one grout coupling every eight (8) feet longitudinally along the casing for contact grouting the annular void outside the casing due to overcutting.

2.2 GROUT AND SILICA SAND

- A. The annular space between the carrier pipe and the casing shall be filled with grout or silica sand. If grout is used, it shall be proportioned to flow and to completely fill all voids between the carrier pipe and the casing and

shall conform to the requirements for abandonment grout of Section 15.03600 - Grout.

- B. Silica Sand shall be equivalent to that produced by Unimin Corporation; alternative sand mixtures proposed by the Contractor shall be submitted and are subject to approval by CCCSD.

2.3 CARRIER PIPE INSULATORS

Pipe Insulators and pipe end seals shall be as listed in the Approved Materials List.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. Prior to any boring and jacking work, the Contractor shall obtain and provide CCCSD with copies of all required permits including, but not limited to, County and/or city encroachment permits.
- C. Prior to starting any other work, the Contractor shall pothole all underground utilities and/or other facilities marked or suspected to be within ten (10) feet of the planned bore and jack alignment to determine the actual clear distance between each utility and/or other facility and the planned alignment.
- D. The Contractor shall use boring and jacking equipment that is compatible with the ground conditions as described in the Geotechnical Report, if one is available, or the results of soils exploration conducted during construction.

3.2 JACKING AND RECEIVING PITS

- A. The Contractor shall provide a working slab for the jacking pit to provide stable support for guide rails, thrust blocks, and other construction operations. The working slab shall not be connected to thrust blocks. The Contractor shall provide a minimum of two (2) layers of thirty (30) pound roofing felt placed between the working slab and thrust block.

- B. The Contractor shall provide temporary fencing around all pit excavations. Provide traffic control around working areas and pits located within or adjacent to streets, roadways, freeways, driveways or parking lots in accordance with encroachment permit requirements, as appropriate.
- C. After jacking equipment and excavated materials from the boring or jacking operations have been removed from the jacking and receiving pits, the Contractor shall prepare the bottom of the pits to receive the extensions of the carrier pipe, place and compact backfill materials, and restore the jacking and receiving pit sites in accordance with Section 15.02205 - Excavation, Bedding and Backfill.
- D. Provide dewatering wells or other methods of groundwater control in accordance with Section 15.02140 - Excavation Dewatering.
- E. Provide shoring systems for the boring, jacking and receiving pits in accordance with Section 15.02160 - Shoring, Excavation and Support Protective Systems.

3.3 INSTALLATION OF STEEL CASING

Installation of the casing shall be in accordance with the plans and shop drawings, and shall be subject to the approval of the local agency having jurisdiction over the area containing the boring and jacking operations. The Contractor shall:

- A. Provide adequate timber, structural steel and/or concrete jacking frame, thrust blocks, pipe cradles and/or guide rails to ensure accurate control of the boring alignment, and to provide uniform distribution of jacking force over the perimeter of the casing and the thrust block/soil interface. Adequate space shall be provided within the excavation, and in the length of the jacking frame, to permit the insertion of the casing sections. The jacking frame, thrust blocks and pipe cradles shall be adequately anchored or braced so as to maintain the orientation of the jacks in line with the axis of the casing.
- B. Provide a steel jacking head fitted to the lead section of the casing in such a manner that it extends around the entire outer surface of the steel casing and projects at least eighteen (18) inches beyond the leading end of the casing. The jacking head shall not be more than one-half (1/2) inch greater in diameter than the outside diameter of the casing pipe. The head shall be securely anchored to prevent any wobble or alignment variation during the boring or jacking operations.

- C. Provide a closed-face boring head capable of minimizing loss of ground if unstable soil conditions, such as raveling, squeezing, flowing, or running are anticipated.
- D. Provide jacks and backstops of adequate capacity to push the casing through the soil with a minimum factor of safety of 2.0 or greater.
- E. Place the casing pipe on cradles and/or guide rails, and direct it in the proper line and grade. Line up the jacking assembly in the direction and grade of the tunnel. Weld all casing joints completely prior to jacking.
- F. Control the application of the jacking pressure and excavation of materials ahead of the casing as it advances to prevent the casing from becoming earthbound or from deviating from the required line and grade.
- G. Carry out excavation entirely within the jacking head, not in advance of the head to minimize voids outside the casing. Coordinate the advance of the casing and boring rate to avoid over-excavation. Maintain a soil plug inside the jacking head and steel casing as required to minimize loss of ground. Restrict the excavation of the materials to the least clearance necessary to prevent binding in order to avoid loss of ground and consequent settlement or possible damage to overlying pavements, utilities or structures.
- H. Remove excavated materials from the casing as the boring and jacking operation progresses. No accumulation of excavated materials within the casing shall be permitted.
- I. Repair any surface or subsurface damage that occurs as a result of the boring and jacking operation.

3.4 INSTALLATION OF SEWER PIPE

- A. The Contractor shall install the sewer pipe to the line and grade shown on the plans. Each individual pipe length or section shall be supported with pipe insulators/skids in accordance with the recommendations of both the pipe and insulator/skid manufacturers.

3.5 FILLING OF ANNULAR SPACE

- A. The Contractor shall completely fill the annular space between the casing pipe and the carrier pipe with grout or silica sand, and shall furnish all grout, equipment, hoses, valves, and fittings necessary for the grouting operation. Grout shall be placed by concrete pump through a pipe or

hose. The Contractor shall provide plugs or bulkheads at each end of the casing to contain the grout fill. The plugs or bulkheads shall be designed to withstand the anticipated grouting pressure and to prevent ground water intrusion into the casing. All necessary precautions shall be taken as instructed by the Inspector, to prevent uplift or floating of the pipe during grouting.

- B. When using silica sand to fill the annular space around the carrier pipe, the carrier pipe shall be properly covered at both ends, allowing for a vent on one end and a threaded member at the other that will allow sand to flow into the pipe. Pumping of sand shall be complete when the sand has come out the other end and completely filled the annular space around the carrier pipe.

- END OF SECTION -

SECTION 15.02350

PIPE BURSTING

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall furnish and install sewer pipe, complete and in place, by the pipe bursting method. All work shall be performed as indicated on the plans and as required in these Specifications and shall be supervised by personnel experienced in installation of pipe using the pipe bursting technique. The Contractor shall provide all materials, labor, equipment, and services necessary for bypass pumping and/or diversion of sewage flows, installation of sewer pipe, and testing of completed pipe system.
- B. The Contractor's pipe bursting equipment shall be capable of bursting the host pipe and installing the new pipe as shown on the plans and specified herein.
- C. The Contractor shall be responsible for repairing or replacing existing utilities, pavements, structures or other improvements damaged by the pipe bursting work.
- D. If pipe bursting operation results in a partial or complete blockage of the public main sewer, the Contractor shall immediately notify CCCSD's Inspector. In such a case, CCCSD's wastewater bypass and construction crew will be dispatched, and the Contractor will be billed for all CCCSD's costs incurred to clear the blockage.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02145 - Bypassing Wastewater
- B. Section 15.02160 - Shoring, Excavation Support and Protective Systems
- C. Section 15.02205 - Excavation, Bedding and Backfill
- D. Section 15.02701 - Manholes and Rodding Inlets
- E. Section 15.02730 - Pipeline Cleaning, Testing and Televising
- F. Section 15.15000 - Piping, General
- G. Section 15.15064 - Polyvinyl Chloride (PVC) Pipe
- H. Section 15.15066 - High Density Polyethylene (HDPE) Pipe

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM F 585 Practice for Insertion of Flexible Polyethylene Pipe into Existing Sewers

1.4 CONTRACTOR SUBMITTALS

A. For main sewer jobs, the Contractor shall submit the following items to CCCSD for review prior to ordering pipe materials and/or commencement of work.

1. Pipe manufacturer's technical information; physical properties of pipe; joining/fusion method; dimensions of pipe and fittings; manufacturer's recommendation for handling; storage and repair of pipe and fittings; and certificate of compliance of the pipe and fittings with these Specifications.
2. Method of pipe bursting; type of bursting tool (e.g., pneumatic, static) and installation equipment; procedures for operating the equipment; copies of any technology licenses; and types of lubricant and Material Safety Data Sheets (MSDS).
3. Estimated pull load, jacking/winch, cable/tow rod capacity for static pipe bursting method.
4. Pneumatic hammer size and winch capacity.
5. Service connection restoration plan/installation schedule; shop drawings and written description of the entire construction sequence, procedures for bedding pipe and insertion/reception/lateral connection pits; plan to remove and dispose of old pipe (if necessary) and a contingency plan.
6. Contingency plans for the following: unforeseen obstructions causing burst stoppage, surface heave, damage to existing utilities and improvements, loss of return to line and grade, and sewer backup.
7. Sewer bypassing plans and procedures required under Section 15.02145 - Bypassing Wastewater.
8. Site layout including: location/dimension of insertion and reception pits; pipe layout and joining work areas; storage and equipment

layout areas; proposed modifications of manholes; and traffic control plans.

9. Reports from independent testing laboratory certifying that the pipe material including physical properties and dimensions meet the requirements of these Specifications.
10. Contractor's pipe bursting qualifications.
11. Data from potholing of existing utilities
12. Procedures for protection of existing utilities, structures and other improvements.

1.5 QUALITY ASSURANCE

- A. Pipe bursting work shall be done by a qualified Contractor with at least five (5) years of pipe bursting experience including a minimum of three (3) projects of similar in pipe size and length to the work to be done.
- B. The Contractor shall fully clean the sewer proposed for pipe bursting and shall call the CCCSD Inspection Office at least one (1) business day in advance to arrange for an Inspector to be present for the pre-installation TV inspection.
- C. The Contractor shall conduct a post-installation TV inspection for all pipe bursting projects. The installation shall not be accepted if any sag of more than 0.0625 times the nominal pipe size (e.g., 1/4 inch for 4-inch diameter pipe) is evident in the post-installation TV inspection.

PART 2 – PRODUCTS

2.1 PIPE

The Contractor shall provide restrained-joint or thermo-fusion welded PVC pipe as specified in Section 15.15064 - Polyvinyl Chloride (PVC) Pipe, or thermo-fusion welded HDPE pipe (minimum SDR 17) as specified in Section 15.15066 - High Density Polyethylene (HDPE) Pipe.

2.2 FIELD JOINTS AND COUPLINGS

Joints in HDPE pipe shall be butt-fusion welded prior to insertion in accordance with Section 15.15066 - High Density Polyethylene (HDPE)

Pipe. Electrofusion couplings shall be used on inaccessible locations. Electrofusion couplings used to install fittings at insertion and/or receiving pits shall be Frialen Electrofusion Couplings, as manufactured by Friatec, Inc., or approved equals.

PART 3 – EXECUTION

3.1 GENERAL

Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 HANDLING OF PIPE

The Contractor shall exercise special care during the unloading, handling and storage of PVC and HDPE pipe to ensure that the pipe is not cut, gouged, scored or otherwise damaged. Any pipe which has cuts in the pipe wall exceeding ten percent (10%) of the wall thickness shall not be used and shall be removed from the site. The pipe shall be stored so that it is not deformed axially or circumferentially which may hinder pipe installation.

3.3 BYPASS PUMPING AND TEMPORARY SERVICE CONNECTIONS

The Contractor shall provide bypass pumping and/or diversion in accordance with the requirements of Section 15.02145 - Bypassing Wastewater when required for acceptable completion of the pipe installation.

3.4 INSTALLATION OF PIPE

- A. The Contractor shall conduct a pre-installation TV inspection for all pipe bursting projects. The Contractor shall call the CCCSD Inspection Office at least one (1) business day in advance to arrange for an Inspector to be present for the pre-installation TV inspection. The Contractor shall fully clean the sewer proposed for pipe bursting prior to the arrival of the Inspector so that the TV inspection will reveal any deficiencies in the line (e.g., sags, offsets and/or repaired sections that could affect pipe bursting). Deficiencies shall be corrected prior to pipe bursting.
- B. Prior to starting any other work, the Contractor shall pothole all underground utilities and/or other facilities marked or suspected to be

within ten (10) feet of the planned pipe burst alignment to determine the actual clear distance between each utility and/or other facility and the existing pipeline.

- C. The Contractor shall locate, design, construct, properly brace or shore, dewater, maintain, and restore insertion and receiving pits. Insertion and receiving pits shall be large enough to accommodate a minimum of two (2) hydraulic shoring jacks, a ladder for access/egress and adequate space for the work. Tunneling or undermining adjacent to any trench or excavation is prohibited. All work shall be shored in accordance with Section 15.02160 - Shoring, Excavation Support and Protective Systems.
- D. The Contractor shall fully expose the main sewer where a lateral is to be replaced to within four (4) feet of its point of connection to the main sewer, so that the point of connection can be inspected.
- E. The insertion pit shall be large enough so that the pipe can be installed without exceeding the manufacturer's recommendations for curvature of the pipe.
- F. The Contractor shall insert the new pipe into the existing pipe in accordance with the requirements of ASTM F 585. Internal beads shall be removed for all sewers.
- G. The Contractor shall not drag the pipe over rocks or rough surfaces that may damage the pipe. An appropriate pulling head shall be attached to the end of the pipe and shall be used for pulling the pipe at all times. Pulling the pipe by a flanged end will not be allowed.
- H. The pipe bursting machine shall be equipped with a direct-reading pulling force gauge acceptable to CCCSD. The maximum pulling force that may be applied to any pipe shall be as follows:

HDPE-SDR 17 (DIPS) Nominal Pipe Size	Outside Diameter (inches)	Minimum Wall Thickness (inches)	Average Inside Diameter (inches)	Allowable Maximum Pulling Force (lbs)
4-inch	4.800	0.282	4.202	3,500
6-inch	6.900	0.406	6.039	7,500
8-inch	9.050	0.532	7.922	13,000
10-inch	11.100	0.653	9.726	20,000
12-inch	13.200	0.776	11.555	28,000

- I. When the Contractor proposes to pull through bends greater than forty-five degrees (45°), the existing pipe shall be exposed to allow a minimum radius of two (2) feet at bends. Realigned pipe shall be properly bedded and backfilled in accordance with Section 15.02205 - Excavation, Bedding and Backfill after bursting.
- J. The pipe shall be pulled a minimum of two (2) feet beyond the planned connection to allow inspection of the condition of the pipe (e.g., for scarring or other damage).
- K. Connections to existing pipes in insertion and receiving pits shall employ fittings or couplings listed in the CCCSD Approved Materials List. Prior to making connection at each end of an installed reach of pipe with fittings or couplings, the Contractor shall allow a minimum of six (6) hours to elapse to allow pipe to relax from the tension resulting from pulling the pipe and for the pipe to equalize with ambient ground temperature.
- L. Connections at manholes shall be in accordance with Section 15.02701-Manholes.
- M. Upon completion of pipe installation, the Contractor shall remove all spoils, debris and unsuitable material from the insertion and receiving pits. All pits shall be backfilled in accordance with the requirements of Section 15.02205 - Excavation, Bedding and Backfill.

- END OF SECTION -

SECTION 15.02360

CURED IN PLACE PIPE (CIPP)

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall furnish and install cured in place pipe (CIPP), as indicated on the plans and as required in these Specifications. Work shall be supervised by personnel experienced in installation of cured in place pipe. The Contractor shall furnish all materials, labor, equipment and services necessary for bypass pumping, and or diversion of sewer flows, pretreatment or disposal of process wastewater, installation of sewer pipe and testing of completed piping system.
- B. The Contractor shall obtain a CCCSD permit for all CIPP side sewer repair projects, one (1) business day prior to the start of work.
- C. The Contractor shall obtain a CCCSD Special Discharge Permit if it proposes to discharge CIPP process wastewater to the public sewer system. Process wastewater shall not be discharged to storm drains, gutters watercourses, swales, impoundments or onto the ground.
- D. Side Sewers shall be thoroughly cleaned prior to calling for pre-installation TV inspection. Side sewers will be considered acceptable for CIPP repair if all of the following criteria are conclusively met at the pre-installation TV inspection:
 - 1. Pipe shall be free of debris and root intrusion, and thoroughly clean
 - 2. No sag (standing water) >1/2 inch
 - 3. No joint offset > 1/4 inch
- E. If the CIPP side sewer repair operation results in a partial or complete blockage of the public main sewer, the Contractor shall immediately notify CCCSD's Inspector.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02730 – Pipeline Cleaning, Testing and Televising

1.3 QUALITY ASSURANCE

- A. The Contractor shall clean and test the installed cured in place pipe in accordance with the requirements of Section 15.02730 – Pipeline Cleaning, Testing and Televising.
- B. For all side sewers proposed for CIPP repair, the Contractor shall conduct both pre-job and post-installation TV inspections using equipment that produces an image satisfactory to the CCCSD Inspector. The Contractor shall call the CCCSD Inspection Office at least one (1) business day in advance to arrange for an Inspector to be present for the pre-installation TV inspection. The installation shall not be accepted if any sag of more than 0.0625 times the nominal pipe size (e.g., 1/4 inch for 4-inch diameter pipe) is evident in the post installation TV inspection.
- C. Televising of the main line may be required at the discretion of the Inspector.

1.4 CONTRACTOR SUBMITTALS

- A. Prior to installation of the line, design calculations shall be submitted to determine the minimum thickness of the liner to be installed. The pipe design shall have sufficient strength to support all dead loads, live loads and groundwater loads imposed.
- B. Evidence of operator certification for the CIPP system proposed and a copy of the manufacturer's system written procedures shall be submitted to CCCSD prior to the start of work.

PART 2 – PRODUCTS

2.1 GENERAL

Prior to starting work, an encroachment permit (if working in a public right-of-way), and all tools and materials needed for the job, including (but not limited to) CIPP wetting, insertion and curing equipment, pipe, fittings, couplings, shoring, gas detector, ladder, trench plates (if needed for street installations) or one and one-eighth (1-1/8) inch plywood (for off-road installations) shall be onsite.

2.2 PERMA-LINER AND MAXLINER

Perma-Liner and Maxliner System materials and products shall be provided as specified by the manufacturer's list of materials and procedures. Contractor shall

submit a copy of the materials list and applicable procedures to CCCSD prior to the start of work.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. Any deficient work identified during or after construction shall be properly repaired or replaced by open-cut or pipe bursting at the discretion of the CCCSD Inspector.
- C. The finished CIPP shall be continuous over the entire length of the service lateral connection at the mainline. The inner seal shall be free of dry spots, lifts and de-lamination.

3.2 PRELIMINARY CLEANING

Sewers shall be cleaned of all debris, roots and other materials that would block proper inversion of the cured-in-place-pipe, prior to the post-job TV inspection. All cleaning procedures shall be done as specified in Section 15.02730 - Pipeline Cleaning, Testing and Televising.

3.3 LINING

- A. During preparation, placement and curing, a CIPP system manufacturer-certified operator shall be on the jobsite in charge of the work and the Contractor shall strictly comply with the CIPP system manufacturer's written procedures.
- B. The finished pipe must be such that when the resin cures, the total wall thickness will be a homogeneous and monolithic felt composite coated with PVC that will be chemically resistant to withstand internal exposure to domestic sewage.

- END OF SECTION -

SECTION 15.02515

ASPHALT CONCRETE PAVEMENT AND BASE RESTORATION

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall perform all work associated with Asphalt Concrete (AC) pavement and base restoration as specified herein and satisfying all the encroachment permit requirements of agencies having right-of-way jurisdiction, whichever is more stringent.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02205 - Excavation, Bedding and Backfill
- B. Section 15.02275 - Geotextile Fabric

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:

ASTM D 1188 Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples

ASTM D 1557 Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))

ASTM D 2950 Test Method for Density of Bituminous Concrete in Place by Nuclear Methods

AASHTO T 209 Maximum Specific Gravity and Density of Bituminous Paving Mixtures

Caltrans Standard
Specification, Section 37 Bituminous Seals

Caltrans Standard
Specification, Section 39 Asphalt Concrete

Caltrans Standard

Specification, Section 59	Painting
Caltrans Standard Specification, Section 84	Traffic Stripes and Pavement Markings
Caltrans Standard Specification, Section 85	Pavement Markers
Caltrans Standard Specification, Section 92	Asphalts
Caltrans Standard Specification, Section 93	Liquid Asphalt
Caltrans Standard Specification, Section 94	Asphaltic Emulsions

PART 2 – PRODUCTS

2.1 GENERAL

Without limiting the generality of other requirements of the plans, all work specified herein shall conform to or exceed the requirements of the local jurisdiction.

2.2 AGGREGATE BASE

Aggregate base shall be Type I backfill material as specified in Section 15.02205 - Excavation, Bedding and Backfill.

2.3 PRIME COAT

Prime coat shall be Grade SC-70 liquid asphalt complying with the requirements of Caltrans Standard Specification, Section 93.

2.4 TACK COAT

Tack coat shall be emulsified asphalt Grade SS-1 or SS-1h, CSS-1 or CSS-1h diluted with one (1) part water to one (1) part emulsified asphalt. Emulsified asphalt shall comply with the requirements of Caltrans Standard Specification, Section 94.

2.5 ASPHALT

Asphalt shall be Grade AR-4000 complying with the requirements of Caltrans Standard Specification, Section 92.

2.6 ASPHALT-AGGREGATE COURSE MIXTURE

- A. The job-mix formula for the asphalt-aggregate mixture shall be within the limits specified in Caltrans Standard Specifications, Section 39. Asphalt aggregate shall be Type A, one half inch (1/2") maximum, medium.
- B. The asphalt-aggregate course mixture shall meet the Caltrans Standard Specifications, Section 39-2.02.

2.7 PAVEMENT MARKINGS, STRIPES, PAVEMENT MARKERS AND CURB PAINTING

- A. Stripes and pavement marking replacement shall be thermoplastic material in accordance with Caltrans Standard Specifications, Section 84.
- B. Pavement marker replacement shall be in accordance with Caltrans Standard Specifications, Section 85.
- C. Paint for replaced curbs, where required for fire lanes, no parking zones, and other similar markings shall match existing color and be in accordance with Caltrans Standard Specifications, Section 59-6.
- D. Pavement lane delineators shall match existing and shall be in accordance with Caltrans Standard Specifications requirements.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

B. Pavement Restoration

Pavement cut for trenching and/or damages caused during the work must be restored with a cross section equal to that of the existing road, or a minimum of two and one-half (2-1/2) inches of asphalt over six (6) inches of aggregate base (whichever is greater). The limits of the pavement restoration must extend to competent existing pavement, and shall be "T-cut" with a minimum width equal to the trench width plus twelve (12) inches on each side of the trench. Where the edge of the "T-cut" is within twenty-four (24) inches of the edge of the existing paving, restoration in that area must extend to the edge of the road.

3.2 SUBGRADE PREPARATION

The subgrade shall be prepared as specified Section 15.02205 - Excavation, Bedding and Backfill. The surface of the subgrade after compaction shall be hard, uniform, smooth, self-draining and true to grade and cross-section with roller.

3.3 PREPARATION OF EXISTING AC PAVEMENT

The edge of existing AC pavement shall be saw cut to provide a smooth joint for new pavement. The Contractor may saw cut or mechanically grind the pavement before excavating the trench to facilitate removal of pavement. After trench backfill and compaction the Contractor shall saw cut and remove a minimum of twelve (12) inches AC beyond any irregular or damaged pavement on each side of the trench before installation of the trench pavement patch.

3.4 AGGREGATE BASE

Aggregate base (AB) shall be provided where shown to the thickness required. The Contractor shall install aggregate base to match existing pavement AB thickness or a thickness of six (6) inches, whichever is greater. AB shall be delivered to the jobsite as uniform mixtures and each layer shall be spread in one (1) operation. Segregation shall be avoided and the base shall be free of pockets of coarse or fine material. Where the required thickness is six (6) inches or less, the base materials may be spread and compacted in one (1) layer. Where the required thickness is more than six (6) inches the base material shall be spread and compacted in two (2) or more layers of approximately equal thickness. The maximum compacted thickness of any single layer shall not exceed eight (8) inches. The compaction of each layer of aggregate base shall be not less than ninety-five percent (95%) of maximum density when measured in accordance with ASTM D 1557. The compacted surface of the finished

aggregate shall be hard, uniform, smooth, self-draining and true to grade and cross-section.

3.5 PRIME COAT

Prior to placing pavement a prime coat shall be applied to the compacted base or subgrade at a rate between 0.30 and 0.50 gal/sq yd.

3.6 TACK COAT

A tack coat shall be applied to existing paved surfaces where new asphalt concrete is to be placed on or against existing pavement. It shall also be applied to the contact surfaces of all pavement joints, curbs, gutters, manholes and the like immediately before the adjoining asphalt pavement is placed. Care shall be taken to prevent the application of tack coat material to surfaces that will not be in contact with the new asphalt concrete pavement. Tack coat shall be applied at the rate of 0.20 to 0.30 gal/sq yd.

3.7 ASPHALT CONCRETE

- A. At the time of compaction, the temperature of mixture shall not be lower than two hundred eighty-five degrees Fahrenheit (285°F) or higher than three hundred twenty-five degrees Fahrenheit (325°F), the lower limit to be approached in warm weather and the higher in cold weather.
- B. Asphalt concrete shall not be placed when the atmospheric temperature is below fifty degrees Fahrenheit (50°F) or during unsuitable weather.
- C. Asphalt concrete shall be spread and compacted in the number of layers and thicknesses specified in Caltrans Standard Specifications, Section 39-6.
- D. The Contractor shall install asphalt concrete to match existing pavement AC thickness, to a thickness of two and one-half (2-1/2) inches or to the depth required by the local jurisdiction, whichever is greater.
- E. The depositing, distributing and spreading of the asphalt concrete shall be accomplished in a single, continuous operation.
- F. The mix shall be compacted using suitable compaction methods immediately after placing.

- G. Upon completion, the final surface, pavement shall be true to grade and cross-section. The edge between new and existing pavements shall be flush. When a ten (10) foot long straightedge is laid on the finished surface parallel to the center of the roadway, the surface shall not vary from the edge of the straight edge more than one-eighth (1/8) inch except at intersections or changes of grade. In the transverse direction, the surface shall not vary from the edge of the straightedge more than one-quarter (1/4) inch.
- H. The relative density after compaction shall be ninety-six percent (96%) of the density obtained by using AASHTO Test Method T 209. A properly calibrated nuclear asphalt testing device shall be used for determining the field density of compacted asphalt concrete in accordance with ASTM D 2950, or cores may be laboratory tested in accordance with ASTM D 1188. The Contractor shall supply certified test reports of the adequacy of compaction. The Contractor shall provide a minimum of one (1) compaction test per day and an additional compaction test for each five hundred (500) square feet completed.
- I. The minimum pavement patch section for all locations shall be two and one-half (2-1/2) inches of AC over six (6) inches of AB.

3.8 PAVEMENT MARKINGS, STRIPES, PAVEMENT MARKERS AND CURB PAINTING

- A. The Contractor shall restore all existing pavement markings, stripes and pavement markers to their original or better condition. Stripes and pavement marking replacement shall be installed in accordance with Caltrans Standard Specifications, Section 84 unless otherwise directed by CCCSD.
- B. Pavement marker replacement shall be installed in accordance with Caltrans Standard Specifications, Section 85 unless otherwise directed by CCCSD.
- C. Paint for replaced curbs, where required for fire lanes, no parking zones and other similar markings shall be installed in accordance with Caltrans Standard Specifications, Section 59-6 unless otherwise directed by CCCSD.

3.9 SLURRY SEAL

- A. For all locations that will not receive a full-width pavement overlay, a slurry seal shall be applied to match the surfaces of adjacent existing pavement and to cover the joint between the pavement patch and the existing

pavement. Before placing slurry seal the pavement shall be cleaned by sweeping or other means necessary to remove all loose particles of paving, dirt and other extraneous material.

- B. The slurry seal shall be mixed in accordance with the requirements of Caltrans Standard Specifications, Section 37-2.04 and the following provisions:
 - 1. Mixing machines shall be equipped with a water pressure system and nozzle type spray bars to provide a rate of application of the fog spray. The mixing machine shall be adjusted to compensate for ambient temperature, surface texture, etc., and shall cover the entire surface without flowing or ponding.
- C. The slurry mixture shall be uniformly spread by means of a controlled spreader box conforming to the requirements of Caltrans Standard Specifications, Section 37-2.05.
- D. The slurry mix shall be placed in accordance with the requirements of Caltrans Standard Specification, Section 37-2.06 and the following provisions:
 - 1. Slurry seal shall not be placed if the pavement or the air temperature is below fifty-five degrees Fahrenheit (55°F).
 - 2. Slurry seal shall be feathered onto existing pavement to provide a smooth transition between new and existing pavements.
- E. All existing and new manhole covers, valve boxes, vault covers and the like shall be temporarily covered during slurry sealing to prevent contact with these surfaces. The temporary coverings shall be removed after application of the slurry seal.

3.10 ASPHALT CONCRETE PAVEMENT OVERLAY

- A. Pavement grinding shall be performed such that the new finished pavement grade accurately matches the grade of existing gutters and storm drain inlets and restores the existing street crown sloping.
- B. Where indicated on the plans, the Contractor shall install geotextile paving fabric in accordance with Section 15.02275 - Geotextile Fabric prior to placement of the pavement overlay.

- C. Existing manhole covers, valve and survey monuments pots and vault lids shall be raised to the new pavement grade as required by each agency with jurisdiction over these appurtenances. The Contractor shall restore any utility structures and appurtenances that become damaged during grinding or overlay work including, but not limited to, raising castings to match new finished grades and repairing concrete collars. The Contractor shall coordinate work with those utility agencies that require repairs to be performed by their own forces.
- D. Any joint between overlaid pavement and existing pavement shall be slurry sealed per Paragraph 3.9 upon completion of the overlay work. Existing pavement markings shall be restored in accordance with the requirements of Paragraph 3.8 above.
- E. Overlaid pavement shall be flush with the existing pavement grade at all joints with existing pavement and/or gutters.

- END OF SECTION -

SECTION 15.02522

CURBS, GUTTERS, SIDEWALKS AND DRIVEWAYS

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish all labor, materials, and equipment necessary to construct as shown on the plans or restore curbs, gutters, sidewalks, and driveways removed, damaged or displaced.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02051- Clearing, Grubbing, Demolition, Abandonment, Removal, Disposal, and Salvage
- B. Section 15.02205 - Excavation, Bedding and Backfill
- C. Section 15.02515 - Asphalt Concrete Pavement and Base Restoration
- D. Section 15.03310 - Cast-in-Place Concrete

1.3 CONTRACTOR SUBMITTALS

- A. Submit manufacturers' literature for all machines specifically designed for such work (i.e., machines to construct asphaltic concrete curbs).
- B. Material submittals for concrete shall be in accordance with the requirements of Section 15.03300 - Cast-in-Place Concrete. Submittals for AC shall be in accordance with Section 15.02515 - Asphalt Concrete Pavement and Base Restoration.

PART 2 – PRODUCTS

2.1 MATERIALS

Concrete shall conform to the requirements specified in Section 15.03310 - Cast-In-Place Concrete. Asphaltic concrete shall conform to the requirements specified in Section 15.02515 - Asphalt Concrete Pavement and Base Restoration.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. Curbs, gutters, sidewalks and driveways shall be constructed by the conventional use of forms unless CCCSD has favorably reviewed the Contractor's submittal proposing the use of a curb and gutter machine. Curb and gutter machines shall be specifically designed for such work, and the resulting products shall be equal to or better than would typically be obtained using forms. If the results are not satisfactory, then use of machines shall be discontinued.

3.2 SURFACE PREPARATION

- A. Where any curb, gutter, sidewalk or driveway has been removed, damaged, or displaced, the same shall be replaced to the nearest construction joint to the same dimensions and finish as the original construction that was removed, damaged or displaced. Features to be demolished shall be saw cut at the limiting construction joints and all demolished curbs, gutters, sidewalks or driveways shall be removed and disposed of by the Contractor.
- B. The subgrade shall be constructed and compacted true to line and grade, as required. All soft or unsuitable material shall be removed to a depth of not less than nine (9) inches below subgrade elevation and replaced with satisfactory material.

3.3 FORMS

Forms conforming to the dimensions of the curb, gutter, sidewalk or driveway shall be carefully set to line and grade and shall be securely staked in place. The forms and subgrade shall be watered immediately in advance of placing concrete. Forms shall be thoroughly cleaned each time they are used and shall be coated with light oil or other releasing agent of a type that will not discolor the concrete.

3.4 PLACEMENT

- A. Concrete shall be thoroughly spaded away from the forms to eliminate rock pockets next to the forms. The concrete may be compacted by mechanical vibrators acceptable to CCCSD. Tamping or vibrating shall continue until the mortar flushes to the surface and the coarse aggregate is below the concrete surface.
- B. Expansion joints shall be located to match the expansion joints in the removed curb, gutter, sidewalk or driveway. Expansion joints shall be constructed vertical and at right angles to the centerline of the street. Joints shall be constructed at all radius points, driveways, alley entrances, and at adjoining structures.
- C. Crack-control joints shall be constructed not more than fifteen (15) feet apart. Joints shall be made by the use of steel dividers, scoring or saw cutting to a depth of not less than one and one-half (1-1/2) inches and matching joints in adjacent sidewalks and/or driveways.

3.5 FINISH

The surface shall be finished with appropriate finishing tools to match adjacent existing finish. The front-face form shall not be removed before the concrete has taken the initial set and has sufficient strength to carry its own weight. Gutter forms and rear forms shall not be removed until the concrete has hardened sufficiently to prevent damage to the edges. Any portion of the curb, gutter, sidewalk or driveway that is damaged shall be replaced by the Contractor.

3.6 TESTING AND TOLERANCES

- A. All surfaces shall be tested by laying a ten (10) foot long straightedge along the surface. Any deviation from the lines and grades indicated in the plans of more than one-quarter (1/4) inch in the ten (10) foot length shall be cause for rejection. Similarly, any section of the work that is deficient in depth shall be removed and replaced.
- B. When required by the Inspector, gutters having a slope of 0.8 foot per one hundred (100) feet, or less, or gutters having unusual or special conditions that cast doubt on the capability of the gutter to drain, shall be water tested for proper drainage. Water testing shall consist of establishing flow in the length of gutter to be tested by supplying water from a hydrant, tank truck or other source. One (1) hour after the water source is removed, the gutter shall be visually inspected for evidence of ponding or improper shape. In the event water is found ponding in the gutter or on adjacent pavement to a depth of one-half (1/2) inch or greater, or on the adjacent

asphalt pavement, the defect or defects shall be corrected by the Contractor.

- END OF SECTION -

SECTION 15.02600

LATERALS AND BUILDING SEWERS (SIDE SEWERS)

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish all pipe, fittings, tools, materials and labor required to install and test sanitary sewer laterals, in accordance with the requirements of the Plans and Standard Specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02145 - Bypassing Wastewater
- B. Section 15.02205 - Excavation, Bedding and Backfill
- C. Section 15.03330 - Controlled Low-Strength Material (CLSM)
- D. Section 15.02522 - Curbs, Gutters and Sidewalks
- E. Section 15.02730 - Pipeline Cleaning, Testing and Televising
- F. Section 15.02900 - Protection of Trees and Restoration of Landscaping
- G. Section 15.15000 - Piping, General
- H. Section 15.15055 - Vitrified Clay Pipe (VCP)
- I. Section 15.15061 - Ductile Iron Pipe (DIP)
- J. Section 15.15064 - Polyvinyl Chloride (PVC) Pipe
- K. Section 15.15066 - High-Density Polyethylene (PVC) Pipe
- L. Section 15.15068 - Cast Iron Soil Pipe (CIP)
- M. Section 15.15072 - Acrylonitrile-Butadiene-Styrene (ABS) Pipe

PART 2 – PRODUCTS

2.1 GENERAL

- A. Referenced pipe sizes are nominal pipe diameters. The minimum size for side sewers serving single-family dwellings shall be four (4) inches. The minimum size for side sewers serving all other properties shall be six (6) inches.

- B. All side sewers materials shall be new, free from defects, and marked to identify manufacturer, material, class and other appropriate information.

2.2 PIPE, FITTINGS AND APPURTENANCES

- A. Only pipe, fittings, couplings, appurtenances and other components listed in the Approved Materials List shall be used for side sewer construction or repair.
- B. Warning tape shall be three (3) inch wide green plastic electronically detectable marking tape labeled "Buried Sewer Line Below," and installed above the pipe zone.

2.3 OVERFLOW PROTECTION DEVICES

Overflow Protection Devices (OPD) and utility boxes shall be as listed in the Approved Materials List and as shown on DWG-23 of the Standard Drawings. Utility boxes over OPDs in areas subject to vehicular traffic shall be rated for H-20 traffic service. Utility boxes over OPDs shall be fitted with a grate lid and box extensions, if required to provide proper clearances.

PART 3 – EXECUTION

3.1 GENERAL

- A. A cleanout shall be installed within two (2) feet of the building foundation, and:
 - 1. At intervals not to exceed one hundred (100) feet of laid pipe length;
 - 2. At bends where accumulated deflection from the last downstream cleanout equals or exceeds ninety degrees (90°).
 - 3. At any single bend greater than forty-five degrees (45°)
 - 4. At intervals along the side sewer system where the cumulative total of deflection from the point of connection to the main sewer or from another cleanout equals or exceeds ninety degrees (90°)
- B. Excavation and backfill shall be in accordance with the requirements of Section 15.02205 - Excavation, Bedding and Backfill.
- C. To mark the location of side sewers, electronically detectable marking tape shall be installed one (1) foot below subgrade from the main sewer end of each side sewer to the connected building.

- D. When performing work on side sewers, the Contractor shall bypass wastewater around the work area in accordance with the requirements of Section 15.02145 - Bypassing Wastewater, or shall arrange with the Property Owner to temporarily shut down the side sewer. The Contractor shall ensure that no wastewater is discharged from side sewer to the excavation.
- E. Minimum slopes shall be two percent (2%) for four (4) inch diameter sewer pipe, and one and one-tenth percent (1.1%) for six (6) inch sewer pipe. The slope of any portion of a side sewer shall not be less than one and one-tenth percent (1.1%) or greater than one hundred and fifty percent (150%). Wherever available slope is less than two percent (2%) or the length of the side sewer is greater than one hundred (100) feet, the side sewer shall be installed using an industrial-standard laser grade control system to confirm that the pipe is installed to the proper grade. Requirements for operation of the laser grade control system shall be as specified in Section 15.15000 – Piping, General for main and trunk sewers.
- F. When an existing building which is sewerred by a septic tank is to be connected to the CCCSD public sewer system, the new side sewer shall be installed in accordance with these Specifications. A cleanout and Overflow Protection Device shall be installed at the building. If the existing sewer from the building to the septic tank is of a material listed on the Approved Materials List, is a minimum of four (4) inches in diameter, passes a hydrostatic or low-pressure air test, and passes a television inspection, the existing sewer may be used as part of the new side sewer for the building.
- G. Removal of septic tanks after installation of a new side sewer connection to the CCCSD public sewer shall be in accordance with the requirements of the Contra Costa Environmental Health Division.
- H. When a building connected to CCCSD public sewer is to be demolished, an abandonment permit shall be obtained and the side sewer serving the building shall be temporarily disconnected and capped at the property or easement boundary.
- I. Independent Systems - Unless otherwise permitted by the local building code jurisdiction, the requirements of the California Plumbing Code, Section 312.0 regarding “independent systems” as follows, shall be enforced:

“The drainage system of each new building and of new work installed in any existing building shall be separate and independent

from that of any other building, and, when available, every building shall have an independent connection with a public or private sewer.

Exception: Where one building stands in the rear of another building on an interior lot, and no private sewer is available or can be constructed to the rear building through an adjoining court, yard, or driveway, the building drain from the front building may be extended to the rear building.

3.2 INSTALLATION

A. General

Side sewers (laterals and building sewers) shall be installed in accordance with the requirements of Section 15.15000 - Piping, General and the specific Section of these Specifications for the particular pipeline material being used.

B. Lateral Sewer Location

Prior to installation of lateral sewers in subdivisions, the lot corner nearest the side sewer and the lateral sewer terminus shall both be staked and flagged in the field. Where curbs, gutters and/or sidewalks exist or are to be a part of an improvement, the location of each lateral sewer shall be permanently marked by imprinting an "S" (1-1/2" size) or by chiseling an "S" (4" size) in the concrete surface vertically above the lateral sewer pipe. The "S" shall be marked on the curb, gutter or on the sidewalk. It shall be the Contractor's responsibility for providing the marking and for its accuracy.

C. Overflow Protection Devices

All Property Owners shall install and maintain an Overflow Protection Device (OPD) on any side sewer that is connected or is intended for connection to, the CCCSD sewer system.

1. Side Sewer Installations or Alterations or Repairs

No person shall install, alter or repair a side sewer that is connected, or is intended for connection to the CCCSD sewer system without installing an OPD of the type and in the manner prescribed in these Specifications. Prior to installation of coupling when repairing side sewers a maximum spacing of 1/4" shall be left between the pipe ends to allow for proper installation of coupling. See DWG-27 for side sewer repair details.

2. **Maintenance Requirements**
OPDs shall be maintained so as to provide for their continuing function as designed. OPDs shall be accessible at all times and shall be kept free from any obstructions including, but not limited to, rocks, soil, vegetation, grass, trees, bushes, plants, landscaping, concrete, asphalt or other ground coverings that may impair the function of and accessibility to the devices.
3. **Elevation Requirements**
OPDs shall be installed at an elevation that protects the property from damage. The Property Owner is responsible to either: 1) confirm that the backwater overflow prevention device is at the proper elevation; or 2) to obtain competent assistance from a licensed plumber or Contractor to confirm its proper elevation. If any subsequent modification of the property results in the OPD being at an improper elevation, the Property Owner or Contractor shall adjust the OPD to the proper elevation.
4. Installation extendable backwater overflow devices shall be determined by Inspector for the given field conditions

3.3 LANDSCAPE RESTORATION

The Contractor shall restore the area affected by its side sewer installation operations in accordance with the requirements of Section 15.02522 - Curbs, Gutters, Sidewalks and Driveways, and Section 15.02900 - Protection of Trees and Restoration of Landscaping.

3.4 TESTING AND TELEVISION

Laterals installed with main sewer extension jobs shall be tested as a part of the main sewer system in accordance with the requirements of Section 15.02730 - Pipeline Cleaning, Testing and Television. New building sewers and side sewer repairs shall be subject to low-pressure air or hydrostatic testing or television inspection at the discretion of the Inspector.

- END OF SECTION -

SECTION 15.02701

MANHOLES AND RODDING INLETS

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install manholes and rodding inlets, complete with cast-in-place or precast bases, pipe connections, barrel and cone components, preformed joint sealant, grade rings, frames, covers and other appurtenances shown on the Plans or specified in this Section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02205 - Excavation, Bedding and Backfill
- B. Section 15.02275 - Geotextile Fabric
- C. Section 15.02730 - Pipeline Cleaning, Testing and Televising
- D. Section 15.03310 - Cast in-Place Concrete
- E. Section 15.03600 - Grout
- F. Section 15.05500 - Miscellaneous Metal Work

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:

ASTM C 150 Specification for Portland Cement

ASTM C 478 Specification for Precast Reinforced Manhole
Sections

1.4 CONTRACTOR SUBMITTALS

The Contractor shall submit complete shop drawings for all precast manhole bases to CCCSD, and shall receive favorable review prior to ordering the bases.

1.5 QUALITY ASSURANCE

After installation, the Contractor shall demonstrate that all manholes have been properly installed, level, with tight joints, at the correct elevations and orientations

and that the backfilling has been carried out in accordance with the plans and these Specifications. Vacuum testing of manholes may be required at CCCSD's sole discretion.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Manhole bases may be either cast-in-place or precast. Channels and shelves shall conform to the requirements of the Standard Drawings (DWG-1 through DWG-7). Manhole channels shall be shaped to form a smooth transition of uniform cross-section from inlet pipes to the outlet pipe, both horizontally and vertically.
- B. Precast Concrete Components: Only components listed in the Approved Materials List shall be used in the construction of manholes.
 - 1. Precast manhole bases, and barrel and cone sections shall be manufactured by a process that will produce dense homogeneous reinforced concrete of high quality in conformance with ASTM C 478. Cement shall be Type V Portland Cement as specified in ASTM C 150.
 - 2. Precast manhole components shall be designed to support vertical AASHTO H20 truck loading, plus the weight of soil above the cone section.
 - 3. Pipe connections at precast bases shall be pipe bells of the size, material and class of inlet and outlet pipes, integrally cast into the base by the manufacturer.
 - 4. The minimum wall thickness for barrel and cone sections (in inches) shall be calculated by dividing the nominal diameter of the barrel (in inches) by twelve (i.e., $D/12$).
 - 5. Manhole throats shall be constructed of reinforced concrete grade rings.
- C. Preformed plastic sealing gasket for sealing joints between the manhole base, barrel and cone sections shall be as listed in the Approved Materials List.
- D. Non-shrink grout shall conform to the requirements of Section 15.03600 - Grout.

- E. Castings for manhole frames and covers shall conform to the requirements of Section 15.05500 - Miscellaneous Metal Work.
- F. Primer and sealant tape for sealing exterior joints between precast components shall be as listed in the Approved Materials List.
- G. Concrete for cast-in-place manhole and rodding inlet components (bases and top blocks) shall conform to Section 15.03310, Cast-in-Place Concrete.

2.2 TEMPORARY COVERS

Temporary covers for new construction or reconstruction of manholes shall be fabricated as detailed in DWG-34 of the Standard Drawings.

2.3 TEMPORARY PLUGS

Temporary plugs shall be of the mechanical expanding type, not pneumatic and shall be permanently marked in a manner acceptable to CCCSD with the Contractor's identification or initials.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. An All-Weather Access Road as specified in this Section is required for access to all structures in off-road locations (e.g., easements).

3.2 INSTALLATION

- A. Temporary Plugs

Mechanical expanding type temporary plugs shall be installed and removed as specified below in the presence of an Inspector. Plugs shall be secured by tethering with a one-quarter (1/4) inch nylon rope attached to the top of a wood

Two (2) feet x four (4) feet of sufficient length to extend from the shelf to a point in the throat within six (6) inches of the underside of the cover.

1. When a manhole exists or a new manhole is constructed at the beginning of a new main extension, a temporary plug shall be installed at the inlet of the new pipe at the existing manhole or new manhole.
2. When a new main extension begins at an existing rodding inlet or stub, a temporary plug shall be installed on the outlet of the first manhole upstream from the beginning of the new main extension.

B. Cast-in-Place Manhole Bases (over existing sewers only):

1. Cast-in-place manhole bases shall be poured against undisturbed native soil, which has been excavated to the dimensions shown on the plans, (see DWG 1 through DWG-8). If the excavation extends beyond the dimensions shown on the Standard Drawings, the Contractor shall construct forms and pour the base to the specified dimensions.
2. If water or soft ground is encountered at the bottom of the excavation, a minimum lift of nine (9) inches of coarse bedding material in a geotextile wrap shall be used as shown on DWG-1 of the Standard Drawings.
3. A joint forming ring shall be used to form a level joint groove in the manhole base while the concrete is fresh to receive the first precast barrel section. The metal forming ring may be removed as soon as the concrete has set sufficiently to eliminate any slump in the joint groove.
4. Manhole channels shall be shaped to form a smooth transition from inlet pipes to the outlet pipe, both horizontally and vertically.

C. Precast Manhole Bases (on all new main sewer extensions):

1. Precast manhole bases shall be placed to the lines and grades shown on the plans as an integral part of the pipe laying operation on a minimum thickness of six (6) inches of Type I Bedding Material compacted to ninety-five percent (95%) relative compaction. Where soft ground or water is present, a minimum thickness of nine (9) inch of Coarse Bedding Material in a wrap of geotextile fabric, per the requirements of Section 15.02275 - Geotextile Fabric, shall be placed below the course of Type I Bedding Material.

2. Inlet and outlet pipe connections at precast bases shall be pipe bells cast into the base by the manufacturer.
3. All precast concrete manholes shall be installed in strict conformance with the manufacturer's written instructions, on a well-compacted foundation, as specified in Section 15.02205 – Excavation Bedding and Backfill.

D. Setting Precast Barrel and Cone Sections

All joint surfaces of precast manhole bases, barrel and cone sections shall be thoroughly cleaned and dried prior to setting, and shall be sealed with a preformed plastic sealing gasket listed in the Approved Materials List at each joint as follows:

1. Apply one (1) coat of primer to clean, dry joint surface (both tongue and groove) and allow the primer to dry. Remove the paper wrapper from one side of the gasket, retaining the outside paper in place to protect the gasket and assure against stretching. Place the plastic gasket strip in the joint, forming a continuous gasket around the entire circumference of the manhole joint. Remove the paper wrapper from the exposed side of the gasket and place the next manhole component.
2. Care shall be taken in the handling of barrel and cone sections after the plastic gasket has been affixed to avoid displacing the gasket or contaminating the joint or gasket with dirt or other foreign material. Any displaced or soiled gaskets shall be removed and replaced.
3. Care shall be taken to properly align the manhole section with the previously set section before it is lowered into position.
4. During cold or wet weather, the joint surfaces shall be heated with hot air until ice, frost, and moisture are removed and surface to be primed is dry and warm. Hot air shall also be passed over plastic gasket strips immediately prior to attaching them to joint surfaces and immediately prior to setting the section.

- E. Manhole frames and covers shall not be set to final grade until the pavement has been completed, unless otherwise approved by CCCSD. Precast concrete grade rings shall be installed as shown in the Standard Drawings. Paving around the manhole shall be in accordance with local jurisdiction requirements. Openings in manholes shall be protected from construction loads, debris and unauthorized entry.

- F. When new piping is installed in existing structures, the Contractor shall accurately position core-drilled openings in the concrete as shown on the job plans and Standard Drawings or otherwise directed by the Inspector. Openings shall be of sufficient size to permit a final alignment of pipelines and fittings without deflection of any part and to allow adequate space for satisfactory placement of mechanical seals or packing with non-shrink grout where the pipe passes through the wall to ensure the resulting structure is watertight. Before placing the non-shrink grout, concrete surfaces shall be sandblasted, thoroughly cleaned of sand and any other foreign matter, and coated with epoxy bonding compound. After connection of the new inlet pipe, the Contractor shall rechannel the inside of the existing manhole base to provide a smooth flow channel to the new exit pipe.
- G. The throat shall be constructed using appropriately sized reinforced concrete grade rings to bring the manhole cover to finished grade surface. No plastic sealing gaskets shall be used for jointing grade or extension rings.
- H. Manhole top blocks shall be poured against forms constructed to the specified dimensions shown on DWG-1 of the Standard Drawings.
- I. All manholes located on slopes steeper than 3:1 (horizontal to vertical) in easement areas shall be constructed with a reinforced concrete, reinforced concrete masonry unit or interlocking masonry unit retaining wall as shown on DWG-13 of the Standard Drawings.
- J. All manholes shall be tested in accordance with Section 15.02730 - Pipeline Cleaning, Testing and Televising.
- K. Temporary covers shall be used during construction until permanent frames and covers are installed.

3.3 RECONSTRUCTION OF EXISTING STRUCTURES

A. General

1. Reconstruction work on any particular structure shall be diligently prosecuted so as to be completed within three (3) calendar days after work is begun on that particular structure. The Contractor shall provide continuous access for CCCSD maintenance forces to the structure at all times.
2. When removing existing structures, the Contractor shall take precautions to ensure that no foreign material enters the structure

or the downstream system. Before any work is started, the base shall be covered with a plywood ("false bottom") as shown on DWG-53 of the Standard Drawings, and then the false bottom shall be covered with a drop cloth of heavy canvas. The drop cloth and false bottom shall be kept in place during the work to catch debris, and upon completion, shall be removed with the collected debris. No debris shall enter the downstream system or be allowed to remain in the manhole.

B. Structure Adjustments and Repairs

All workmanship and materials for structure adjustments shall conform to the requirements of these Specifications. In the case of existing brick or cast-in-place concrete structures, repair or adjustments shall be accomplished with materials in kind or with precast elements as detailed on the job plans.

1. Existing structure precast elements, adjustment rings, frames, and covers removed for adjustments and/or repairs may be reinstalled only when such undamaged items are permitted by the Inspector for reuse.
2. Manhole adjustments shall be accomplished by one of the methods specified below or as detailed on the job plans.
 - a. Upward adjustments of manholes to finish grade surface may be accomplished with reinforced concrete grade rings, formed concrete and/or a single cast iron extension ring when the adjusted manhole throat will not exceed twelve (12) inches in height. In no case shall multiple cast iron extension rings be used in adjustments. When adjustments are made that position the bottom of the cast iron manhole frame above the existing concrete top block, the top block shall be reconstructed in accordance with the requirements of DWG-1 through DWG-8 of the Standard Drawings.
 - b. Whenever upward adjustment of manholes would result in a completed manhole throat section exceeding twelve (12) inches in height, the upper manhole section, including the top block and cone section, shall be removed and the adjustment shall be made by reconstructing the structure using manhole barrel and cone sections, grade rings and frames and covers in accordance with the requirements of these Specifications and DWG-1 through DWG-8 of the Standard Drawings.

- c. Downward adjustments of manholes shall be accomplished by removal of existing grade or extension rings and cone and barrel sections as required, and reconstructing the structure using manhole barrel and cone sections, grade rings and frames and covers in accordance with the requirements of these Specifications and DWG-1 through DWG-8 of the Standard Drawings.
3. Rodding inlet adjustments shall be accomplished by one of the methods specified below or as detailed on the job plans.
 - a. Upward adjustments of rodding inlets shall be accomplished with formed concrete or cast iron extension rings where the extension will not exceed eight (8) inches, including any previous adjustments. When adjustments are made that position the bottom of the cast iron frame above the existing concrete top block, the top block shall be reconstructed in accordance with the requirements of these Specifications and DWG-10 of the Standard Drawings.
 - b. Upward adjustments of rodding inlets exceeding eight (8) inches shall be accomplished by removing the structure's frame, cover, and top block, and reconstructing the structure in accordance with the requirements of these Specifications and DWG-10 of the Standard Drawings. Pipe used for such adjustments shall be as required for pipeline repair and shall be installed so as to extend the line and grade of the existing pipe.
 - c. Downward adjustments of rodding inlets shall be accomplished by removal and reconstructions of the entire upper section of the structure including the top block.

- END OF SECTION -

SECTION 15.02702

ALL-WEATHER ACCESS ROADS

PART 1 – GENERAL

1.1 THE REQUIREMENT

All-weather roads shall be provided for permanent maintenance access to all sewer structures (i.e., manholes and rodding inlets). The Contractor shall construct these roads as shown on the Plans and specified in this Section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02205 - Excavation, Bedding and Backfill
- B. Section 15.02515 - Asphalt Concrete Pavement and Base Restoration
- C. Section 15.03310 - Cast in-Place Concrete

1.3 CONTRACTOR SUBMITTALS

- A. Road Maintenance and Repair Agreement

An Access Road Maintenance Agreement shall be executed and recorded prior to CCCSD's "Final Review for Construction" of job Plans. The agreement shall be in CCCSD's standard form and shall require that the owners of properties served by sewers to be accessed from a particular road maintain that road in good repair at all times for routine and/or emergency access by CCCSD maintenance vehicles.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Type 1 Bedding and Backfill Material Aggregate Base shall be in accordance with the requirements of Section 15.02205 - Excavation, Bedding and Backfill.
- B. Asphalt Concrete shall be in accordance with Section 15.02515 – Asphalt Concrete Pavement and Base Restoration.
- C. Concrete shall be in accordance with the requirements of Section 15.03310 - Cast in-Place Concrete.

PART 3 – EXECUTION

3.1 REQUIRED STRUCTURAL CROSS SECTION

- A. The minimum structural cross section for all-weather access roads shall depend on the finished grade of roadway as follows:
1. For finished grades less than ten percent (10%): the structural cross section of the road shall consist of a surface course having a minimum thickness of eleven (11) inches of Type 1 Bedding and Backfill Material (newly quarried crushed “Clayton Blue” or equal, not recycled material or mined alluvium), or equivalent section based on Caltrans “Gravel Equivalent Method”, over competent native sub-base. Sub-base and Type 1 Bedding and Backfill Material shall be compacted to ninety-five percent (95%) relative compaction.
 2. For finished grades between ten percent (10%) and fifteen percent (15%): the structural cross section of the road shall consist of a surface course having a minimum thickness of two and one-half (2-1/2) inches of Asphalt Concrete (AC), over a minimum of nine (9) inches of Type 1 Bedding and Backfill Material (newly quarried crushed “Clayton Blue” or equal, not recycled material or mined alluvium), or equivalent based on Caltrans “Gravel Equivalent Method”, or six (6) inches reinforced concrete (#4 @ 16” OC each way, or equivalent WWF), over a minimum of three (3) inches Type 1 Bedding Material sub-base. Sub-base and Type 1 Bedding and Backfill Material shall be compacted to ninety five percent (95%) relative compaction.
 3. For finished grades between fifteen percent (15%) and twenty percent (20%): the structural cross section of the road shall consist of a surface course of a minimum thickness of six (6) inches of reinforced concrete (#4 @ 16” OC each way, or equivalent WWF) over a minimum of three (3) inches Type 1 Bedding Material sub-base compacted to ninety five percent (95%) RC, grooved per Contra Costa County Fire Protection District Drawing. No. FPS-001-D3.
 4. Grades exceeding twenty percent (20%) shall not be allowed.

3.2 REQUIRED GEOMETRY

A. Minimum geometric requirements for all-weather access roads shall be as follows:

1. The minimum width of access roads shall be twelve (12) feet.
2. The maximum cross slope of access roads shall be two percent (2%).
3. The minimum radius at the centerline of access roads shall be twenty-eight (28) feet.
4. Access roads shall either have access to a public road at each end, or shall have a turn-around as shown on DWG-35 of the Standard Drawings.

3.3 DRAINAGE

Engineered drainage facilities to properly convey storm water runoff from the roadway surface and adjacent areas into storm drains or drainage ways shall be provided.

- END OF SECTION -

SECTION 15.02730

PIPELINE CLEANING, TESTING AND TELEVISIONING

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall furnish all labor, materials, tools, and equipment necessary to clean, perform acceptance testing, and provide for televising of completed sewer pipelines.
- B. The Contractor shall notify the Inspector at least one (1) business day prior to any cleaning or testing work. All final testing and cleaning of sewer lines shall be done in the presence of the Inspector.
- C. The Contractor shall complete cleaning and testing of sewer lines as required in this Section prior to requesting television inspection.
- D. In new subdivisions or jobs involving potential conflicts with other new underground utilities, preliminary tests may be conducted at the discretion of the Contractor or Inspector at any time. The final test for acceptance will be made after the installation of all underground facilities, curb, gutter, lateral sewers and subbase, but prior to placing the final layer of paving.
- E. If deficiencies are identified during testing, the Contractor shall re-test after the deficiencies have been corrected.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02205 - Excavation, Bedding and Backfill

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:

ASTM C 969	Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
ASTM C 1091-03a	Test Method for Hydrostatic Infiltration Testing of Vitrified Clay Pipe Lines
AWWA C600-54T	Installation of Ductile-Iron Water Mains and Their Appurtenances

ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM F 679	Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings

PART 2 – PRODUCTS

2.1 MATERIAL REQUIREMENTS

Mandrels, temporary plugs, low-pressure testing equipment and all other necessary materials shall be provided by the Contractor, subject to the Inspector's approval. No materials shall be used which would be injurious to the public, personnel, adjacent improvements or the pipeline. Air test gauges shall be laboratory-calibrated test gauges and shall be recalibrated by a certified laboratory prior to the leakage test. Gauge shall be easy to read in no more than one (1) pound per square inch (psi) per increments and have a maximum full-scale range of five (5) psi.

PART 3 – EXECUTION

3.1 GENERAL

- A. The Contractor shall clean pipelines by balling and flushing or Hydroflushing prior to deflection and pressure testing.
- B. The Contractor shall perform deflection and pressure tests after submittal of compaction reports demonstrating compliance with the backfill compaction requirements included in Section 15.02205 - Excavation, Bedding and Backfill, and before acceptance television inspections.
- C. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 CLEANING

- A. After all work on the pipeline installation has been completed to the satisfaction of CCCSD, including all manhole channeling, the Contractor shall clean the pipe in the presence of the Inspector.
- B. The Contractor shall clean all new main and trunk sewer installations, and such site collector and side sewer system installations deemed necessary

- by the Inspector, with a cleaning ball or device in accordance with the device manufacturer's instructions or recommendations and flushed. Hydroflush pressure must be maintained below two thousand (2,000) psi. Traps with screens in accordance with DWG-29 of the Standard Drawings shall be used to trap debris. The Contractor shall remove all debris from the manhole prior to removing the trap.
- C. Release of water during and/or after cleaning and testing has been completed, shall be performed in a manner approved by the Inspector. The Contractor shall be responsible for the proper disposal of water released.
 - D. The Contractor shall perform an additional cleaning of the pipeline after the installation of final paving, top block, frames and covers, and after all other required inspections, prior to acceptance, if required by the Inspector due to a reasonable determination that additional debris may have accumulated in the pipeline after initial cleaning.

3.3 DEFLECTION TESTING

PVC and HDPE pipe (8) eight inches in diameter or larger shall be tested for deflection, joint displacement, or other obstruction by passing a rigid mandrel through the pipe. Deflection shall be tested after submittal of daily compaction reports demonstrating compliance with, but prior to, permanent resurfacing. The mandrel shall be a full circle, rigid, non-adjustable, an odd-numbered leg (9 leg minimum), approved by the Engineer as to design and manufacturer. Mandrel size shall meet the minimum requirements set forth in ASTM D 3034 and ASTM F 679. The circular cross section of the mandrel shall have a diameter of at least ninety five percent (95%) of the specified average inside diameter of the pipe and the minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. Where obstructions and excessive deflection encountered by the mandrel, the Contractor shall remove, replace and retest the deficient section. Rerounding will not be allowed.

3.4 PIPELINE LEAKAGE TESTING

- A. Repaired Pipelines shall be Re-Tested as Follows:
 - 1. For gravity sewers the Contractor shall conduct a low-pressure air test or a water pressure test. Sewers seventeen (17) inches or greater in diameter shall not be tested with air.
 - 2. For pressure sewers (force mains), the Contractor shall conduct an air-over-water pressure test at one hundred twenty percent (120%)

of maximum design operating pressure, measured at the lowest point of the pipeline section being tested.

B. Air Pressure Test

1. Each section of main sewer and its appurtenant connected laterals shall be tested between successive manholes by plugging and bracing all openings in the sewer lines. If any leaks are found, the air pressure shall be released, the leaks eliminated, and the test procedure started over again.
2. Air tests shall be conducted in accordance with the following procedure and the details shown on DWG-28 of the Standard Drawings. All necessary test equipment shall be in proper working order and tests shall be made in the presence of the Inspector. Test plugs shall be carefully placed at each end of the section of line to be tested. When all necessary test equipment is in place, a compressed air supply shall be attached to the air fitting on the test equipment and the air pressure within the line increased to four (4) pounds per square inch (psi). After the air supply is securely turned off or disconnected, there shall be a two (2) minute waiting period to allow stabilization of air within the sewer line before the actual test period begins. In no case shall the air pressure within the line be less than three and one-half (3-1/2) pounds per square inch at the beginning of the test period. The allowable air pressure loss shall not exceed one (1) pound per square inch. When testing sewers up to and including sixteen (16) inches in diameter, refer to DWG-28 of the Standard Drawings for the length of the test period. When testing side sewers, or portions thereof, the test period shall be four (4) minutes and the allowable loss shall not exceed one (1) pound per square inch. After completion of a test, the air pressure shall be released slowly through the valve, which is incorporated in the test equipment. Air test plugs shall not be removed until the air pressure is no longer measurable.

C. New sewers larger than seventeen (17) inches in diameter shall be hydrostatically tested in accordance with the following procedure:

1. After installation, all new trunk sewer pipelines shall be thoroughly cleaned prior to pressure testing. A section of trunk sewer shall be prepared for testing between two structures by plugging the inlet side of the discharge manhole and all openings in the upstream manhole except the discharge opening. All plugs shall be properly braced against the manhole wall to withstand the forces of the test in order to prevent loss in the event of a failure.

2. A section of the trunk sewer prepared as above shall be tested by filling it with water to an elevation five (5) feet above the top of pipe at the upstream end of the test section, or five (5) feet above the existing groundwater elevation, whichever is greater. The water shall be introduced into the test section at least one (1) hour in advance of the test period and refilled as necessary prior to commencement of the test period to allow the pipe and joint material to become saturated. The loss in water may be determined by measuring the rate of fall of the water level, but the level shall not be allowed to fall more than one (1) foot below the specified head during the test period.
 3. For RCP, the pressure shall be maintained for not less than four (4) hours and the leakage rate shall not exceed two hundred (200) gallons per inch of diameter per mile of pipe for twenty-four (24) hours (ASTM C 969-02). For VCP, the pressure shall be maintained for not less than one (1) hour and the leakage rate shall not exceed two hundred (200) gallons per inch diameter per mile for twenty-four (24) hours (ASTM C 1091-03a). For DIP, the pressure shall be maintained for not less than one (1) hour and the leakage rate shall not exceed seventy (70) gallons per inch diameter per mile of pipe of twenty-four (24) hours (AWWA C600-54T).
- D. When leakage exceeds the amount allowed by the specifications, the Contractor shall locate the leaks, submit a repair procedure for the Inspector's review, and make the necessary repairs.

3.5 TESTING OF MANHOLES

- A. CCCSD may require hydrostatic testing for leakage after installation and prior to backfilling. Prior to hydrostatic testing, all manholes shall be visually inspected. All defects shall be repaired by the Contractor, with non-shrink grout, to the satisfaction of the Inspector. All pipes entering the manhole shall be sealed at a point outside the manhole walls so as to include testing of the pipe/manhole joints. Safety lines shall be secured to all plugs utilized. The manhole shall be filled with water to a level two (2) inches below the top of the frame. After a period of at least one (1) hour to allow the water level to stabilize, the manhole shall be refilled and the water level shall be checked. The water level shall again be checked after a period of four (4) hours. If the water level drops by more than one (1) inch, the leakage shall be considered excessive, and the Contractor shall make necessary repairs and retest the manhole.

- B. As an alternative to manhole hydrostatic testing, the Inspector may allow the use of vacuum testing. A vacuum of ten (10) inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test hood closed and the vacuum pump shut off. The manhole shall be deemed to have passed the test if the vacuum drop is less than one (1) inch of mercury during a one (1) minute test period.

3.6 TELEVISION INSPECTION

- A. CCCSD will perform a television inspection of the sanitary sewer upon substantial completion of the work. The Contractor shall coordinate with the Inspector to arrange for an acceptable time to conduct the inspection. Defects discovered by the television inspection shall be corrected and the line re-inspected at the Contractor's cost.
- B. The procedure outlined in items 1 through 11 below will be repeated until all deficiencies observed by television inspection have been corrected to the complete satisfaction of CCCSD.
 - 1. The Contractor shall request television inspection once the following procedures have been completed:
 - a. Sewer pipelines are installed, backfilled, and compacted.
 - b. Structures are in place, all channeling is complete and pipelines are accessible from structures.
 - c. All other underground facilities, utility piping, and conduits in the vicinity are installed.
 - d. For street locations, placement of aggregate base has been completed.
 - e. Pipelines to be inspected have been cleaned and flushed.
 - f. Final pressure test has been completed.
 - g. Mandrel testing is complete.
 - 2. After the above work is complete, the Contractor shall request the Inspector to have CCCSD establish a date for television inspection.
 - 3. The Contractor for the project will be notified by phone as to the scheduled date of the television inspection, and shall arrange for water to be available the date of the inspection.
 - 4. If the jobsite will not be ready or accessible for the television inspection on the scheduled date, the Contractor shall notify the

Inspector of the necessary cancellation at least twenty-four (24) hours in advance of the scheduled inspection to avoid being charged a cancellation fee.

- a. If the CCCSD's television crew arrives at the jobsite and the work is not ready or accessible, the Contractor will be billed the cancellation fee payable to CCCSD prior to the date of rescheduled television inspection.
 - b. The Contractor shall reschedule inspection as outlined above.
5. If a portion of an entire job is to be television inspected, a separate fee will be due as established by CCCSD. Fees are payable prior to the date of the partial television inspection.
 6. The entire job will be initially televised by CCCSD. If no deficiencies are observed, the work will be considered satisfactory. If deficiencies are observed, a recording will be made and defects serious enough to require correction will be determined by the Inspector.
 7. Notification will be made in writing of any deficiencies revealed by the television inspection that will require repair. If corrective work is indicated and viewing of the recording is desired, the Contractor shall contact the Inspector to set a time for the viewing.
 8. All corrective work shall be done, and shall be subject to approval by CCCSD. CCCSD reserves the right to require cleaning and additional leak testing of the repaired pipeline.
 9. Those portions of the pipeline where deficiencies have been corrected must be re-televised. Payment of re-television inspection fees must be received by CCCSD prior to the scheduled date of the television re-inspection.
 10. All sewer stubs will be televised.
 11. The following observations from television inspections will be considered defects requiring correction prior to paving:
 - a. Low spot 0.0625 x diameter of pipe or greater (e.g., 0.5 inch for 8-inch pipe).
 - b. Joint separations (three-quarter (3/4) inch or greater opening between pipe sections).

- c. Cocked joints present in straight runs or on the inside of pipe curves.
 - d. Chips in pipe ends.
 - e. Cracked or damaged pipe.
 - f. Offset joints.
 - g. Infiltration.
 - h. Debris or other foreign objects.
 - i. Other obvious deficiencies.
- C. Television inspection of the work and the correction of observed defects shall not relieve the Contractor of its responsibility for the one (1) year guarantee period. CCCSD may inspect and/or televise portions of any projects during said guarantee period. This inspection may include a televising of the pipelines and the checking of the pipeline deflection in the case of plastic pipes.

– END OF SECTION –

SECTION 15.02900

PROTECTION OF TREES AND RESTORATION OF LANDSCAPING

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall protect trees and restore landscaping in accordance with the requirements of this Section.
- B. The Contractor shall exercise due diligence and implement necessary precautions so as not to needlessly damage or destroy trees, shrubs or other landscaping including those within street rights-of-way and project limits. Removal or pruning of trees or shrubs shall occur only with prior approval of the Inspector and only in the presence of and under the supervision of a certified arborist acceptable to CCCSD. If the Contractor damages any tree or shrub not specifically designated for removal on the plans, the Contractor shall replace or trim the damaged tree or shrub as directed by a certified arborist engaged by the Contractor and acceptable to CCCSD. The Contractor shall obtain approval from the jurisdictional agency where required, and the owner of the trees and or shrubs prior to replacement or pruning.
- C. Existing growth on adjacent land and rights-of-way shall be preserved. Construction equipment shall not be operated in areas designated for preservation. If necessary for preservation of trees and shrubs, the Contractor shall install temporary protective fences, protective padding and/or staked straw bales around trunks of trees along the construction alignment to prevent damage by vehicles, equipment and material storage, pedestrian activity, and/or disposal of phytotoxic material.

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:

ANSI A 300 American National Standards Institute, Pruning Standards

ISA International Society of Arboriculture Tree Pruning Guidelines

1.3 CONTRACTOR SUBMITTALS

A list of the materials used, together with typical certificates of each material, shall be submitted to CCCSD prior to the final acceptance of the job.

1.4 QUALITY ASSURANCE

- A. The Contractor shall request inspection at least one (1) business day in advance of the time inspection is required. Inspection will be required on the following stages of the work:
1. During preliminary grading, soil preparation and initial weeding.
 2. When trees are spotted for planting, but before planting holes have been excavated.
 3. When finish grading has been completed.
 4. When all specified work, except warranty work has been completed.
 5. Final inspection at the completion of the warranty period.
- B. Plants shall be subject to inspection upon delivery to the site and at any time before or during progress of the work.
- C. Rejected plants shall be identified in an obvious manner, removed from the site and replaced.

1.5 CLEANUP

During landscaping work and upon completion of planting operations, the site used for work or as a storage area by the Contractor shall be maintained in a neat and clean condition.

1.6 MAINTENANCE OF LANDSCAPING DURING WARRANTY PERIOD

- A. The Contractor shall be responsible for protecting, watering and maintaining all planting and irrigation systems until the end of the warranty period.
- B. Trees and shrubs shall be thoroughly soaked after planting and provided with additional water at intervals as necessary to provide for good health and growth of the planting.

PART 2 – PRODUCTS

2.1 GENERAL

All landscaping materials for soil conditioning, weed abatement, or planting shall be first-grade, commercial quality and shall have certificates indicating the source of material, analysis, quantity, or weight attached to each sack or container or provided with each delivery.

2.2 TOPSOIL

Topsoil shall be obtained from naturally drained areas and shall be fertile, friable loam suitable for plant growth, and be of uniform quality, free from stiff or lumpy clay, hard clods, hardpan, rocks, disintegrated debris, plants, roots, seeds, or any other materials that would be toxic or harmful to plant growth. Topsoil shall contain no harmful weeds or harmful weed seeds.

2.3 FERTILIZER AND ADDITIVES

Fertilizer shall be furnished in bags or other standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon, and shall be applied at recommended rates.

2.4 MULCH

Mulching material shall be shredded bark, free of sticks, stones, clay or other foreign materials.

2.5 PLANT MATERIALS

- A. All plants shall be symmetrical and shall conform to the size, age and condition as specified on the plant list. Plants shall be of sound health, vigorous, and free from plant disease and shall be well-branched, shall have full foliage when in leaf, and shall have a healthy well-developed normal root system. Cold storage plants will not be accepted.
- B. Roots and root balls of all plants shall be adequately protected at all times from sun and/or drying winds.

- C. Trees shall have straight trunks and all abrasions and cuts shall be completely callused over. In no case shall trees be topped before delivery.

2.6 STAKES

- A. Stakes for supporting trees shall be two (2) inch diameter sound No. 2 redwood or lodge pole pine stakes.
- B. Tree ties shall be approved by the Inspector prior to use.

PART 3 – EXECUTION

3.1 GENERAL

- A. The Contractor shall provide protection to structures, pavements, adjacent properties and other facilities that are subject to damage during landscape work. Open excavations shall be provided with barricades and warning lights which conform to the requirements of governing authorities and the Cal/OSHA safety requirements from dusk to dawn each day and when needed for safety.
- B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 REMOVAL OF TREES AND SHRUBS

- A. The roots of trees or shrubs not specifically designated for removal on the plans shall be protected from damage by the Contractor's operations. If necessary for preservation of trees or shrubs, as determined by the arborist, **the Contractor shall either hand dig or use an "air-spade" around roots in the drip zone.** No tree roots over two (2) inches in diameter shall be cut without permission of the Inspector. Trees shall be supported during excavation, and no herbicides shall be used.
- B. The Inspector may authorize removal of tree and shrub branches that interfere with construction operations. When tree or shrub branches must be removed, the removal shall be done in a manner that does not injure the tree or shrub as directed by a certified arborist engaged by the Contractor and acceptable to CCCSD. The trimming shall be completed in a manner that will preserve the symmetry of the tree or shrub

presenting a balanced appearance. No stubs, splits or torn branches shall remain following the trimming. Clean cuts shall be made close to the trunk or a large branch.

- C. The Contractor shall notify the Inspector a minimum of one (1) week in advance if a tree limb greater than three (3) inches in diameter needs to be removed and shall request authorization to remove the limb from the owner. Submitting a request to remove limbs does not guarantee approval. If approval is denied, the Contractor shall modify its operation in order to protect the limb.
- D. Trees or shrubs designated for removal shall be felled in sections from the top down and removed in such a manner as not to injure standing trees, plants, structures or other improvements. Trees or shrubs to be removed shall be removed to a depth of eighteen (18) inches below existing minimum grade.
- E. Trunks, stumps, dead or fallen limbs and branches, and roots of dead vegetation within the construction limits shall be removed from the jobsite.
- F. The Contractor shall notify the Inspector prior to removal of any tree with a trunk diameter greater than six (6) inches at four and one-half (4-1/2) feet above its natural grade or any riparian tree with a trunk diameter of four (4) inches at four and one-half (4-1/2) feet above its natural grade or a multi-trunk riparian tree with a cross-sectional area of all trunks equal to a cross-section of a single stem of four (4) inches at four and one-half (4-1/2) feet above its natural grade. "Riparian Tree" is a tree within thirty (30) feet of the edge of a creek bank.

3.3 PRUNING AND MULCHING

- A. Root Pruning
 - 1. No tree roots larger than two (2) inches in diameter shall be cut without the permission of the Inspector. A certified arborist engaged by the Contractor and acceptable to CCCSD shall be present during trenching in root zones. If roots larger than two (2) inches in diameter are cut, the arborist may require some plant reduction. The arborist shall evaluate damaged trees and shrubs for stability, health, and aesthetic appearance. If reduction or removal is required, the Contractor shall notify the owner in writing and approval shall be secured prior to pruning or removal.
 - 2. All damaged roots regardless of size shall be pruned square and clean, in accordance with standard horticultural practice.

B. Pruning of Trees and Shrubs

1. Pruning shall be done under the direction and in the presence of a certified arborist acceptable to CCCSD and performed by tree workers who are competent in the area of tree trimming, maintenance, repairing and removal and familiar with equipment used in this work. The use of climbing spurs, spikes, or irons is prohibited in pruning operations on live trees. Pruning shall be done in accordance with the ISA "Pruning Guidelines" and ANSI A-300 Standards.
 2. All cuts shall be made close to the trunk without cutting into the branch collar so that closure can readily start under normal conditions. Clean cuts shall be made at all times. Heavy branches shall be notched from below to prevent splitting or peeling the bark. Cuts and wounds shall be treated with tree dressing where open wounds may attract insects that carry disease or allow fungus invasion. After use on a tree or shrub known to be diseased, tools shall be disinfected with methyl alcohol or seventy percent (70%) bleach solution after each cut and before use on another tree or shrub.
 3. No more than thirty-three percent (33%) of the total plant mass shall be reduced at a single operation. Where practical, avoid cutting back to small suckers. In reducing overall size, attention shall be given to achieving a symmetrical appearance. The top shall remain higher than the sides to maintain a natural appearance.
- C. All dead wood or suckers and all broken or badly bruised branches shall be removed by thinning out and shortening branches. All cuts shall be made just above a healthy bud. Pruning shall be done with clean, sharp tools.
- D. Plants shall be mulched after planting has been completed. A layer of mulch materials shall be spread on finished landscaping grade to a depth of two (2) inches. Mulching around isolated plants shall be six (6) inches greater in diameter than the planting hole.

3.4 REPLACEMENT OF DAMAGED TREES AND SHRUBS

- A. If any tree or shrub is damaged by the Contractor's operations, the Contractor shall immediately notify the Inspector and the Owner of the tree

or shrub. If, in the judgment of a certified arborist engaged by the contractor and acceptable to CCCSD, the damage is such that replacement is necessary, the Contractor shall replace the tree or shrub. If possible, the replacement shall be of like size and variety as the tree or shrub damaged.

- B. The size of replacement trees shall be no less than three (3) inches in diameter or less than six (6) feet in height contained in a 24" x 24" box. The size of replacement shrubs shall not be less than five (5) gallon in size. Place topsoil around tree to allow root crown to remain at the original grade so that the root flares can be seen for at least several inches away from the trunk. The root crown shall remain dry and free of debris, such as lawn or ivy. Place an acidic, organic compost or mulch around the rooting area.

3.5 SOIL PREPARATION

- A. The landscape work shall not begin until all other trades have repaired all areas of settlement, erosion, rutting, etc., and the soils have been re-established, re-compacted and refinished to finish grades.
- B. Areas requiring grading by the landscaper including adjacent transition areas shall be uniformly level or sloping between finish elevations to within 0.10 ft. above or below required finish elevations.
- C. The landscape work shall not proceed until roadways and irrigation systems are in place, and other construction operations are completed to a point where the landscape areas will not be disturbed. The subgrade shall be free of waste materials of any kind.
- D. During grading, waste materials in the planting areas such as weeds, rocks (2 inches and larger), building materials, rubble, wires, cans, glass, lumber, sticks, etc., shall be removed from the site. Weeds shall be dug out by the roots.
- E. Fertilizers, additives, seed, peat, etc. subject to moisture damage shall be kept in a weatherproof storage place in such a manner that they will be kept dry.
- F. After removal of waste materials, the planting areas' subgrade shall be scarified and pulverized to a depth of no less than six (6) inches and all surface irregularities below the cover of topsoil removed.
- G. Finish grading shall consist of:

1. Final contouring of the planting areas.
 2. Placing four (4) inches of topsoil over all areas to be planted unless shown or specified otherwise.
 3. Placing all soil additives and fertilizers.
 4. Tilling of planting areas.
 5. After tilling, bring areas to uniform grades by floating and/or hand raking.
 6. Making minor adjustment of finish grades as directed by the Inspector.
 7. Removing waste materials such as stones, roots, or other undesirable foreign material and raking, discing, dragging, and smoothing soil ready for planting.
- H. Topsoil shall be uniformly distributed over all areas where required. Subgrade and topsoil shall be damp and free from frost.
- I. Surface drainage shall be provided as shown by grading the surface to facilitate the natural run-off of water. Low spots and pockets shall be filled with topsoil and graded to drain properly.
- J. Finish grade of all planting areas shall be one and one-half (1-1/2) inches below finish grades of adjacent pavement of any kind.

3.6 DELIVERY, STORAGE AND HANDLING OF PLANT MATERIALS

- A. Plants shall not be pruned prior to delivery.
- B. Plant material shall be planted on the day of delivery if possible. The Contractor shall protect the stock in a temporary nursery at the project site where it shall be protected from sun and drying winds and shall be shaded, kept moist, and protected with damp soil, moss or other acceptable material.
- C. No plants shall be bound with wire or rope at any time so as to damage the bark or break branches.
- D. Plants shall not be picked up or moved by stem or branches, but shall be lifted and handled from the bottom of the ball or the sides of the containers. Plants with balls cracked or broken before or during planting operations will not be accepted and shall be immediately removed from the site and replaced.

3.7 TREE AND PLANT LOCATIONS

- A. The Contractor shall locate and stake all tree and shrub locations and have the locations approved by the Property Owner before starting excavation of planting holes.
- B. No trees shall be located closer than eighty-four (84) inches to sewers or sewer structures.

3.8 PLANTING HOLES

- A. Planting holes shall be excavated circular pits centered on location stakes with vertical sides and flat or saucer shape bottom.
- B. Holes for trees shall be at least two (2) feet greater in diameter than the specific diameter of ball or spread of roots, and at least six (6) inches below depth of ball or roots.

3.9 PREPARED BACKFILL

- A. All soil for backfilling operations shall be prepared soil consisting of: one (1) part soil amendment, three (3) parts of topsoil. Commercial fertilizer shall be mixed with topsoil per manufacturer's printed recommendations.
- B. Soil amendments shall be thoroughly mixed on the site before placement. Mixing of materials in pits will not be permitted.

3.10 ROCKS OR UNDERGROUND OBSTRUCTIONS

In the event that rock or underground obstructions are encountered in the excavation of plant pits, alternative locations shall be selected by the Property Owner.

3.11 SETTING PLANT MATERIALS

- A. Prior to setting, all broken or frayed roots shall be properly cut off. Water shall be applied if necessary to provide ideal moisture for filling and for planting as specified herein.
- B. Plants shall be set plumb and straight in the center of pits.

- C. Planting soil around roots or root balls shall be compacted and watered. Muddy soil shall not be used for backfilling.
- D. All plants shall be thoroughly watered immediately after planting.
- E. Remove all tags and labels after final inspection.

3.12 STAKING

- A. Staking of trees shall be done immediately after planting. Plants shall stand plumb after staking.
- B. Trees less than two (2) inches in diameter shall be supported by two (2) stakes placed diametrically opposite at perimeter line of the root ball and to sufficient depth to hold the tree rigid. Trees shall be supported by guy wires in accordance with standard horticultural practice.

- END OF SECTION -

SECTION 15.03200
REINFORCEMENT STEEL

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish, fabricate, and place all concrete reinforcement steel, welded wire fabric, couplers and concrete inserts for use in reinforced concrete.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.03600 - Grout

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:

ACI 315	Detail and Detailing of Concrete Reinforcement
ACI 318	Building Code Requirements for Structural Concrete and Commentary
ASTM A 82	Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A 185	Specification for Steel Welded Wire Reinforcement, Plain for Concrete
ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 775	Specification for Epoxy-Coated Reinforcing Steel Bars
CRSI MSP-1	Concrete Reinforcing Steel Institute Manual of Standard Practice

1.4 QUALITY ASSURANCE

If requested by CCCSD, the Contractor shall provide samples from each heat of reinforcement steel delivered in a quantity adequate for testing.

PART 2 – PRODUCTS

2.1 GENERAL

Materials specified in this Section that may remain or leave residue on or within the concrete shall be classified as acceptable for potable water use by the U.S. Environmental Protection Agency.

2.2 REINFORCEMENT STEEL

A. Reinforcement Steel for all cast-in-place, reinforced concrete construction shall conform to the following requirements:

1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement with supplementary requirement S-1, or as otherwise shown.
2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 185 and the details shown; provided that welded wire fabric with longitudinal wire of W4 size wire and smaller shall be either furnished in flat sheets or in rolls with a core diameter of not less than ten (10) inches; and provided further that welded wire fabric with longitudinal wires larger than W4 size shall be furnished in flat sheets only.
3. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A 82.

B. Accessories:

1. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers and other devices to position reinforcement during concrete placement. All bar supports shall meet the requirements of the CRSI Manual of Standard Practice, including special requirements for supporting epoxy-coated reinforcing bars. Wire bar supports shall be CRSI Class 1 for maximum protection with a one-eighth (1/8) inch minimum thickness of plastic coating that extends at least one-half (1/2) inch from the concrete surface. Plastic shall be gray in color.
2. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.

- C. Epoxy coating for reinforcing and accessories, where indicated, shall conform to ASTM A 775.

2.3 MECHANICAL COUPLERS

If the Contractor proposes the use of mechanical couplers, it shall submit product data for CCCSD approval.

2.4 EPOXY GROUT

Epoxy for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature and orientation of the hole to be filled. Epoxy grout shall meet the requirements specified in Section 15.03600 - Grout.

PART 3 – EXECUTION

3.1 GENERAL

- A. All reinforcement-steel, welded wire fabric and other appurtenances shall be fabricated and placed in accordance with the requirements specified herein. Welded splices or mechanical couplers shall not be used unless approved by CCCSD. Reinforcement shall not be straightened or re-bent.
- B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 FABRICATION

- A. Reinforcement steel shall be accurately formed, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318. Stirrups and tie bars shall be bent around a pin having a diameter not less than one (1) inch for No. 3 bars, two (2) inches for No. 4 bars and No. 5 bars. Bars shall be bent cold. The Contractor shall fabricate reinforcement bars for structures in accordance with bending diagrams, placing lists and placing drawings.
- B. Fabricating Tolerances: Bars used for concrete reinforcement shall meet the following requirements for fabricating tolerances:

1. Cut or sheared length: 1 inch
2. Depth of truss bars: +0, -1/2 inch
3. Stirrups, ties, and spirals: 1/2 inch
4. All other bends: 1 inch

3.3 PLACING

- A. Reinforcement steel shall be accurately positioned and shall be supported and wired together to prevent displacement, using annealed-iron wire ties or suitable clips at intersections. Concrete, plastic, metal supports, spacers, or metal hangers shall support all reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties that are embedded in the blocks. For concrete over form work, the Contractor shall furnish concrete, metal, plastic or other acceptable bar chairs and spacers.
- B. Limitations on the use of bar support materials shall be as follows:
 1. Concrete dobies are permitted at all locations, except where architectural finish is required.
 2. Wire bar supports are permitted only at slabs over dry areas and exterior wall surfaces.
 3. Plastic bar supports are permitted at all locations, except on grade.
 4. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- C. Bars additional to those shown that may be found necessary or desirable for the purpose of securing reinforcement in position shall be provided by the Contractor.
- D. Unless otherwise specified, reinforcement placing tolerances shall be within the limits specified in Section 7.5 of ACI 318.
- E. Bars may be moved as necessary to avoid interference with other reinforcement steel, conduits, or embedded items. If bars are moved more than one (1) bar diameter or enough to exceed the specified tolerances, the resulting arrangement of bars shall be as acceptable to CCCSD.

- F. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters. Slab bolsters shall be spaced not more than thirty (30) inches on centers, shall extend continuously across the entire width of the reinforcement mat, and shall support the reinforcement mat in the plane indicated.
- G. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than three (3) feet on centers in any direction. The practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.
- H. Epoxy-coated reinforcing bars shall be stored, transported, and placed in such a manner as to avoid chipping of the epoxy coating. Non-abrasive slings made of nylon and similar materials shall be used. Specially coated bar supports shall be used. All chips or cracks in the epoxy coating shall be repaired with a compatible epoxy repair material prior to placing concrete.
- I. Accessories supporting reinforcing bars shall be spaced such that there is no deflection of the accessory from the weight of the supported bars. When used to space the reinforcing bars from wall forms, the forms and bars shall be located so that there is no deflection of the accessory when the forms are tightened into position.

3.4 SPACING OF BARS

- A. The clear distance between parallel bars not including bundled bars (except in columns and between multiple layers of bars in beams) shall not be less than the nominal diameter of the bars, not less than one and one-half (1-1/2) times the maximum size of the coarse aggregate, nor less than one (1) inch. The clear distance between bars shall also apply to the distance between a contact splice and adjacent splices or bars.

3.5 SPLICING

- A. Reinforcement bar splices shall only be used at locations shown. When it is necessary to splice reinforcement at points other than where shown, the character of the splice shall be as acceptable to CCCSD.
- B. Splices of Reinforcement:
 - 1. The length of lap for reinforcement bars, unless otherwise shown, shall be in accordance with ACI 318.

2. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one (1) tie for each two (2) running feet. Wires shall be staggered and tied in such a manner that they cannot slip.
3. Splices in column spiral reinforcement, when necessary, shall be made by a lap of one and one-half (1-1/2) turns.

3.6 CLEANING AND PROTECTION

- A. Reinforcement steel shall be protected at all times from conditions conducive to corrosion until concrete is placed around it.
- B. The surfaces of all reinforcement steel and other metal work to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale, rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcement shall be re-inspected and, if necessary, re-cleaned.

3.7 EMBEDMENT OF DRILLED, REINFORCING-STEEL DOWELS

- A. Hole Preparation:
 1. The hole diameter shall be as recommended by the epoxy manufacturer but shall be no larger than one-quarter (1/4) inch greater than the diameter of the outer surface of the reinforcing bar deformations.
 2. The depth of the hole shall be as recommended by the epoxy manufacturer to fully develop the bar but shall not be less than twelve (12) bar diameters, unless noted otherwise.
 3. The hole shall be drilled by methods that do not interfere with the proper bonding of epoxy.
 4. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling. The location of holes to be drilled shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.
 5. The hole shall be blown clean with clean, dry compressed air to remove all dust and loose particles.

- B. Epoxy shall be injected into the hole through a tube placed to the bottom of the hole. The tube shall be withdrawn as epoxy is placed but kept immersed to prevent formation of air pockets. The hole shall be filled to a depth that ensures that excess material will be expelled from the hole during dowel placement.
- C. Dowels shall be coated with epoxy and twisted during insertion into the partially filled hole so as to guarantee full wetting of the bar surface with epoxy. The bar shall be inserted slowly enough to avoid developing air pockets.

3.8 SAFETY

- A. No employee shall be permitted to work above vertically protruding reinforcing steel until the steel has been so protected that the employee cannot fall or be impaled on the steel.
- B. Employees working more than six (6) feet above any adjacent working surface placing and tying reinforcing steel in walls, piers, columns, etc., shall be provided with and required to use a safety belt or other device affording equivalent protection for the hazard of falls from elevated surfaces.
- C. Reinforcing steel for walls, piers, columns, and similar vertical structures shall be guyed and supported to prevent collapse.
- D. Wire mesh rolls shall be secured at each end to prevent dangerous recoiling action.

- END OF SECTION -

SECTION 15.03310

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish materials, form, mix, place, cure, repair, finish and do all other work required to produce finished concrete in accordance with the provisions of this section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.03200 - Reinforcement Steel

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:

ACI 301	Specifications for Structural Concrete for Buildings
ACI 347	Guide to Formwork for Concrete
ASTM C 33	Specification for Concrete Aggregates
ASTM C 94	Specification for Ready-Mixed Concrete
ASTM C 150	Specification for Portland Cement
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	Specification for Chemical Admixtures for Concrete
ASTM C 618	Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

1.4 CONTRACTOR SUBMITTALS

- A. When the Contractor proposes to use a mix design not listed in the CCCSD Approved Materials List, the proposed mix design including the proportions and gradations of all materials proposed shall be submitted to CCCSD and shall

receive favorable review prior to use. Mix designs shall be tested by an independent testing laboratory for properties specified in this section, and the results shall be submitted with the proposed concrete mix designs.

- B. Where ready-mix concrete is used, the Contractor shall furnish certified delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state certified equipment used for measuring, and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate, added at the batching plant, and the amount allowed to be added at the site for the specific design mix. In addition, each certificate shall state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the time when the batch was dispatched, when it left the plant, when it arrived at the job, when unloading began, and when unloading was finished.
- C. When a water-reducing admixture is proposed, the Contractor shall furnish mix designs for concrete both with and without the admixture.
- D. The Contractor shall submit shop bending diagrams, placing lists, and drawings of all reinforcement steel.

PART 2 – PRODUCTS

2.1 REINFORCEMENT STEEL

Reinforcement Steel shall satisfy the requirements specified in Section 15.03200 - Reinforcement Steel.

2.2 CONCRETE MATERIALS

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one (1) brand of cement shall be used.
- B. All materials furnished for the work shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.
- C. Materials for concrete shall conform to the following requirements:
 - 1. Cement shall be standard brand Portland cement conforming to ASTM C 150 for Type II or Type V.
 - 2. Clean potable or recycled water free from objectionable quantities of silty organic matter, alkali, salts and other impurities shall be used.

3. Aggregates shall be obtained from pits acceptable to CCCSD, shall be non-reactive, and shall conform to ASTM C 33. Lightweight sand for fine aggregate shall not be permitted.
4. Ready-mix concrete shall conform to the requirements of ASTM C 94.
5. Air-entraining agent shall meet the requirements of ASTM C 260.
6. Fly Ash shall meet the requirements of ASTM C 168.
7. Admixtures may be added at the Contractor's option to control the set, effect water reduction, and increase workability. The use of an admixture shall be subject to acceptance by CCCSD. Concrete shall not contain more than one water reducing admixture. Water reducing admixture shall conform to ASTM C 494, Type A or Type D.
8. Calcium chloride shall not be used in concrete.

2.3 CURING MATERIALS

Materials for curing concrete shall conform to ASTM C 309. Curing compounds shall be white pigmented and resin based. Sodium silicate compounds shall not be used. Concrete curing compound shall be MB-429 as manufactured by Master Builders; Spartan Cote Cure-Seal Hardener by the Burke Company; Super Rez Seal by Euclid Chemical Company; or equal.

2.4 CONCRETE DESIGN REQUIREMENTS

A. General

1. Concrete shall be composed of cement, admixtures, aggregates and water. These materials shall be of the qualities specified. The mix shall be designed to produce a concrete capable of being deposited to obtain maximum density and minimum shrinkage and where deposited in forms to have good consolidation properties and maximum smoothness of surface.
2. The Contractor is cautioned that the limiting parameters specified below are NOT a mix design. Additional cement or water reducing agent may be required to achieve workability demanded by the Contractor's construction methods.

B. Concrete shall meet the requirements in the following tabulation:

Minimum 28-Day Compressive Strength (psi)	4,000
Maximum Size Aggregate (inches)	1
Minimum Cement per cu yd (sacks*)	6.0
Slump Range	2" to 4"
Maximum W/C Ratio (by weight)	0.45

*Note: One sack of cement equals 94 lbs.

2.5 MEASUREMENT OF CEMENT AND AGGREGATE

The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment acceptable to CCCSD.

2.6 MEASUREMENT OF WATER

The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device acceptable to CCCSD and capable of measuring the water in variable amounts within a tolerance of one percent (1%).

2.7 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall be delivered to the site of the work, and discharge shall be completed within one (1) hour after the addition of the cement to the aggregates or before the drum has been revolved two hundred and fifty (250) revolutions, whichever occurs first. In hot weather, or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is eighty-five degrees Fahrenheit (85°F) or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed forty-five (45) minutes.
- B. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.
- C. Each batch of concrete shall be mixed in a truck mixer for not less than seventy (70) revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as

agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.

- D. Each batch of ready-mixed concrete delivered at the jobsite shall be accompanied by a certified delivery ticket furnished to CCCSD's Inspector.
- E. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted only if the pour can be made with continuous placement and within thirty (30) minutes of batching at the plant. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by CCCSD.

PART 3 – EXECUTION

3.1 GENERAL

Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 FORMWORK REQUIREMENTS

- A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The Contractor shall assume full responsibility for the adequate design of all forms, and any forms that are unsafe or inadequate in any respect shall promptly be removed from the jobsite and replaced. The design and inspection of concrete forms, false work, and shoring shall comply with applicable local, state and federal regulations. All design, construction, maintenance, preparation, and removal of forms shall be in accordance with ACI 347 and the requirements specified herein.
- B. All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is called for on the plans.
- C. Forms may be reused only if in good condition and acceptable to CCCSD.

3.3 REINFORCEMENT REQUIREMENTS

- A. All reinforcement steel and appurtenances shall be fabricated, and placed in accordance with Section 15.03200 - Reinforcement Steel.
- B. Reinforcement shall not be straightened or re-bent. Bars with kinks or bends not shown shall not be used. All bars shall be bent cold.
- C. Reinforcement steel shall be accurately positioned as shown, and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties that are embedded in the blocks.
- D. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- E. Reinforcement steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.

3.4 PROPORTIONING AND MIXING

- A. Proportioning of the concrete mix shall conform to the requirements of Chapter 3 of ACI 301.
- B. Mixing of concrete shall conform to the requirements of Chapter 7 of ACI 301.
- C. Retempering of concrete that has partially hardened shall not be permitted.

3.5 PREPARATION OF SURFACES FOR CONCRETING

- A. Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. All water entering the space to be filled with concrete shall be cut off or diverted prior to placement of concrete. No concrete shall be deposited underwater nor shall the Contractor allow still water to rise on any

concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete.

3.6 HANDLING, TRANSPORTING AND PLACING

- A. Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section. No aluminum materials shall be used in conveying any concrete.
- B. Concrete shall be conveyed from the mixer to place of deposit by methods that prevent separation or loss of material.
- C. No concrete shall be placed when the ambient temperature exceeds one hundred five degrees Fahrenheit (105°F).

3.7 CONSOLIDATION

As concrete is placed in the forms or in excavations, it shall be thoroughly settled, tamped and compacted, throughout the entire depth, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement using mechanical vibrators. Vibrators shall be high speed power vibrators (8,000 to 10,000 rpm).

3.8 FINISHING CONCRETE SURFACES

- A. Finished surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface, and shall be plumb, level or conform to the design alignment, profiles, and dimensions shown on the plans.
- B. No treatment is required after form removal except for curing, repair of defective concrete, and treatment of surface defects.
- C. Surface holes larger than two (2) inch in diameter or deeper than three (3) inch are defined as surface defects in basins and exposed walls.

3.9 CURING

- A. All concrete shall be cured for no less than seven (7) days after placing, in accordance with the methods indicated below:

Surface to be Cured	Method
Unstripped forms	1
Encasement concrete, thrust blocks, manhole bases and top blocks	2
All other concrete surfaces	3

- B. Method 1: Outside of wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removal. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within seven (7) days of placing the concrete, curing shall be continued in accordance with Method 3.
- C. Method 2: The surface shall be covered with moist earth for no less than four (4) hours or more than twenty-four (24) hours after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least seven (7) days after placement of concrete. Stacking of manhole components on cast-in-place bases shall not commence until the next working business day after the base has been placed.
- D. Method 3: The surface shall be sprayed with a liquid curing compound applied in accordance with the manufacturer's printed instructions. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces and within one (1) hour after removal of forms. Repairs to formed surfaces shall be made within the one (1) hour period.

3.10 TREATMENT OF SURFACE DEFECTS

All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of this section, using approved methods which will not disturb the bond, cause sagging or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

3.11 CARE AND REPAIR OF CONCRETE

The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress or any other cause until final acceptance by CCCSD. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or

which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the plans, shall be satisfactorily removed and replaced with acceptable concrete.

- END OF SECTION -

SECTION 15.03330

CONTROLLED LOW-STRENGTH MATERIAL (CLSM)

PART 1 – GENERAL

1.1 THE REQUIREMENTS

The Contractor shall furnish all materials for Controlled Low Strength Material (CLSM) in accordance with the provisions of this Section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02205 - Excavation, Bedding and Backfill
- B. Section 15.03600 - Grout

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:

ASTM C 33	Specification for Concrete Aggregates
ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Specifications for Ready-mixed Concrete
ASTM C 150	Specification for Portland Cement
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete
ASTM C 494	Specification for Chemical Admixtures for Concrete
ASTM C 618	Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Filler in Portland Cement Concrete

1.4 CONTRACTOR SUBMITTALS

When the Contractor proposes to use a mix design not listed in the CCCSD Approved Materials List, the proposed mix design including the proportions and gradations of all materials proposed shall be submitted to CCCSD and shall receive favorable review prior to use. Mix designs shall be tested by an independent testing laboratory for properties specified in this Section, and the results shall be submitted with the proposed CLSM mix designs.

1.5 QUALITY ASSURANCE

CCCSD Inspectors will take samples of CLSM from time to time to ensure compliance with the requirements of this Section.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. CLSM shall be a mixture of cement (one (1) sack per cubic yard minimum; two (2) sacks per cubic yard maximum), pozzolan, fly ash, coarse and fine aggregate, admixtures, and water batched by a ready mix concrete plant and delivered to the work by means of standard transit mixing trucks. The mixture shall produce a material which may be excavated by hand. The minimum twenty-eight (28) day compressive strength shall be fifty (50) psi and the maximum twenty-eight (28) day compressive strength shall be no greater than one hundred fifty (150) psi in accordance with ASTM C 39.
- B. Cement shall be Type II in accordance with the requirements of ASTM C 150.
- C. Pozzolan and/or fly ash may be added to improve the flowability and shall be Type F in accordance with the requirements of ASTM C 618.
- D. Coarse aggregate shall consist of a well-graded mixture of crushed rock, or sand with a maximum size aggregate of three-eighth (3/8) inch. One hundred percent (100%) shall pass the one-half (1/2) inch sieve. Not more than thirty percent (30%) shall be retained by the three-eighth (3/8) inch sieve and not more than twelve percent (12%) shall pass the number two hundred (200) sieve. All material shall be free from organic matter and meet the requirements of ASTM C 33.
- E. Clean potable or recycled water free from objectionable quantities of silty organic matter, alkali salts and other impurities shall be used.

2.2 ADMIXTURES

- A. An air entraining admixture may be added to improve the workability and shall be in accordance with the requirements of ASTM C 260. The entrained air content shall be a minimum of eight percent (8%) and a maximum of twenty percent (20%) as required by the Contractor to meet the uses specified herein.
- B. A water reducing agent may be added in accordance with the requirements of ASTM C 494 to improve workability.

PART 3 – EXECUTION

3.1 GENERAL

Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 PREPARING FOR PLACEMENT

The subgrade and compacted fill and/or trench to receive CLSM shall be complete and acceptable in accordance with Section 15.02205 – Excavation, Bedding and Backfill.

3.3 MIXING AND DELIVERING

CLSM shall be batched by a ready mix batching plant acceptable to CCCSD, and shall be delivered in standard transit mix trucks.

3.4 PLACEMENT

- A. Use of CLSM in the pipe zone may cause flotation or displacement of the pipe during installation of the CLSM. The Contractor shall take necessary precautions to prevent flotation and ensure that the pipe is installed according to the alignment and grade shown on the plans.
- B. CLSM shall be placed by means of tailgate discharge, conveyor belts, concrete pumps, or other means acceptable to CCCSD.
- C. A vibrator may be used to ensure that all voids, crevices, and pockets are filled with CLSM. Care shall be taken to avoid over-consolidation of the material separating the large and fine aggregate.
- D. Where new CLSM must be placed against existing CLSM, the placement shall be clean of all loose and foreign material. The surface of existing CLSM shall be soaked a minimum of one (1) hour before placement of fresh CLSM. No standing water will be allowed before starting placement of fresh CLSM.
- E. When placing CLSM for trench dams, the Contractor shall ensure that no voids exist around the pipe barrel and that the CLSM completely fills the trench width, including keyways, for the full depth required, as shown.
- F. When using CLSM as abandonment grout, the Contractor shall contain CLSM in sewer pipelines and structures to be abandoned using bulkheads.

3.5 FINISHING CLSM

The finished surface of CLSM shall be smooth and to the grade shown on the plans or as directed by CCCSD.

3.6 PROTECTION

CLSM shall be protected from running water, rain, freezing, or other conditions that could damage the material until cure is complete.

3.7 TRENCH BACKFILL

No equipment, traffic, or backfill shall be allowed on the CLSM until the surface of the CLSM is able to withstand a twenty (20) psi load without displacement or damage. If necessary, the Contractor shall provide steel trench plates that span the trench, as specified in Section 15.02205 – Excavation, Bedding and Backfill, until the CLSM has reached the required strength.

- END OF SECTION -

SECTION 15.03400

PRECAST CONCRETE BOXES AND VAULTS

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install precast boxes and vaults as shown on the plans, including appurtenances necessary for a complete installation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.03310 - Cast-in-Place Concrete
- B. Section 15.03600 - Grout

1.3 CONTRACTOR SUBMITTALS

The Contractor shall submit shop drawings for all precast concrete items not included in the CCCSD Approved Materials List. Submitted drawings shall show all dimensions, location and type of embedded items, lifting inserts, and details of reinforcement and joints.

1.4 QUALITY ASSURANCE

- A. Tests on component materials and for compressive strength of concrete will be performed as specified herein.
- B. Test methods and criteria for evaluation and acceptance of concrete shall be as specified in Section 15.03310 – Cast-In-Place Concrete.

PART 2 – PRODUCTS

2.1 MANUFACTURED ITEMS

- A. Precast boxes and vaults shall be as listed in the CCCSD Approved Materials List, or approved equals.
- B. Concrete used for manufactured vaults shall have a minimum twenty-eight (28) day compressive strength of three thousand (3,000) psi.

- C. Boxes or vaults to be installed in areas subject to vehicular traffic shall be designed for HS-20 loads.

2.2 PREFORMED JOINT SEALANT

Preformed joint sealant shall be as listed in the CCCSD Approved Materials List, or approved equal.

2.3 NON-SHRINK GROUT

Non-shrink grout shall be as specified in Section 15.03600 - Grout.

PART 3 – EXECUTION

3.1 GENERAL

Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 INSTALLATION

- A. All precast items shall be installed in accordance with the manufacturer's recommendations. All joints shall be sealed by the use of preformed sealant so as to be watertight. All precast boxes and vaults shall be set on a minimum foundation of six (6) inches of Type I Bedding Material compacted to ninety-five percent (95%) relative compaction.
- B. Connections to precast boxes and vaults shall be made by one of the following:
 - 1. Casting sections of pipe into the item.
 - 2. Core drilling or casting pipe chases into the items. Where core drilled holes or cast-in pipe chases are used; the annular space between the core-drilled hole or chase and the connecting pipe shall be filled with non-shrink grout or sealed using an approved resilient connector, skirt or reducing coupling, unless otherwise specified on the plans. All such connections shall be watertight.

- END OF SECTION -

SECTION 15.03600

GROUT

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall furnish grout and shall form, mix, place, cure, repair, finish and do all other work as required to produce finished grout in accordance with the provisions of this Section.
- B. The following types of grout are covered in this Section:
 - 1. Non-Shrink Grout: shall be used wherever grout is shown on the plans or required by these Specifications, unless another type is specifically referenced.
 - 2. Epoxy Grout
 - 3. Grout for Topping and Concrete Fill
 - 4. Abandonment Grout

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.03310 - Cast-in-Place Concrete
- B. Section 15.03330 - Controlled Low-Strength Material (CLSM)

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:
 - ASTM C 109 Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or 50-mm Cube Specimens)
 - ASTM C 579 Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
 - ASTM C 827 Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
 - ASTM C1107 Standard Specification for Packaged dry, Hydraulic Cement Grout (Non-shrink)

1.4 CONTRACTOR SUBMITTALS

CCCSO may require that the Contractor submit certified test results verifying that grout meets the compressive strength, shrinkage, and expansion requirements specified herein; and manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

1.5 QUALITY ASSURANCE

A. Field Tests:

Compression test specimens may be taken by the Inspector at any time during construction to ensure continued compliance with these Specifications. The specimens will be made by the Inspector.

1. Compression tests and fabrication of specimens for non-shrink grout will be performed as specified in ASTM C 109.
2. Compression tests and fabrication of specimens for epoxy grout will be performed as specified in ASTM C 579, Method B.

PART 2 – PRODUCTS

2.1 CEMENT GROUT

- A. Cement grout shall be composed of one (1) part cement, three (3) parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white Portland cement shall be blended with regular cement as needed. The minimum required compressive strength at twenty-eight (28) days shall be four thousand (4,000) psi.
- B. Component materials for cement grout materials shall be as specified in Section 15.03310 – Cast-in-Place Concrete.

2.2 PREPACKAGED GROUTS

A. Non-Shrink Grout:

1. Non-shrink grout shall be inorganic, non-gas liberating, nonmetallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout shall be as recommended by the manufacturer for the particular application.
2. Non-shrink grouts shall have a minimum twenty eight (28) day compressive strength of five thousand (5,000) psi; shall have no shrinkage (0.0%) and a maximum of four percent (4%) expansion in the plastic state when tested in accordance with ASTM C 827; and shall have no shrinkage (0.0%) and a maximum of point two percent (0.2%) expansion in the hardened state when tested in accordance with ASTM C1107.
3. Non-shrink grout shall be used for the repair of all holes and defects in concrete members which are water bearing or in contact with soil or other fill material, grouting under all equipment base plates, and at all locations where grout is specified in the plans; except for those applications where epoxy grout, grout for topping and concrete fill, and abandonment grout is specified herein.

B. Epoxy Grout:

1. Epoxy grout shall be a pourable, non-shrink, one hundred percent (100%) solids system. The epoxy grout system shall have three (3) components: resin, hardener, and specially blended aggregate, all pre-measured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.
2. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application.
3. The mixed epoxy grout system shall have a minimum working life of forty- five (45) minutes at seventy-five degrees Fahrenheit (75°F).

4. The epoxy grout shall develop a compressive strength of five thousand (5,000) psi in twenty four (24) hours and ten thousand (10,000) psi in seven (7) days when tested in accordance with ASTM C 579, Method B. There shall be no shrinkage (0.0%) and a maximum four percent (4%) expansion when tested in accordance with ASTM C 827.

2.3 GROUT FOR TOPPING AND CONCRETE FILL

- A. Grout for topping of slabs and building up surfaces of tank, channel and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed as specified herein. All component materials and procedures specified for concrete in Section 15.03310 - Cast-in-Place Concrete, shall apply except as noted otherwise herein.
- B. Topping grout and concrete fill shall contain a minimum of six (6) sacks (564 pounds) of cement per cubic yard with a maximum water-cement ratio of 0.45.
- C. Coarse aggregate shall be graded as follows:

U.S. Standard Sieve Size	Percent by Weight Passing
1/2"	100
3/8"	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 30	0

- D. Final mix design shall be as determined by trial mix design under supervision of an approved testing laboratory.
- E. Strength: Minimum compressive strength of topping grout and concrete fill at the end of twenty-eight (28) days shall be three thousand (3,000) psi.

2.4 ABANDONMENT GROUT

Refer to Section 15.03330 - Controlled Low-Strength Material (CLSM) for abandonment grout requirements.

2.5 CURING MATERIALS

Curing materials shall be as specified in Section 15.03310 - Cast-in-Place Concrete for cement grout and as recommended by the manufacturer of prepackaged grouts.

2.6 CONSISTENCY

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency shall be such that the grout is plastic and moldable but will not flow. Where dry pack is called for on the plans, it shall mean a grout of that consistency; the type of grout to be used shall be as specified herein for the particular application.
- B. The slump of grout for topping and concrete fill shall be adjusted to match placement and finishing conditions but shall not exceed four (4) inches.

2.7 MEASUREMENT OF INGREDIENTS

- A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurement shall not be allowed.
- B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 – EXECUTION

3.1 GENERAL

- A. All surface preparation, curing, and protection of cement grout shall be as specified in Section 15.03310 - Cast-in-Place Concrete. The finish of the grout surface shall match that of the adjacent concrete.
- B. Base concrete shall have attained its design strength before grout is placed, unless otherwise authorized by CCCSD.
- C. Grout at the consistency necessary for the particular application shall be placed in such a manner so as to completely fill the space to be grouted.
- D. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including

the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 GROUTING PROCEDURES

- A. Prepackaged Grouts: All mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- B. Grout for topping or concrete fill:
 - 1. All finish work shall be completed prior to placement of topping or concrete fill. The base slab shall be given a roughened textured surface by sandblasting or hydroblasting, exposing the aggregates, to ensure bonding to the base slab.
 - 2. The minimum thickness of grout topping and concrete fill shall be one (1) inch. Where the finished surface of concrete fill is to form an intersecting angle of less than forty-five degrees (45°) with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of three (3) inches wide by one (1) inch deep.
 - 3. The base slab shall be thoroughly cleaned and wetted prior to placing topping and fill. No topping concrete shall be placed until the slab is free from standing pools or ponds of water. A thin coat of Type II cement shall be broomed into the surface of the slab just before topping or fill placement. The topping and fill shall be compacted by rolling or tamping, brought to established grade, and floated.
 - 4. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.
 - 5. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping and fill has hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used as an assist in this operation, but the last pass over the surface shall be by hand-troweling. During finishing, no water, dry cement or mixture of dry cement and sand shall be applied to the surface.

C. Abandonment Grout

1. Placing of Material

- a. Batching, mixing, and placing may be started if the weather conditions are favorable and when the air temperature is thirty four degrees Fahrenheit (34°F) and rising. At the time of placement, the abandonment grout must have a temperature of at least forty degrees Fahrenheit (40°F). Mixing and placing shall stop when the air temperature is thirty eight degrees Fahrenheit (38°F) or less and falling.
- b. The Contractor shall contain abandonment grout in sewer pipelines and structures to be abandoned using bulkheads.

- END OF SECTION -

SECTION 15.05500

MISCELLANEOUS METAL WORK

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall provide miscellaneous metalwork and appurtenances, complete, in accordance with the plans and these Specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.09800 - Protective Coating and Painting

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:

ASTM A 36	Carbon Structural Steel
ASTM A 48	Specification for Gray Iron Castings
ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	Carbon Steel Bolts and Studs, 60,000 psi Tensile
ANSI/AWS D1.1	Structural Welding Code – Steel
AWS	American Welding Society Standards

PART 2 – PRODUCTS

2.1 GENERAL

- A. Standard: Structural steel shapes, plates, bars (excluding reinforcement steel covered in Section 15.03310 - Cast-In-Place Concrete) shall conform to the requirements of ASTM A 36.
- B. Corrosion Protection: Fabricated steel shall be coated in accordance with Section 15.09800 - Protective Coating and Painting or shall be hot dip galvanized as indicated on the plans.

- C. Stainless Steel: Unless otherwise indicated, stainless steel metalwork and bolts shall be of Type 316 stainless steel and shall not be galvanized.

2.2 BOLTS AND ANCHORS

- A. Standard Service Bolts (Not Buried or Submerged): Bolts, anchor bolts and cap screws shall be in accordance with the requirements of ASTM A 307 Grade A or B, or threaded parts of ASTM A 36.
- B. Length of Bolts: The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case more than one-half (1/2) inch beyond the nut.
- C. Adhesive Anchors: Unless otherwise indicated, all drilled, concrete or masonry anchors shall be adhesive anchors. No substitutions will be considered unless accompanied with ICBO report verifying strength and material equivalency.
 - 1. Epoxy adhesive anchors are required for drilled anchors where exposed to weather, in submerged, wet, splash, overhead and corrosive conditions, and for anchoring handrails, pumps, mechanical equipment and reinforcing bars. Epoxy systems shall be per the Approved Materials List. Threaded rods shall be Type 316 stainless steel. Holes are to be clean and dry prior to the application of epoxy.
 - 2. Unless otherwise shown, glass capsule, polyester resin adhesive anchors will be permitted in locations not specified above and shall be per the Approved Materials List. Threaded rod shall be galvanized steel.
- D. Expanding-Type Anchors: Expanding-type anchors if indicated or permitted shall be steel expansion type per the Approved Materials List. Lead caulking anchors will not be permitted. Size shall be as shown. Non-embedded buried or submerged anchors shall be Type 316 stainless steel.
- E. Lubricant: Non-seize lubricant shall be applied to the threads of all stainless steel bolts prior to installation.

2.3 CASTINGS

- A. Steel castings shall contain no less than point six percent (0.6%) of manganese and not less than point two percent (0.2%) of silicon.

- B. All castings shall be sound and free from shrinkage crack, blow holes and other defects. All fins and burnt sand shall be removed. Excessive porosity and spongy surfaces will constitute causes for rejection. CCCSD shall be final judge as to whether the defects present are sufficient to cause rejection.
- C. No welding or patching of defects in castings will be permitted unless authorized by the Inspector. Any such welding or patching done without the Inspector's consent shall be cause for rejection.
- D. All castings shall be true to the form and dimensions shown on the Standard Drawings. After inspection and prior to shipping, all machined surfaces shall be coated with a blue rust inhibitive lacquer, or other material which can be easily removed, unless otherwise specified.
- E. Castings shall not be more than seven and one-half percent (7-1/2%) overweight.

2.4 CAST IRON FRAME AND COVERS

- A. Castings for manhole frames and covers shall be non-rocking and shall conform to the requirements of ASTM A 48, Class 30. Cast iron covers and frames shall be heavy traffic type with a minimum weight and diameter as shown in the Drawings. Frame and cover shall be designed for H-20 traffic loading. Each item in a set of frames and covers shall be supplied by the same Manufacturer. The manhole covers shall have open pick holes.
- B. Refer to DWG-8 of the Standard Drawings for cover requirements. Covers for public sewer manholes shall be marked "CCCSD." Covers for manholes in private site collector systems shall be marked "Sanitary Sewer".
- C. The cover and its seat in the frame shall be machined so that the cover will sit evenly and firmly in the frame. Cast iron frames and covers shall be dipped or painted with asphalt.

2.5 FILLETS

- A. Steel, gray iron, malleable iron and bronze castings shall be provided with continuous fillets in all inside angles. The radius of curvature of the exposed surface of a fillet shall define the size of the fillet.

- B. The size of fillets shall not be less than one-half (1/2) of the thickness of the thinnest adjoining member nor less than one-half (1/2) inch.

2.6 MATCH MARKING

Connecting parts assembled in the shop for the purpose of alignment in the field shall be match marked.

PART 3 – EXECUTION

3.1 GENERAL

Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 FABRICATION AND INSTALLATION REQUIREMENTS

Except as otherwise indicated, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction," current edition.

3.3 WELDING

- A. All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's (AWS) "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards.
- B. In assembly and during welding, the component parts shall be adequately clamped, supported and restrained to minimize distortion and for control of dimensions. Welded reinforcement shall be as indicated by the AWS Standards. Upon completion of welding, all weld splatter, flux, slag and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. All sharp corners of material which are to be painted or coated shall be ground to a minimum one-thirty second (1/32) inch chamfer.

- C. Welding electrodes shall be uniformly and heavily coated (not washed) and shall be of such nature that the coating will not chip or peel while being used with the maximum amperage specified by the manufacturer.

3.4 GALVANIZING

All structural steel plates shapes, bars and fabricated assemblies to be galvanized shall be thoroughly cleaned of rust and scale, and galvanized in accordance with the requirements of ASTM A 123. Bolts, anchor bolts, nuts and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A 153. Field repairs to galvanizing shall be made using approved coating according to the Approved Materials List.

3.5 DRILLED ANCHORS

Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions. Holes shall be roughened with a brush on a power drill, cleaned and dried. Expanding anchors if permitted shall not be installed until the concrete has reached the required twenty-eight (28) day compressive strength. Adhesive anchors shall not be loaded until the adhesive has reached its indicated strength in accordance with the manufacturer's instructions.

3.6 CUTTING WITH TORCH

- A. The use of a cutting torch is permissible if the metal being cut is not carrying stress during the operation.
- B. When cutting with a torch, cuts shall be true to line with a maximum deviation of one-eighth (1/8) inch. All burned edges shall be finished by grinding or chipping.
- C. The use of the cutting torch will be permitted on ends that form compression connections providing a minimum of one-quarter (1/4) inch of metal is left to be removed by machining.

- END OF SECTION -

SECTION 15.09800

PROTECTIVE COATING AND PAINTING

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall apply protective coatings, complete and in place, where indicated on the plans, or as directed by the Inspector, in accordance with the requirements of this Section.
- B. The Contractor or its subcontractor who applies the protective coatings shall possess a valid license from the California Contractor's State License Board as required for performance of the painting and coating work.

1.2 CONTRACTOR SUBMITTALS

The Contractor shall submit the following information at least thirty (30) days prior to commencement of protective coating work:

- A. Coating Materials List: Showing the manufacturer and the name of the product. The list shall be submitted prior to or at the time of submittal of samples.
- B. Paint Manufacturer's Information: For each coating system product to be used, the following data:
 - 1. Paint manufacturer's data sheet, including statements on the suitability of the material for the intended use.
 - 2. Technical and performance information that demonstrates compliance with the system performance and material requirements.
 - 3. Paint manufacturer's instructions and recommendations on surface preparation and application.
 - 4. Colors available for each product (where applicable). Color charts that identify each color the Contractor is proposing shall be submitted. CCCSD will select the color to be used during the submittal process.
 - 5. Compatibility of shop and field applied coatings (where applicable).
 - 6. Material Safety Data Sheet for each product to be used.

- C. Samples of all paint, finishes, and other coating materials shall be submitted on eight and one-half (8-1/2) inch by eleven (11) inch sheet metal. Each sheet shall be completely coated over its entire surface with one protective coating material, type, and color.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.15070 - Steel Pipe

1.4 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:

The following referenced surface preparation Specifications of the Steel Structures Painting Council shall form a part of this specification:

- SSPC SP1 Solvent Cleaning: Removal of oil, grease, soil, salts, and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion or steam.
- SSPC SP2 Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint and other loose detrimental foreign matter, by hand chipping, scraping, sanding and wire brushing.
- SSPC SP3 Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing and grinding.
- SSPC SP5 White Metal Blast Cleaning: Removal of all visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products and foreign matter by blast cleaning.
- SSPC SP6 Commercial Blast Cleaning: Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than thirty-three percent (33%) of each square inch of surface area.
- SSPC SP7 Brush-Off Blast Cleaning: Removal of all visible oil, grease, soil, dust, loose mill scale, loose rust and loose paint.
- SSPC SP10 Near-White Blast Cleaning: Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter, except that staining shall be limited to no more than five percent (5%) of each square inch of surface area.

- SSPC-SP13 Surface Preparation of Concrete, Abrasive Blast Cleaning Method: Removal of all visible oil, grease, soil, dust, mill scale, paint, oxides, corrosion products and foreign matter by blast cleaning.

1.5 QUALITY ASSURANCE

- A. The Contractor shall prepare surfaces and apply coatings in strict accordance with the requirements and intent of the Specifications. All materials furnished and all work accomplished shall be subject to inspection by CCCSD. The Contractor shall provide access and allow for adequate time to perform all inspections.
- A. Quality assurance procedures and practices shall be used to monitor all phases of surface preparation, application and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be used provided they meet recognized and acceptable professional standards and are approved by CCCSD.

PART 2 – PRODUCTS

2.1 GENERAL

- A. The Contractor shall use suitable coating materials as recommended by the manufacturer. Materials shall comply with Volatile Organic Compound (VOC) limits applicable at the site.
- B. Coating materials shall be sealed in containers clearly labeled to indicate the designated name, formula or specification number, batch number, color, date of manufacture and name of manufacturer, all of which shall be plainly legible at the time of use.

2.2 COATING SYSTEMS FOR EXPOSED STEEL PIPE

- A. Zinc/Epoxy/Polyurethane System: The zinc primer shall be an aromatic urethane that contains at least eighty-three percent (83%) of metallic zinc by weight in the dried film, and is recommended by the coating manufacturer as a primer for this system. The intermediate coat shall be a high-build two-component epoxy with a solids content of at least sixty-nine percent (69%) by volume. Finish coats shall be a two-component aliphatic acrylic or polyester polyurethane coating material that provides superior color and gloss retention, resistance to chemical fumes and severe weathering. Finish coat shall have a minimum solids content of seventy-

three percent (73%) by volume.

1. Prime coat (minimum dry film thickness = 3 mils): Tnemec Series 90-97 Tneme-Zinc, Amercoat 68HS, Carbozinc 859, or equal.
2. Intermediate coat (minimum dry film thickness = 4 mils): Tnemec Series N69 Polyamidoamine Epoxy, Amerlock 400, Carboguard 890 or equal.
3. Finish coats (one or more, minimum dry film thickness = 3 mils): Tnemec Series 1075 Endurashield, Ameron Amershield, Carbothane 134 HG or equal.
4. Total system minimum dry film thickness = 10 mils.
5. Intermediate coat shall be applied in excess of four (4) mils minimum dry film thickness or in more than one (1) coat as necessary to completely cover the organic zinc primer and prevent application bubbling of the polyurethane finish coat.
6. More than one finish coat shall be applied as necessary to produce a finish with uniform color and texture. If the organic zinc primer is used as a pre-construction or shop applied primer, all damaged and uncoated areas shall be spot abrasive blasted and coated after construction using the indicated material.

PART 3 – EXECUTION

3.1 GENERAL

Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 STORAGE, MIXING AND THINNING OF MATERIALS

- A. Manufacturer's Recommendations: Unless otherwise indicated, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating and for all other procedures relative to coating shall be strictly observed.
- B. All protective coating materials shall be used within the manufacturer's

recommended shelf life.

- C. Storage and Mixing: Coating materials shall be stored under the conditions recommended by the Material Safety Data Sheets, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings of different manufacturers shall not be mixed together.

3.3 METAL SURFACE PREPARATION (UNGALVANIZED)

- A. The minimum abrasive blasting surface preparation shall be as indicated in the coating manufacturer's printed recommendations for the intended service.
- B. Workmanship for metal surface preparation shall be in conformance with the current SSPC Standards and this Section. Blast cleaned surfaces shall match the standard samples available from the National Association of Corrosion Engineers (NACE), NACE Standard TM-01-70 - Visual Standard for Surfaces of New Steel Airblast Cleaned with Sand Abrasive and TM-01-75 - Visual Standard for Surfaces of New Steel Centrifugally Blast Cleaned with Steel Grit.
- C. All oil, grease, welding fluxes, and other surface contaminants shall be removed by solvent cleaning per SSPC SP1 - Solvent Cleaning prior to blast cleaning.
- D. All sharp edges shall be rounded or chamfered and all burrs, surface defects and weld splatter shall be ground smooth prior to blast cleaning.
- E. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendation for the particular coating and service conditions. Abrasives for submerged and severe service coating systems shall be clean, hard, sharp cutting crushed slag. Automated blasting systems shall not be used for surfaces that will be in submerged service. Metal shot or grit shall not be used for surfaces that will be in submerged service, even if subsequent abrasive blasting is planned to be one with hard, sharp cutting crushed slag.
- F. The abrasive shall not be reused unless an automated blasting system is used for surfaces that will be in non-submerged service. For automated blasting systems, clean oil-free abrasives shall be maintained. The abrasive mix shall include at least fifty percent (50%) grit.
- G. The Contractor shall comply with the applicable federal, state and local air pollution control regulations for blast cleaning.

- H. Compressed air for air blast cleaning shall be supplied at adequate pressure from well-maintained compressors equipped with oil and moisture separators that remove at least ninety-five percent (95%) of the contaminants.
- I. Surfaces shall be cleaned of all dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming, or another approved method prior to painting.
- J. Enclosed areas and other areas where dust settling is a problem shall be vacuum cleaned and wiped with a tack cloth.
- K. Damaged or defective coating shall be removed by the blast cleaning to meet the clean surface requirements before recoating.
- L. If the required abrasive blast cleaning will damage adjacent work, the area to be cleaned is less than one hundred (100) square feet, and the coated surface will not be submerged in service, then SSPC SP2 or SSPC SP3 is to be used.
- M. Shop applied coatings of unknown composition shall be completely removed before the indicated coatings are applied. Valves, castings, ductile or cast iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by solvent cleaning per SSPC SP1 before the abrasive blast cleaning work has been started.
- N. Shop primed equipment shall be solvent cleaned in the field before finish coats are applied.

3.4 SURFACE PREPARATION FOR GALVANIZED FERROUS METAL

- A. Unless noted otherwise, galvanized ferrous metal shall be alkaline cleaned per SSPC SP1 to remove oil, grease, and other contaminants detrimental to adhesion of the protective coating system to be used, followed by brush off blast cleaning per SSPC SP7.
- B. Pretreatment coatings of surfaces shall be in accordance with the printed recommendations of the coating manufacturer.

3.5 SURFACE PREPARATION OF FERROUS SURFACES WITH EXISTING COATINGS

- A. General: All grease, oil, heavy chalk, dirt, or other contaminants shall be

removed by solvent or detergent cleaning prior to abrasive blast cleaning. The generic type of the existing coatings shall be determined by laboratory testing.

- B. The Contractor shall provide the degree of cleaning indicated in the coating system schedule for the entire surface to be coated. If the degree of cleaning is not indicated in the schedule, deteriorated coatings shall be removed by abrasive blast cleaning to SSPC SP6. Areas of tightly adhering coatings shall be cleaned to SSPC SP7, with the remaining thickness of existing coating not to exceed three (3) mils.
- C. If coatings to be applied are not compatible with existing coatings, the Contractor shall apply intermediate coatings per the paint manufacturer's recommendation for the indicated coating system or shall completely remove the existing coating prior to abrasive blast cleaning. A small trial application shall be conducted for compatibility prior to painting large areas.
- D. Coatings of unknown composition shall be completely removed prior to application of new coatings.
- E. Where indicated or where site conditions do not permit dry abrasive blasting due to dust or air pollution considerations, water abrasive blasting or wet abrasive blasting may be used. In both methods, paint-compatible corrosion inhibitors shall be used, and coating application shall begin as soon as the surfaces are dry. Water abrasive blasting shall be done using high pressure water with sand injection. In both methods, the equipment used shall be commercially produced equipment with a successful service record. Wet blasting methods shall not be used for submerged and severe service coating systems unless indicated.

3.6 PREPARATION FOR COATING

- A. All surfaces to receive protective coatings shall be cleaned as indicated prior to application of coatings. The Contractor shall examine all surfaces to be coated, and shall correct all surface defects before application of any coating material. All marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any coating application. Surfaces to be coated shall be dry and free of visible dust.
- B. Surfaces that are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations.
- C. All hardware, lighting fixtures, switch plates, machined surfaces,

couplings, shafts, bearings, nameplates on machinery, and other surfaces not to be painted shall be removed, masked or otherwise protected. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of all mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.

- D. Care shall be exercised not to damage adjacent work during blast cleaning operations. Spray painting shall be conducted under carefully controlled conditions. The Contractor shall be fully responsible for and shall promptly repair any and all damage to adjacent work or adjoining property occurring from blast cleaning or coating operations.
- E. Cleaning and coating shall be coordinated so that dust and other contaminants from the cleaning process will not fall on wet, newly coated surfaces.

3.7 APPLICATION OF COATING

- A. Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to insure thorough cleaning and adequate thickness of coating material. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The finish coat application shall be so complete that the addition of another coat would not substantially change the color or texture of the finished work.
- B. All damage to surfaces resulting from the work shall be cleaned, repaired, and refinished to its original condition.

- END OF SECTION -

SECTION 15.13100

INDIVIDUAL LOT PUMPING SYSTEMS

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. Design and construction of private individual lot pumping systems shall be in conformance with applicable Cal/OSHA regulations, electrical, plumbing, and building codes, and the requirements of this Section.
- B. Pumping systems for single residential units may be either simplex (single pump) or duplex (two pumps). Systems to serve multiple residential units or nonresidential uses service shall be duplex systems (two pumps).
- C. Flow Rates: Pumping systems shall produce a velocity in the pressure sewer (force main) of three (3) to five (5) feet per second when pumping against the non-surcharged head at sump Low Water Level (LWL).
 - 1. Connection to House Plumbing
Systems connected to the house plumbing shall employ grinder pumps that discharge at a maximum flow rate of thirty (30) gallons per minute (gpm).
 - 2. Connection to Side Sewer
Systems connected to side sewers shall discharge at a maximum flow rate of fifty (50) gpm.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02205 - Excavation, Bedding and Backfill
- B. Section 15.13200 – Multiple-User Low Pressure Sewer Systems
- C. Section 15.15064 - Polyvinyl Chloride (PVC) Pipe
- D. Section 15.15066 - High-Density Polyethylene (HDPE) Pipe

1.3 CONTRACTOR SUBMITTALS

- A. The Contractor shall submit a complete Individual Lot Pumping System Application including manufacturer's Specifications for pumps, electrical controllers, sumps, and alarms to CCCSD and receive favorable review prior to purchasing any pumping system components, or commencing construction work.

- B. The Contractor shall submit a copy of the electrical permit signed off as approved by the local building code enforcement agency to the Inspector prior to startup testing of the pumping system.

1.4 QUALITY ASSURANCE

- A. Leakage Test: After closing the isolation valve at the pump station, the pump discharge pressure sewer shall be filled with water and pressurized with compressed air to the required test pressure cited on the approved CCCSD pump curve data sheet at its point of connection to the gravity sewer system (air-over-water). The pressure shall be allowed to stabilize for a period of five (5) minutes immediately preceding a ten (10) minute test period. To pass the test, there shall be no pressure drop during the test period.
- B. Electrical Permit and Inspection: The Property Owner or the Contractor shall obtain an electrical construction permit for the electrical control and alarm work from the local building code enforcement agency, and shall show evidence of favorable inspection of the system prior to functional testing of the pumping system.
- C. Functional Test: When the pumping system installation is complete and favorable inspection of the electrical work has been obtained, the Contractor shall call for functional testing of the system. The Contractor shall arrange for a supply of water for use in the functional testing. The Inspector will witness the Contractor's operation of the system during the functional test, which shall include running through more than one (1) normal automatic pumping cycle; hand (manual) switching of pumps; alternation of pumps in duplex systems; activation, silencing and resetting of alarms (visual and audible); and activation of all other switches and system features.

PART 2 – PRODUCTS

2.1 GENERAL

All equipment and accessories shall be standard manufactured items and shall be specifically manufactured for sewage use by a company regularly engaged in the manufacture and assembly of pumping system components.

2.2 PUMPS

- A. Pump systems not listed as “pre-approved” in the Approved Materials List are subject to review by CCCSD. Such pumps shall be approved for residential sewage service by a Nationally Recognized Testing Entity (NRTE) such as Underwriters Laboratories (UL Listed) and/or CSA, and shall carry a certification label for this use, and shall be one of the types described below:
1. Submersible, centrifugal, non-clog pumps: Impeller shall be a non-clog type and shall be capable of passing a two (2) inch sphere. The pump discharge shall be at least two (2) inches in diameter.
 2. Submersible, centrifugal or positive displacement grinder pumps: The grinder pump shall be constructed of long-lasting, low maintenance material that is capable of reducing all components in normal domestic sewage (including “foreign objects”, such as paper, wood, plastic, glass, rubber, etc.) to finely divided particles which will pass freely through the passages of the pump, force main, and fittings. The pump discharge shall match the manufacturer’s recommended discharge size, but shall be at least one and one-quarter (1-1/4) inches in diameter.
- B. For duplex systems (two pumps), an alternator shall be provided to automatically alternate between the pumps on each operating cycle so that each pump is assured of near-equal operating time. For duplex systems, the High Water Alarm (HWA) shall be activated in the event that the lead (first) pump is unable to maintain proper level and the lag (second) pump is called to run.

2.3 PUMP SUMPS

- A. The pump sump shall include integral anti-flotation flanges, and shall be fabricated from one of the following materials:
1. Asphalt-coated steel (minimum three-sixteenth (3/16) inch plate), with interior and exterior surfaces protected with a minimum of 0.10-inch thick corrosion barrier acceptable to CCCSD.
 2. Filament wound fiberglass, minimum one-quarter (1/4) inch wall thickness with tank interior surface protected with a minimum of 0.10-inch thick, resin-rich corrosion barrier.
 3. Reinforced concrete pipe or manhole barrel sections with a corrosion barrier of PVC “T-lock” or other material or coating acceptable to CCCSD.

4. High density polyethylene (HDPE).
 5. A CCCSD-approved alternative.
- B. The sump shall have a four (4) inch minimum inlet and an outlet at least the size of the pump discharge. The invert of the inlet shall be at least six (6) inches above the High Water Alarm (HWA) set-point elevation.
 - C. The pump sump cover shall be epoxy coated steel plate (one-half (1/2) inch minimum thickness), heavy cast iron or the pump system manufacturer's standard molded plastic, and shall be designed to support reasonably anticipated dead and live loads, including impact (HS-20 required for traffic areas).

2.4 MOTORS

- A. Motors for column-type pumps shall be a drip-proof vertical type, totally enclosed, weather protected, and shall conform to the standards of NEMA.
- B. Only explosion proof pump and motor assemblies approved by an NRTE and listed as explosion proof for Class 1, Division 1, Groups C and D locations shall be used in non-residential applications.
- C. Pumps constructed with separate thermal overload protection and moisture-sensing seal failure probes shall have these devices connected to sensors and to an alarm in the control panel according to the manufacturers' recommendations.

2.5 MOTOR LEVEL CONTROLS AND PANELS

- A. The pump's level controls shall employ either: 1) a ball and rod mechanical float switch mounted above the cover; 2) a weighted mechanical-type float switch sealed within a polypropylene shell with a neoprene-covered cable; or a CCCSD approved alternate.
- B. Each pump level control switch shall be wired directly and independently to terminals in the control panel.
- C. Each pump and the level control/alarm system shall be on separate electrical circuit breakers.
- D. The following level control switches shall be provided:

1. A “High Water Alarm (HWA)” switch set to alarm a minimum of six (6) inches below the invert elevation of the gravity inlet sewer and to start the “lag” pump in a duplex system.
2. A “Pump On” (High Water Level (HWL)) switch set to start the single pump in a simplex system or the “lead” pump in a duplex system at a reasonable elevation below the HWA.
3. A “Pump Off” (Low Water Level (LWL)) switch set to turn off the pump(s) at a reasonable elevation above the LWA. The distance between the HWL and LWL shall be great enough to allow the pump to run for at least thirty (30) seconds during each pump cycle.
4. An optional “Low Water Alarm” (LWA) switch set to alarm at an elevation above the pump suction inlet and wired to a redundant pump shut off.

2.6 INTRINSICALLY SAFE CIRCUITS

Level control and alarm system circuit wiring connected to level switches in the tank shall be listed as intrinsically safe by an NRTE. The circuits shall reduce the power to the pilot devices and alarms to a value incapable of releasing sufficient thermal or electrical energy to ignite an explosive environment. Separate conduits for the control and motor power wiring shall be run between the sump and the control panel. Both conduits shall be provided with seals to prevent sewer gases from migrating to the control panel.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- B. Installation of pumping system components shall conform to the manufacturer recommendations.
- C. A standard clean out with an Overflow Protection Device shall be installed between the served building and the sump inlet.

3.2 PUMP SUMP

- A. Ballast consisting of material specified in Section 15.03310-Cast In-Place Concrete, or Section 15.03330 - Controlled Low-Strength Material (CLSM), and weighing at least one and one-half (1-1/2) times the calculated buoyant force on the sump assuming the groundwater surface is one (1) foot below finish grade shall be provided. The required minimum volume of ballast material will be cited on the approved CCCSD pump curve data sheet.
- B. The top of the cover shall be at least three (3) inches above the surrounding ground surface in non-traffic areas. The sump cover shall be securely attached to the pump sump with stainless steel bolts, and all joints between the component parts and openings shall be sealed with gas tight gaskets.
- C. The sump shall be vented to atmosphere, either: 1) to the building drain-waste-roof vent; or 2) through an integral vent in the cover.

3.3 CONTROL PANEL, ALARM SYSTEM AND ELECTRICAL WORK

- A. The Control Panel shall be mounted outside the pump sump on a post or building wall, or inside the served building. The panel shall have a NEMA 1 classification when mounted inside a building or a minimum NEMA 3R classification when mounted outside the building.
- B. The Alarm Panel, or a remote alarm indicator, shall be mounted within the building that is served by the pump and shall provide a visible pilot light and audible alarm with silencer to alert the building occupants to alarm events. The alarm system shall be on a separate electrical circuit from pump motor power. When activated by a high water or low water condition, the alarm system shall remain latched until manually acknowledged and cleared.
- C. Electrical work shall conform to the technical and permitting requirements of the local building code enforcement agency.

3.4 DISCHARGE LINE

- A. The pressure portion of the discharge line, including the isolation valve, check valve and mechanical couplings shall be the same size as the pump discharge line. The valves and discharge line connecting the isolation valve, check valve, cleanout and mechanical couplings inside the sump shall be DWV brass, copper or galvanized steel pipe (Schedule 40), or a

CCCSO approved alternate material. The isolation valve shall be operable from grade and shall be placed in a utility box if outside the sump.

- B. The portion of the pressure discharge line between the sump and its connection to the private gravity side sewer shall be PVC conforming to the requirements of Section 15.15064 - Polyvinyl Chloride (PVC) Pipe; or High Density Polyethylene (SDR 11) conforming to the requirements of Section 15.15066 - High Density Polyethylene (HDPE) Pipe; and shall meet depth and bedding requirements for side sewers as specified in Section 15.02205 - Excavation, Bedding and Backfill. All bends shall be special extra long radius ($R_{\min} = 9$ inches).
- C. A standard tee or wye branch with cleanout shall be placed where the discharge line connects to the private gravity side sewer as shown in DWG-44 of the Standard Drawings.
- D. Installation of a high water passive overflow pipe is optional. If installed, the pipe shall extend to a sanitary sewer main. A CleanCheck valve as listed in the Approved Materials List shall be installed in the passive overflow line.

- END OF SECTION

SECTION 15.13200

MULTIPLE-USER LOW PRESSURE SEWER SYSTEMS

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish all pipe, manholes, flushing inlets, valves, fittings, other appurtenances, tools, materials, and labor required to install and test multiple-user low-pressure sewer systems (MULPSS), in accordance with the requirements of the Plans and this Section.

- A. Extension of MULPSS shall be subject to the same rules, requirements and procedures as apply to extensions of the public gravity main sewers.
- B. Individual lot pumping systems (ILPS) connected to MULPSS shall conform to the requirements specified in Section 15.13100 of these Specifications, and in addition shall:
 - 1. Utilize “grinder” pumps with nearly vertical pump curves (semi-positive displacement type pumps) discharging at less than twenty (20) gallons per minute;
 - 2. Incorporate a redundant curb stop (isolation valve) and check valve at each connection to a MULPSS, in addition to the isolation and check valves installed at the ILPS;
 - 3. Connections to the MULPSS shall be at a manhole as specified in DWG 48.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02205 - Excavation, Bedding and Backfill
- B. Section 15.02701 - Manholes & Rodding Inlets
- C. Section 15.13100 - Individual Lot Pumping Systems
- D. Section 15.15064 - Polyvinyl Chloride (PVC) Pipe
- E. Section 15.15066 - High-Density Polyethylene (HDPE) Pipe

1.3 CONTRACTOR SUBMITTALS

- A. The Contractor shall submit complete shop drawings for all precast manhole components to CCCSD, and shall receive favorable review prior to ordering the components.
- B. The Contractor shall submit catalog cuts and/or shop drawings for any proposed MULPSS components not listed in the Approved Materials List.

1.4 QUALITY ASSURANCE

Leakage Test: After closing the isolation valves at each individual lot connection and fitting the lowest flushing inlet with a liquid filled pressure gauge having a full-scale reading of one hundred sixty (160) psi, the multi-user low-pressure sewer shall be filled with water and pressurized with compressed air at its high point until the pressure gauge reads one hundred (100) psi (air-over-water). The pressure shall be allowed to stabilize for a period of at least five (5) minutes immediately preceding a minimum fifteen (15) minute test period. There shall be no pressure drop during the test period.

PART 2 – PRODUCTS

2.1 GENERAL

All equipment and accessories shall be standard manufactured items and shall be specifically manufactured for sewage use by a company regularly engaged in the manufacture and assembly of pumping system components.

2.2 PIPES AND FITTINGS

- A. Casing pipe and fittings shall be C900 PVC (DR-14) of the size indicated on the Plans, conforming to the requirements of Section 15.15064 of these Specifications.
- B. Pressure sewer pipe shall be HDPE (SDR 11) of the size indicated on the Plans, conforming to the requirements of Section 15.15066 of these Specifications.
- C. Brass pipe and threaded fittings shall be one (1) inch diameter Schedule 40 NPS.

2.3 VALVES

- A. Isolation Valves shall be true union ball valves of the size indicated on the Plans, fabricated from PVC rated for one hundred fifty (150 psi) service at seventy five degrees Fahrenheit (75°F) as listed in the Approved Materials List, or equal.
- B. Check Valves shall be true union flap check valves of the size indicated on the Plans, fabricated from PVC rated for one hundred fifty (150 psi) service at seventy five degrees Fahrenheit (75°F) as listed in the Approved Materials List, or equal.
- C. Combination Isolation/Check Valves shall be a combination true union ball valve and flap check valve of the size indicated on the Plans, fabricated from PVC rated for one hundred fifty (150 psi) service at seventy five degrees Fahrenheit (75°F) as listed in the Approved Materials List, or equal.
- D. Bronze ball valves shall be one (1) inch diameter, FIPT x FIPT, rated for a maximum working pressure of six hundred (600 psi) WOG (water, oil, gas), having chromium plated balls and PTFE (Teflon) seats.

2.4 MANHOLE COMPONENTS

- A. Precast manhole components shall be as listed on the Approved Materials List and as shown in DWG-48 through DWG-51.
- B. Standard manhole frames and covers shall be as listed on the Approved Materials List.

2.5 TRACER WIRE AND TERMINAL BOARDS

- A. Tracer wire shall be TW #10 copper.
- B. Terminal Boards for tracer wires shall be fabricated from three-eighths (3/8) inch HDPE sheet and three-sixteenths (3/16) inch diameter brass machine screws, washers and knurled nuts.

2.6 FLUSHING NOZZLE COMPONENTS

- A. Pressure gauges shall be glycerine-filled having stainless steel cases, brass internal components, one quarter (1/4) inch NPT inlets and two (2)

- inch diameter dials having maximum range of three hundred (300) psi and five (5) psi graduations, Grainger Stock Number 5WZ52, or equal.
- B. Pressure relief valves shall have bronze bodies, stainless steel ball valves, one (1) inch MNPT inlet ports, three-quarters (3/4) inch right angle FNPT outlet ports, adjustable outlet pressure from zero (0) to four hundred (400) psi and maximum outlet flow of forty (40) gpm; Dayton Model Number 3YB67, or equal.

PART 3 – EXECUTION

3.1 GENERAL

- A. Casing pipes and structures (manholes and flushing inlets) for MULPSS shall be installed in accordance with the requirements of these Specifications pertaining to installation of gravity sewers, except where otherwise required in this Section.
- B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 INSTALLATION OF PRESSURE SEWER MAIN

- A. After installing the casing pipe and manhole bases, pull HDPE pressure main sewer pipe of the size indicated on the Plans into the casing.
- B. The Contractor may pull more than one reach of adjacent HDPE pressure sewer main pipe of the same size through intermediate manholes.

3.3 PLUMBING AT MANHOLES

- A. Plumbing for pressure main sewers and laterals shall be configured and firmly attached to galvanized metal struts as shown on the Plans and in DWG-48 through DWG-51.
- B. At most, four (4) private pressure lateral sewers shall be connected to the public pressure main sewer at each manhole. Connection tees shall be located as near to the center of the manhole as is practical to provide adequate space for initial assembly and disassembly/assembly for future maintenance.

3.4 TRACER WIRE

- A. Pull tracer wire into pipe casing when installing the HDPE pressure main sewer in the casing.
- B. Terminate the tracer wires on a terminal board at each manhole. Test each tracer wire for continuity after installation.

3.5 FLUSHING INLET ASSEMBLIES

The Contractor shall install a flushing inlet assembly as shown on DWG-49 at each Flushing Inlet shown on the Plans.

- END OF SECTION -

SECTION 15.15000

PIPING, GENERAL

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. Pipe materials and installation procedures shall be in accordance with the pipe manufacturer's recommendations unless otherwise specified in this Section, or in the specific Section of these Specifications for the particular pipeline material being used.
- B. A current list of pipe, fittings and joint materials specifically approved by CCCSD as conforming to these Specifications and allowed for use in sewer pipeline installations within CCCSD boundaries, referred to as the "Approved Materials List," is on file and copies are available at CCCSD's office. Pipe, appurtenances and accessories not appearing on the Approved Material List shall not be used without prior written approval of CCCSD.
- C. Pipe sizes cited in these Specifications refer to the nominal diameter of the pipe in whole inches.
- D. For a particular sewer installation, pipe and manufactured fittings connecting pipe between structures shall be of one and only one manufacturer's brand and of the same type, quality, class and size.
- E. Joining of pipe dissimilar in size and/or material shall be accomplished either by use of an Expansion Block as detailed in DWG-30 of the Standard Drawings, or by use of special adapters or couplings listed on the Approved Materials List.
- F. Where field cuts are required, the Contractor shall use tools and/or equipment recommended by the pipe manufacturer. No hammer and chisel cuts will be permitted.
- G. All pipe and fittings delivered to the jobsite shall be marked by the manufacturer with such inventory and identification (Brand Name, Pipe Type, Strength Class, Batch Lot, Lengths, etc.) as to be properly identified in the field as meeting the requirements of these Specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 7 – Surveying for Construction
- B. Section 15.02160 - Shoring, Excavation Support and Protective Systems
- C. Section 15.02205 - Excavation, Bedding and Backfill
- D. Section 15.02730 - Pipeline Cleaning, Testing and Televising
- E. Section 15.09800 - Protective Coating and Painting
- F. Section 15.15017 - Reinforced Concrete Pipe (RCP)
- G. Section 15.15055 - Vitrified Clay Pipe (VCP)
- H. Section 15.15061 - Ductile Iron Pipe (DIP)
- I. Section 15.15064 - Polyvinyl Chloride (PVC) Pipe
- J. Section 15.15066 - High-Density Polyethylene (HDPE) Pipe
- K. Section 15.15068 - Cast Iron Soil Pipe (CIP)
- L. Section 15.15070 - Steel Pipe
- M. Section 15.15072 - Acrylonitrile-Butadiene-Styrene (ABS) Pipe

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ANSI/ASME B1.20. Pipe Threads, General Purpose (inch)

ANSI/AWS D1.1 Structural Welding Code

B. Codes:

Cal/OSHA Construction Safety Orders

1.4 QUALITY ASSURANCE

- A. Pipe shall be subject to inspection at the place of manufacture. During the manufacture of the pipe, CCCSD shall be given access to all areas where manufacturing is in progress and shall be permitted to make all inspections necessary to confirm compliance with these Specifications.
- B. Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable specifications and standards. The manufacturer shall perform all tests at its own cost.

- C. All installed pipe shall be cleaned, tested and televised in accordance with Section 15.02730 – Pipeline Cleaning, Testing and Televising of these Specifications.

1.5 MANUFACTURER'S SERVICE REPRESENTATIVE

Where the assistance of a manufacturer's service representative is required, in order to obtain compliance for pipe joints, supports, or special connections, the Contractor shall arrange for such assistance.

1.6 MATERIAL DELIVERY, STORAGE AND PROTECTION

All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition, and stored off the ground. All pipe and appurtenances shall be protected from damage by sunlight, moisture, corrosive materials, equipment and other sources. All defective or damaged pipe or appurtenances shall be removed from the jobsite and replaced with new materials.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Pipes, fittings, and appurtenances shall be furnished in accordance with the requirements of the applicable Section of these Specifications for the particular pipeline material being used.
- B. Application of pipe coatings shall be in accordance with the requirements of the applicable Section of these Specifications for the particular pipeline material being used and Section 15.09800 - Protective Coating and Painting.

2.2 BANDED COUPLINGS

Where banded couplings are used for joining of new pipe or repair of existing pipelines, only couplings listed in the Approved Materials List shall be allowed.

2.3 WYES

Sewer lateral bends shall be made with sewer Combination Wye and (1/8) Bends – not with sanitary tees.

PART 3 – EXECUTION

3.1 GENERAL

Sewer pipelines shall be constructed to the alignment and grade shown on the plans, and in compliance with the specified requirements of this Section and of the specific Section of these Specifications for the particular pipeline material being used.

3.2 SEWER INSTALLATION

- A. Sewer pipelines shall have a minimum wall-to-wall horizontal clearance of three (3) feet and a minimum vertical clearance of twelve (12) inches from all other improvements and utilities unless otherwise shown on the plans as being allowed by CCCSD under Special Approval.
- B. Where sewer pipelines are to be installed in the vicinity of potable water pipelines, wall-to-wall sewer-to-water pipeline separation shall be in conformance with the minimum requirements shown in DWG-20 of the Standard Drawings. Sewer pipeline installation in the area labeled “Special Permission,” will not be allowed unless specifically approved in writing by the water utility.
- C. Pipe cover for sewer pipelines shall be in conformance with the requirements showed in DWG-18 of the Standard Drawings, unless otherwise shown on the plans as being allowed by CCCSD under a Special Approval.
- D. For main sewers and trunk sewers, the grade line shall be established by setting cut stakes and obtaining CCCSD approval for cut sheets, as required under Section 7 – Surveying for Construction, before trench excavation is started. During pipe installation, the Contractor shall continuously utilize an industrial-standard laser grade control system to confirm that the pipe is installed to the design grade, subject to the following requirements:
 - 1. The Contractor shall provide a properly calibrated laser instrument and an operator who is qualified and trained in the operation of the particular laser instrument being used. The operator shall adhere

to the provisions of the CalOSHA Construction Safety Orders regarding the use of laser equipment.

2. Laser control points shall be established bench marks or construction cut stakes identified on the CCCSD approved cut sheets.
 3. Laser must contain a direct grade reading screen, which will allow the Inspector to verify the grade at all times.
- E. Pipe shall not be laid when the Inspector determines that the condition of the trench is unsuitable.
- F. If the sewer is to be laid in an area that is to be filled, and the cover prior to filling is less than the required minimum cover specified pipe material and type, the pipe shall not be laid until the area has been properly filled and compacted to a level at least equal to required minimum cover above the proposed pipe, unless otherwise authorized by the Inspector.
- G. If field conditions in areas that are potentially unstable or subject to settlement warrant, the Inspector may require that the Contractor substitute a different pipe material/type for the pipe shown on the plans.
- H. Pipe, fittings and appurtenances shall be carefully handled and protected against damage, impact shocks, and free fall. Pipe shall be stored in a manner which will protect it from damage at the trench site or elsewhere. The Contractor shall inspect each pipe and fitting prior to installation to determine that only undamaged material is installed.
- I. Before placement of pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance and shall be kept clean at all times thereafter.
- J. Sewer pipelines shall be laid upgrade from the point of connection to the existing sewer with the bell end at the upgrade end of each pipe length.
- K. Layout of curves shall conform to the requirements specified in the applicable Section of these Specifications for the particular pipe material being used and DWG-45 of the Standard Drawings.
- L. Non-marring slings shall be used for lowering each length of pipe into the trench (chains shall not be used). The pipe shall be laid on properly compacted bedding material as specified in Section 15.02205 - Excavation, Bedding and Backfill. No blocking will be permitted and the pipe shall have full bearing for its entire length between bell holes excavated in said bedding material to prevent point loading at the bells or

couplings and to allow for unobstructed assembly of all joints. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints. After jointing is completed, bell holes shall be backfilled with properly compacted bedding material, taking care not to damage, move, or lift the pipe from its bedding support.

- M. Where it becomes necessary to modify the design pipe alignment to resolve conflicts with unforeseen obstructions or other causes, the Contractor shall propose a revised alignment to the Inspector who may allow installation per the revised alignment or may require that the revision be submitted to the Engineer for consideration. Such revision may be made by the deflection of joints, by the use of fittings or by forced bending of the pipe if permitted, however, in no case shall the deflection in the pipe or at any joint exceed the maximum deflection recommended by the pipe manufacturer.
- N. Sewer pipes, branches, stubs, or other open ends which are not to be immediately connected, shall be plugged or capped.
- O. The Contractor shall take all necessary precautions to prevent excavated or other foreign material from getting into the pipe during the laying operations. At all times when laying operations are not in progress and at the close of the day's work, the openings of all pipe and specials, whether in the trench or in storage, shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water, or any undesirable substance.
- P. The Contractor shall prevent the pipe from floating during and after its installation.

3.3 CONNECTIONS TO EXISTING SEWERS

- A. Existing sewers are shown on the plans at the locations where new sewers are to be connected. It is the responsibility of the Contractor to determine the exact location and depth of the existing sewers prior to the installation of any sewer pipe. New pipe shall be plugged with mechanical plugs until further connection is necessary.
- B. Connection of new main and/or trunk sewers to existing lines up to and including forty eight (48) inches in diameter shall be made at existing manholes or by constructing a new manhole over the point of connection, or by removing an existing rodding inlet or plug and extending new pipe of the same diameter, material and class from the point of connection.

1. Where the connection is to be made into an existing manhole, the Contractor shall make the connection by core-drilling through the manhole shelf to the existing channel, installing the new pipe, finishing a new channel within the manhole and repairing any damage to the structure.
2. Where the connection is to be made by constructing a new manhole on an existing sewer, the manhole and new connection shall conform to the details shown in DWG-1 through DWG-6 of the Standard Drawings. The existing sewer shall be kept intact until immediately before the cleaning and flushing operation for the new sewer is to begin.
3. Where the connection is to be made at a removed rodding inlet or plug, the existing piping shall be cut square and ends properly prepared for the connection shown and an air test fitting shall be installed at the connection of new and existing pipelines.
4. All new pipe shall be plugged with an approved mechanical plug or brick/mortar until the line is completed and ready for testing.

C. Side Sewer Connections to Main Sewers:

1. Side sewer connections shall be made with fittings or adapters recommended by the manufacturer for use with the particular pipe and as listed on the Approved Materials List.
2. Side sewers equal in size to the main sewer shall be connected by installing a wye branch or tee fitting.
3. Connection and side sewer details shall conform to the requirements shown in DWG-24 and DWG-25 of the Standard Drawings.
4. Side sewer or lateral connections to new or existing manholes shall be as detailed in DWG-1 through DWG-7 of the Standard Drawings.
5. Side sewer connections where wyes, tees or laterals were not installed during main sewer construction, shall be made by installing a tap listed in the Approved Materials List, installing a main sewer repair spool (replacement pipe section) as specified in Subsection 3.5 below including a new wye branch or tee fitting, or by core drilling through the barrel of an existing manhole at the top of the shelf or crown of mainline pipe. Installation of taps shall comply with the following requirements:

- a. Only pre-qualified Contractors shall be permitted to install tap and saddle connections on VCP, CIP, DIP, RCP, PVC-Truss or ABS-Truss.
 - b. Before commencing excavation for tap installation, the Contractor shall have sufficient Type I bedding and backfill material at the site to properly re-bed the main and lateral sewers, and backfill the excavation.
 - c. The excavation for the tapping work shall be a minimum of two (2) feet in width, give enough length for work space, without under-cut sides and shall be properly shored in conformance with Section 15.02160 - Shoring, Excavation Support and Protective Systems. A minimum clearance of three (3) inches below, six (6) inches on each side and twelve (12) inches each way along the main from the point of connection shall be provided for tap installation.
6. If the main sewer is damaged during excavation for or during installation of the tap, the Contractor shall install a main sewer repair spool (replacement pipe section) as specified in Subsection 3.5 below including a new wye branch or tee fitting.
 7. The outer surface of the main in this exposed area shall be thoroughly cleaned prior to tapping.

3.4 REPAIRS TO EXISTING SIDE SEWERS AND MAINS

- A. Repairs to main sewers and trunk sewers sixteen (16) inches or less in diameter shall be made using pipe and fittings specified in Section 15.15061 - Ductile Iron Pipe (DIP), or Section 15.15064 - Polyvinyl Chloride (PVC) Pipe.
- B. Repairs to side sewers shall conform to the requirements shown in DWG-27 of the Standard Drawings, and shall be made using pipe and fittings specified in:
 1. Section 15.15061 - Ductile Iron Pipe (DIP);
 2. Section 15.15064 - Polyvinyl Chloride (PVC) Pipe;
 3. Section 15.15066 - High-Density Polyethylene (HDPE) Pipe; or
 4. Section 15.15068 - Cast Iron Soil Pipe (CIP).

- C. When repair of a damaged section of pipe is required within eighteen (18) inches of a pipe joint, the replacement section shall extend to and include the joint.
- D. Where repair couplings are permitted, only couplings listed in the Approved Materials List shall be used.
- E. The Inspector may require replacement of broken, damaged or improper pipe or fittings discovered during sewer repair or replacement work.

3.5 REPAIRS TO NEW SEWER MAINS

- A. If damage to the new main sewer pipe is identified during inspection, testing or televising, the Contractor shall repair the damage or replace the pipe as instructed by the Inspector. When repair of a damaged section of pipe is required within eighteen (18) inches of a pipe joint, the replacement section shall be extended to include the joint. Repair procedures shall comply with the following:
 - 1. VCP and DIP SEWER MAINS – Manufacturer’s recommended couplings shall be used. The damaged pipe shall be removed by squarely cutting out the damaged section. The replacement pipe shall be squarely cut approximately one-half (1/2) inch shorter than the missing section. The repair couplings shall be placed onto the pipe ends, the replacement assembly inserted into the gap, the repair couplings moved to be centered over each new joint, and the fasteners or bands tightened as required. The Contractor shall re-bed the pipe and backfill the excavation with properly compacted bedding and backfill material in accordance with Section 15.02205 - Excavation, Bedding and Backfill.
 - 2. ABS TRUSS and PVC TRUSS SEWER MAINS - A standard chemically welded coupling strap is required for each joint. Use a narrow-bladed saw to cut each coupling strap at a forty five degree (45°) angle to the centerline of the pipe and debur the edges of the cuts. The replacement pipe shall be a minimum of two (2) feet in length, shall be squarely cut approximately one-half (1/2) inch shorter than the removed section, and its ends shall be deburred. With the four (4) coupling straps placed loosely on the edges of each repair joint, apply primer and cement to the inside of the coupling strap and the outside of the pipe ends at each joint. Center the coupling strap on the joint placing the cut upward. Tighten the straps around the coupling allowing the coupling to slide such that there is a tight fit around the ABS or PVC pipe. Finally, dip fiberglass tape into primer and lay over the cut applying

cement over the strip. Do not apply test pressures internally or externally for sixteen (16) hours, but re-bed the pipe and backfill the excavation with properly compacted bedding and backfill material in accordance with Section 15.02205 - Excavation, Bedding and Backfill immediately.

3. PVC SEWER MAINS - PVC double bell repair couplings shall be used. The damaged pipe shall be removed by squarely cutting out the damaged section, and the remaining ends shall be beveled. The replacement pipe shall be a minimum of three (3) feet in length and shall be squarely cut approximately one-half (1/2) inch shorter than the missing section, and its ends shall be beveled. Reference lines indicating the spigot stab distance required for centering the repair coupling shall be clearly marked on all cut ends. The repair couplings shall be placed onto the pipe ends, the replacement assembly inserted into the gap, the repair couplings moved to be centered over each new joint. The Contractor shall re-bed the pipe and backfill the excavation with properly compacted bedding and backfill material in accordance with Section 15.02205 - Excavation, Bedding and Backfill.

3.6 WARNING TAPE INSTALLATION

See Section 15.02205 - Excavation, Bedding and Backfill for warning tape requirements.

- END OF SECTION -

SECTION 15.15017

REINFORCED CONCRETE SEWER PIPE

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install reinforced concrete sewer pipe and all appurtenances as specified, complete and in place, as shown on the plans, as specified in this Section and in Section 15.15000 Piping, General.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 15.15000 – Piping, General

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM C 76	Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
ASTM C 150	Specification for Portland Cement
AWWA C 302	Reinforced Concrete Pressure Pipe, Non-cylinder Type, for Water and Other Liquids

1.4 CONTRACTOR SUBMITTALS

- A. Certificates guaranteeing that the pipe furnished hereunder is in compliance with the requirements of these Specifications and the referenced standards.
- B. Quality control records as required herein.
- C. Detailed fabrication including pipe designs, special pipe, dimensions, weights, joint details, laying diagrams and a fabrication schedule. Drawings shall indicate, at relative scale, concrete covers, reinforcement placements, joint assembly design, the design pipe size, D-load, cement type, concrete strength and areas, and types and placements of reinforcement.

- D. Three-edge bearing test results. Results shall indicate the CCCSD assigned project number, agency and operator performing the test, date, pipe size and specified D-load and ultimate test load applied. The ultimate test load applied shall not exceed one hundred ten percent (110%) of the specified D-load.
- E. Fabrication plant joint leakage testing results.

1.5 QUALITY ASSURANCE

- A. For concrete pipes of thirty (30) inches inside diameter and larger, each pipe joint shall be inspected by the Contractor from the inside of the installed piece of pipe before backfilling and before the next piece of pipe is connected. The inspection shall include the checking of proper joint gaps and gasket placement, and damaged or chipped joints. The Contractor shall verify the deflection at each joint by comparing the width of gaps at the top and bottom and each side of each joint. Gaps exceeding manufacturer's maximum/minimum allowable limits and/or with potentially rolled or pinched gaskets shall be corrected before the next piece of pipe is installed. If a pipe section, which has previously been installed, is moved or dislodged in the process of installing the next pipe section, those pipe joints which have been previously checked and which may have been affected by the moving or dislodging shall be rechecked. In addition, at the completion of each pipe installation day, the Contractor shall again inspect the inside of the pipeline installed that day for potential problems that may have developed since the individual joint inspections. The Contractor shall correct all excessive gaps and potential problems that may affect the passing of the leakage test before any more pipes are installed.
- B. The Inspector may participate in any or all of the alignment checks or interior pipe inspections. The CCCSD's inspection, if implemented, will be for general compliance only and will not relieve the Contractor from being fully responsible for the overall installation quality including the proper alignment, grades, and the passing of the specified leakage test. The Contractor shall provide all necessary access and safety equipment that will assure a safe work area and facilitate the inspection process for the Inspector.
- C. CCCSD reserves the right to reject the repairing of pipe joints needed to pass the specified leakage test. Such repairs may be allowed only at the Inspector's discretion, and may require the installation of exterior concrete collars designed for leakage and settlement in addition to interior repairs, or other approved equivalent repair methods to ensure the integrity of the pipeline for the full design life. Repair of chipped joints, if approved by

CCCSD, shall be made after the passing of the specified leakage test, as approved by CCCSD.

- D. Except as modified in this Section, all materials used in the manufacture or installation of the pipe shall be tested in accordance with the requirements of the referenced standards.
- E. Submittals and testing shall be done in compliance with Section 15.15000 – Piping, General of these Specifications.

PART 2 – PRODUCTS

2.1 PIPE MATERIALS

- A. All pipe sizes refer to the nominal inside diameter of pipe (including any pipe linings) and no pipe, except where specified herein, shall be more than three-eighth (3/8) inch smaller than the nominal size designated. All pipe, joints incorporated into the pipe, and manufactured fittings connecting pipe between structures shall be fabricated by one and only one manufacturer and be of the same type, quality, class, and size unless otherwise specified or shown. Jointing of pipe dissimilar in size and/or material shall be accomplished at structures. All field cut pipe shall be accomplished by methods and equipment recommended by the pipe manufacturer. No hammer and chisel cuts will be permitted. All pipe and fittings delivered to the jobsite shall be properly marked by the manufacturer with, at a minimum, the manufacturer's name, piece number, pipe diameter, class (or D-load) and date of manufacture. All elliptically reinforced pipe shall also be marked with a "field top" designation.
- B. Reinforced Concrete Sewer Pipe with Flared or Flush Bell and Spigot Joint: All Reinforced Concrete, hereinafter referred to as R.C., pipe and fittings shall conform to the requirements of ASTM C 76 and as modified herein:
 - 1. Materials shall comply with the appropriate ASTM designation under which the subject pipe is to be manufactured, modified as specified hereunder:
 - a. Cement used in the manufacture of R.C. pipe shall be TYPE II in conformance with ASTM C 150.
 - b. No admixtures shall be introduced to concrete mixes.
 - c. Rubber for gaskets shall be neoprene and shall comply with the

requirements of AWWA C 302.

- d. Aggregates used shall consist of granitic, calcareous or combinations.
2. Design shall comply with appropriate ASTM designation under which the subject pipe is to be manufactured and as modified herein.
 - a. In no case shall pipe be less than that specified under ASTM C 76 provisions for CLASS III, Walls "B" or "C". Wall "A" shall not be acceptable.
 - b. Total concrete cover of reinforcement at the inner wall, (clearance of steel surface to inner wall surface), nominal one and one-half (1-1/2) inches, regardless of pipe diameter size or type and placement configuration of reinforcement. Minimum concrete cover at the outer wall shall not be less than one (1) inch.
 - c. Joint design for thirty (30) inch diameter and larger pipe shall be reinforced concrete bell and spigot incorporating a fully-retained, double rubber gasketed joint with a one-half (1/2) inch diameter Schedule 40 PVC testing tube extending from the inside of the pipe into the annular space between the two gaskets. A removable plastic screw-in plug shall be provided to protect the tube opening. Position of the testing tube shall be at the springline of the pipe.
 - d. Reinforced concrete pipe for tunneled installations shall be double spigot type with Type 316 stainless steel joint band. The minimum thickness of the Type 316 stainless steel joint band shall be one-half (1/2) inch unless a greater thickness is required by the Contractor for the tunnel and jacking operation.
 3. PVC lined reinforced concrete pipe shall be manufactured by the vertically cast process, utilizing stationary inner and outer forms. Vertically cast pipe shall be wet cast, vibrated, steam cured, and shall remain in the forms for a minimum of six (6) hours. Pipe manufactured by the "Dry Cast" method is unacceptable. Fabrication of centrifugally spun and vertically cast pipe shall be in accordance with AWWA C 302 and as modified herein:

- a. Form oils or release agents shall not contain any material or substances that would penetrate or otherwise retard concrete set at the formed surface.
 - b. The steel forms shall be placed horizontally in a machine capable of spinning the forms at speeds that will produce concrete meeting or exceeding the concrete strengths required under the appropriate ASTM standard for the subject pipe specified.
 4. Pipe fabrication plant and field hydrostatic joint leakage testing shall be in accordance with the following minimum criteria:
 - a. All pipes shall be subject to a D-load test by the manufacturer. Three-edge bearing test loads shall be applied to the extent that no greater than a 0.01-inch crack is produced in tested pipe sections.
Applied test loading may be terminated without producing a 0.01-inch maximum crack if or when such loading has reached one hundred ten percent (110%) of that required for and relative to the specified D-load for the subject pipe. CCCSD may select at random and test as specified in ANSI/AWWA C 302. The cost of the pipe and the tests shall be borne by the Contractor. Pipe will be acceptable under the test requirements specified herein when all test specimens conform to the test requirements, the manufacturer will be allowed to retest two (2) additional specimens for each specimen that failed, and the pipe shall be acceptable only when all of the retest specimens meet the strength requirements.
 - b. Fabrication plant joint leakage testing shall be performed in accordance with AWWA C 302. The pipe test pressure shall be a minimum head of twenty five (25) feet.
 - c. Field hydrostatic joint leakage testing shall be performed by the Contractor installing the pipe, after the pipe is in place in accordance with the requirements of Section 15.02730 - Pipeline Cleaning, Testing and Televising.
 5. Pipe minimum and maximum lengths, except where required otherwise shall be in accordance with AWWA C 302.
- C. The quality of materials, the process of manufacture, and the finished pipe shall be subject to inspection and approval by CCCSD or its assignee. Pipe shall be substantially free of fractures and internal surface

roughness. The ends of the pipe shall be normal to the walls and centerline of the pipe, within the limits of variations given in ASTM C 76. Pipe shall be subject to rejection for failure to conform to any of the specification requirements. CCCSD's decision regarding rejection of the pipe shall be final and the rejected pipe shall be immediately removed from the jobsite and replaced at the Contractor's cost. Individual sections of pipe may be rejected for any of the following defects:

1. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.
2. Defects that indicate proportioning, mixing, and molding not in compliance with ASTM C 76.
3. Spigot and/or bell surface and/or dimensional irregularities which may impede assembling the joint or affect leak tightness.
4. Surface defects indicating honeycomb, rock pockets or open texture.
5. Damaged or cracked ends where such damage would prevent making a satisfactory joint.
6. Any continuous crack having a surface width of 0.01 inch or more and extending for a length of twelve (12) inches or more, regardless of position in the wall of the pipe.

PART 3 – EXECUTION

3.1 GENERAL

- A. Sewer pipelines shall be constructed in compliance with the requirements of this Section and of Section 15.15000 – Piping, General.
- B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 PIPE INSTALLATION

- A. Reinforced concrete pipe shall be installed in accordance with the Manufacturer's recommendations and the additional requirements of this Section.

- B. Bell holes shall be excavated at each joint to provide full-length barrel support of the pipe and to prevent point loading at the bells or couplings.
- C. Pipe bedding or trench subgrade beneath the pipe shall be compacted and graded to provide a uniform and continuous support beneath the pipe at all points between the bell holes or pipe joints.
- D. Unless otherwise required, all pipes shall be laid straight between changes in alignment and at uniform grade between changes in grade. Where lined reinforced concrete pipe is specified, it shall be installed with the unlined area of the pipe circumference centered on the invert. For pipes with elliptical reinforcement, the pipe shall be placed with the minor axis of the reinforcement in a vertical position.
- E. For standard beveled pipes where it is necessary to defect the pipe joint to achieve the required line or grade, the amount of joint "pull" shall not exceed the pipe manufacturer's recommendation. Pipes installed in straight lines or grades shall have a uniform end gap all around the pipe joint.

3.3. PIPE DEFLECTION

Horizontal Curves shall be installed in straight pipe segments and joint deflections or fittings in accordance with DWG-45 of the Standard Drawings. Minimum curvature radius requirements for RCP pipe are shown on the table below. All designs of curvilinear sewers are subject to approval by CCCSD.

Reinforced Concrete Pipe (RCP)		
Allowable Deflection Per Joint	Segment Length	Minimum Radius
1.2 Degree Joint Deflection	8'0"	400 ft.

3.4 JOINTS

- A. Care shall be taken to avoid dragging the spigot on the ground or allowing it to be damaged by contact with gravel, crushed stone, or other hard objects.
- B. Joint mating surfaces shall be cleaned immediately prior to jointing.
- C. After the subgrade has been prepared as specified, the rubber gaskets shall be placed in the groove(s) on the spigot ring, and the spigot end of the pipe then centered into the bell of the adjoining pipe and pushed into

position. Care shall be taken to avoid twisting or cutting the gasket(s) when jointing the pipe. The inside surface of the bell, the gasket groove(s) and the gasket(s) shall be lubricated immediately prior to jointing with a compound recommended by the manufacturer which will facilitate the telescoping of the joint.

- D. After the pipe joint is made, the Contractor shall check proper gasket(s) placement with a feeler gauge supplied by the pipe manufacturer for such testing. Where joint placement is found to be improper, the tested pipe section shall be first removed, the gasket(s) checked for defects due to manufacturing error, a new gasket(s) installed if necessary, the pipe re-laid and the gasket(s) placement rechecked.

3.5 TRENCH LOAD

Trench load calculations and design shall reflect the following minimum criteria:

- A. Maximum trench width of twenty four (24) inches greater than the outside diametric dimension (O.D.) of the pipe barrel not including bells and a backfill density relative to that anticipated but in all cases not less than one hundred twenty (120) pounds per cubic foot.
- B. A dead load factor not greater than one and nine-tenths (1.9) for bedding shown and specified under DWG-16 and DWG-18 of the Standard Drawings.
- C. Live load and impact factors relative to that anticipated but in all cases not less than that produced by using AASHO HS-20 load criteria and a one and one-half (1.5) impact factor.
- D. A safety factor of not less than one and one-half (1.5).

- END OF SECTION -

SECTION 15.15055

VITRIFIED CLAY PIPE (VCP)

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install vitrified clay pipe and all appurtenances as specified, complete and in place, as shown on the plans, as specified in this Section and in Section 15.15000 Piping, General.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 15.15000 – Piping, General

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM C 12	Practice for Installing Vitrified Clay Pipe Lines
ASTM C 301	Test Methods for Vitrified Clay Pipe
ASTM C 700	Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated

1.4 CONTRACTOR SUBMITTALS

The Contractor shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section, as specified in the referenced standards.

1.5 QUALITY ASSURANCE

- A. All pipes shall be subject to a hydrostatic pressure test and a three (3) edge bearing test at the manufacturer's plant.
- B. All pipe and fittings shall be true, circular, and concentric with the barrel of the pipe, on a plane at right angles to the longitudinal axis of the pipe. At no point shall the thickness of the pipe spigot be less in thickness than the shell of the main body of the pipe. Socket ends shall be square with the

longitudinal axis and shall be true, circular and concentric with the barrel of the pipe.

- C. All pipe and fittings shall have smooth interiors and shall be free from injurious cracks, checks, blisters, broken extremities or other imperfections.
- D. Pipe shall be subject to rejection for failure to conform to any specification requirement. CCCSD's decision regarding rejection of the pipe shall be final and the rejected pipe shall be immediately removed from the jobsite and replaced at the Contractor's cost. Individual sections of pipe may be rejected for any of the following defects:
 - 1. A single crack in the pipe or fitting extending through the entire thickness, regardless of the length of such crack; a single crack which extends through one-fifth (1/5) of the barrel thickness and is over two (2) inches long. Any surface firing crack that is more than 1/32 inch wide at its widest point.
 - 2. Lumps, blisters, pits, or flakes on the interior surface of a pipe or fitting.
 - 3. When spigot or bell of the pipe varies from a true circle more than three percent (3%) of its nominal diameter.
 - 4. Any piece broken from the spigot end that extends through the barrel.
 - 5. Tramp clays, grog, or other foreign matter fused to the exterior or interior surface of the pipe or fittings.
- E. Except as modified in this Section, all materials used in the manufacture or installation of the pipe shall be tested in accordance with the requirements of the referenced standards.
- F. Submittals and testing shall be done in compliance with Section 15.15000 – Piping, General of these Specifications.

PART 2 – PRODUCTS

2.1 PIPE AND FITTINGS

Clay pipe and fittings shall be extra strength, glazed, unless otherwise shown, and shall conform to the requirements of ASTM C 700.

2.2 JOINTS

Joints in vitrified clay pipe shall be made up using a factory-made bell and spigot compression joint, or a coupling listed in the Approved Materials List.

PART 3 – EXECUTION

3.1 GENERAL

- A. Sewer pipelines shall be constructed in compliance with the requirements of this Section and of Section 15.15000 – Piping, General.
- B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 INSTALLATION OF VCP

- A. Installation of pipe shall be in accordance with ASTM C 12. Pipe laying shall proceed upgrade with spigot ends pointing in direction of flow. After a section of pipe has been lowered into the prepared trench, supported along the full length of the pipe section, and immediately before joining the pipe, the ends of the pipe to be joined shall be cleaned and the rubber gasket lubricated, all in accordance with the pipe manufacturer's written instructions. Assembly of the pipe length shall be in accordance with the recommendations of the manufacturer. All special tools and appliances required for joining the pipe shall be provided by the Contractor. When cutting or machining of the pipe is necessary, only tools and methods recommended in writing by the pipe manufacturer and approved by CCCSD shall be employed.
- B. All necessary precautions shall be taken to prevent uplift or floating of the pipe prior to the completion of the backfilling operation. The Contractor shall assume full responsibility for any damage due to this cause and shall restore and replace the pipe to its specified condition and grade if it is displaced due to floating.

3.3 PIPE DEFLECTION

Horizontal curve layouts shall be done as shown on DWG-45 of the Standard Drawings. Minimum curvature radius requirements for VCP pipe are shown on

the table below. All designs of curvilinear sewers are subject to approval by CCCSD.

VCP						
Nominal Pipe Diameter (inches)	Max. Allowed Deflection (Degrees)	Equation for Minimum Radius (L= Pipe Length)	r (feet)			
			Minimum Radius of Curvature, For Pipe Length (L) of:			
			4'	6'	8'	10'
4 to 12	2.4	$r = 24.0(L)$	96	144	192	~
15 to 24	1.8	$r = 32.0(L)$	128	192	256	320
27 to 36	1.2	$r = 48.0(L)$	192	288	384	480
39 to 48	0.9	$r = 64.0(L)$	256	384	512	640

3.4 MANHOLES

VCP entering and leaving manholes or other structures shall have two (2) standard joints within three (3) feet of the manhole base. One (1) joint shall be incorporated in the manhole base or installed immediately adjacent to the manhole base and there shall not be less than twelve (12) inches between the two (2) joints (See DWG-21 of the Standard Drawings).

- END OF SECTION -

SECTION 15.15061
DUCTILE IRON PIPE (DIP)

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install ductile iron pipe (DIP) and all appurtenances as specified, complete and in place, as shown on the plans, as specified in this Section and in Section 15.15000 Piping, General.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 15.15000 – Piping, General.

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ANSI/AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in. for Water and Other Liquids
ANSI/AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
ANSI/AWWA C115/A21.15	Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges
ANSI/AWWA C150/A21.50	Thickness Design of Ductile-Iron Pipe
ANSI/AWWA C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast
ANSI/AWWA C153/A21.53	Ductile-Iron Compact Fittings, 3 in. through 12 in. for Water and Other Liquids
AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances

1.4 QUALITY ASSURANCE

A. Except as modified in this Section, all materials used in the manufacture or installation of the pipe shall be tested in accordance with the

requirements of the referenced standards.

- B. Submittals and testing shall be done in compliance with Section 15.15000 – Piping, General of these Specifications.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Ductile-iron pipe shall conform to the latest revision of ANSI/AWWA C150/A21.50 subject to the following supplemental requirements. The pipe shall be furnished complete with rubber gaskets, and all special fittings shall be provided as shown on the plans.
- B. Bell and spigot joints are to be used for all underground applications. As an alternative to bell and spigot joints the use of mechanical and flanged joints will be permitted for above ground applications only.

2.2 PIPE

Ductile iron pipe shall be of the diameter indicated at a minimum class 52, and shall be manufactured with standard bell and spigot joints in accordance with the latest revision of ANSI/AWWA C151/A21.51.

2.3 LINING AND COATING

Pipe shall have standard asphaltic coating on the exterior and be epoxy lined on the interior with Protecto 401™ ceramic epoxy lining as manufactured by U.S. Pipe, or approved equal.

2.4 FITTINGS

- A. Fittings shall be ductile iron at a minimum of class 52. Fittings shall conform to the latest revision of either ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53. Fittings and accessories shall be furnished with either Push-on or Mechanical Type Joints in accordance with ANSI/AWWA C111/A21.11.
- B. Ductile-iron pipe and fittings shall be furnished with mechanical joints, push-on joints, flanged joints, and/or restrained joints, as required. Bolted joints shall not be used for underground installations.

1. Mechanical and push-on bell and spigot joints shall conform to ANSI/AWWA C111/ A21.11, and be furnished complete with all necessary accessories.
2. Flanged joints shall conform to ANSI/AWWA C115/A21.15.
3. Restrained joints shall be per the Approved Materials List.

PART 3 – EXECUTION

3.1 GENERAL

- A. Sewer pipelines shall be constructed in compliance with the requirements of this Section and of Section 15.15000 – Piping, General.
- B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 INSTALLATION OF PIPE

All pipe shall be installed in accordance with ANSI/AWWA C600.

3.3 RUBBER-GASKETED JOINTS

Immediately before jointing pipe, the bell end of the pipe shall be thoroughly cleaned, and a clean rubber gasket, lubricated with an approved vegetable-based lubricant, shall be placed in the bell groove. The spigot end of the pipe shall be carefully cleaned and lubricated with a vegetable-based lubricant. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and pushed into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

- End of Section -

SECTION 15.15064

POLYVINYL CHLORIDE (PVC) PIPE

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install PVC pipe and all appurtenances as specified, complete and in place, as shown on the plans, as specified in this Section and in Section 15.15000 Piping, General.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 15.15000 – Piping, General.

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

AWWA C900-07	Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm through 300 mm), for Water Transmission and Distribution
AWWA C905-08	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. (350 mm Through 1,200 mm), for Water Transmission and Distribution
ASTM D 1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series)
ASTM D 2321	Practice for Underground Installation of Thermoplastic Sewer Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM F 477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

1.4 QUALITY ASSURANCE

- A. Except as modified in this Section, all materials used in the manufacture or installation of the pipe shall be tested in accordance with the requirements of the referenced standards.
- B. Submittals and testing shall be done in compliance with Section 15.15000 – Piping, General of these Specifications.

PART 2 – PRODUCTS

2.1 GENERAL

All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size and pressure rating in psi.

2.2 PIPE

- A. All PVC pipe shall be joined by compression, solvent-welded, thermo-fusion welded or mechanical restrained joints as shown on the Plans.
- B. Polyvinyl chloride pipe (PVC) shall conform to the requirements of ASTM D 3034, SDR 26, or AWWA C900 or C905, Class 100, 150, 165, 200, 253, or 305. Material for PVC pipe shall conform to the requirements of ASTM D 1784 for Class 12454-B or 12454-C as defined therein.
- C. Flexible rubber rings for compression type joints for PVC pipe and fittings shall conform to the requirements of ASTM F 477.
- D. All sun-faded pipe or pipe with noticeable surface defects will be rejected and shall be replaced by the Contractor.

2.3 COUPLINGS AND FITTINGS

- A. Couplings shall be as listed in the Approved Materials List.
- B. All fittings for PVC pipe shall conform to the requirements of ASTM D 2241. The ring groove and gasket ring shall be compatible with PVC pipe ends.

- C. The strength class of fittings shall be no less than the strength class of any adjoining pipe.
- D. PVC fittings shall, at a minimum, conform to the requirements of ASTM D 3034 as they apply to type SDR 26 PVC Sewer Pipe using an Elastomeric Gasket Joint in a bell and spigot assembly system. Rubber sealing gaskets shall meet the requirements of ASTM F 477.
- E. All PVC pipe entering or leaving a concrete structure shall have a rubber sealing gasket, as supplied by the pipe manufacturer, firmly seated perpendicular to the pipe axis, around the pipe banded and cast into the structure base or near the structure wall center as a water stop. Said water stop may also consist of a manhole coupling with rubber sealing rings cast into the structure base, (See DWG-21 of the Standard Drawings.)

2.4 RESTRAINED JOINTS FOR C900 PVC PIPE

All restrained joints used in sanitary sewer applications shall meet or exceed the requirements of ASTM F 1674. All restrained joints shall be per the Approved Materials List.

PART 3 – EXECUTION

3.1 GENERAL

- A. Sewer pipelines shall be constructed in compliance with the requirements of this Section and of Section 15.15000 - Piping, General.
- B. Work shall meet the specified requirements of these Specifications unless the requirements of the local agency having jurisdiction are greater, in which case the greater requirements shall govern.

3.2 INSTALLATION

PVC pipe shall be installed in accordance with the requirements of ASTM D 2321; as specified herein and shown on the plans.

3.3 HORIZONTAL CURVES

Horizontal curves shall be installed using straight pipe segments, each a minimum of five feet in length and joint deflections or fittings in accordance with

the requirements of DWG-45, or with forced bends where the radius of the curve exceeds the minimums specified in the table below:

SDR 26 PVC Pipe (Forced Bends)				
Pipe Diameter	4"	6"	8"	10"
Minimum Radius	135'	200'	260'	322'

3.4 FIELD JOINTING

- A. Each pipe compression type joint shall be joined with a lock-in rubber ring and a ring groove that is designed to resist displacement during pipe insertion.
- B. The ring and the ring seat inside the bell shall be wiped clean before the gasket is inserted. A thin film of lubricant shall be applied to the exposed surface of the ring and to the outside of the clean pipe end. Lubricant other than that furnished with the pipe shall not be used.
- C. Joints shall not be deflected either vertically or horizontally in excess of the printed recommendations of the pipe manufacturer.

- END OF SECTION -

SECTION 15.15066

HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install high-density polyethylene pipe (HDPE) and all appurtenances as specified, complete in place, as shown on the plans, as specified in this Section and in Section 15.15000 Piping, General. The HDPE pipe and fittings specified herein shall be used only in association with pipe-bursting methods and directional drilling construction methods unless otherwise approved by CCCSD.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.02330 - Directional Drilling
- B. Section 15.02350 - Pipe Bursting
- C. Section 15.15000 - Piping, General

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM D 638	Test Method for Tensile Properties of Plastics
ASTM D 696	Test Method for Coefficient of Linear Thermal Expansion of Plastics
ASTM D 746	Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM D 1238	Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
ASTM D 1248	Specification for Polyethylene Plastics Molding and Extrusion Materials
ASTM D 1505	Test Method for Density of Plastics by the Density-Gradient Technique
ASTM D 1525	Test Method for Vicat Softening Temperature of Plastics
ASTM D 1693	Test Method for Environmental Stress-Cracking of Ethylene Plastics

ASTM D 2240	Test Method for Rubber Property - Durometer Hardness
ASTM D 2837	Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
ASTM D 3350	Specification for Polyethylene Plastics Pipe and Fittings Materials
ASTM F 585	Practice for Insertion of Flexible Polyethylene Pipe into Existing Sewers
ASTM F 714	Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
PLASTICS PIPE	Renewing Sewers with Polyolefin Pipe Industry (PPI)

1.4 QUALITY ASSURANCE

- A. Except as modified in this Section, all materials used in the manufacture or installation of the pipe shall be tested in accordance with the requirements of the referenced standards.
- B. Submittals and testing shall be done in compliance with Section 15.15000 - Piping, General of these Specifications.

PART 2 – PRODUCTS

2.1 GENERAL

Referenced pipe sizes are nominal pipe diameters.

2.2 PIPING MATERIALS

- A. Pipe and fittings shall be high density, high molecular weight polyethylene with a cell classification of 345434D, as defined in ASTM D 3350 and shall be colored white or light gray. In addition, the material shall be listed by the Plastic Pipe Institute with a designation of PE 3408 and shall be classified as a Type III, Class C, Category 5, Grade P34 material, as defined in ASTM D 1248.
- B. Fittings shall be of the same material and class as the pipe. Identification of pipe and fittings shall be in accordance with ASTM D 3350. Pipe and fittings shall be made from virgin material. No rework compound, except that obtained from the manufacturers own production of the same formulation, shall be used. Pipe and fittings shall be homogeneous

throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

- C. Dimensions of pipe and fittings shall be in accordance with ASTM F 714. Pipe and fittings shall be at minimum SDR 17 with cast iron/ ductile iron outside diameter and have a minimum pressure rating of one hundred (100) psi at seventy three and four-tenth degrees Fahrenheit (73.4°F).
- D. The physical properties of the pipe and fittings material shall be as follows:

PROPERTY	TEST METHOD	VALUE
Density	ASTM D 1505	0.955 gm/cc
Melt Index	ASTM D 1238	0.14 gm/10 min
Environmental Stress-Cracking Resistance ^a	ASTM D 1693	> 5,000 hr > 800 hr
Tensile Strength, Yield ^b	ASTM D 638	3,200 psi
Elongation at Break ^c	ASTM D 638	> 750 percent
Vicat Softening Temperature	ASTM D 1525	257° F
Brittleness Temperature	ASTM D 746	< -180° F
Flexural Modulus	ASTM D 3350	125,000 psi
Modulus of Elasticity	ASTM D 638	105,000 psi
Hardness	ASTM D 2240	65 Shore D
Coefficient of Linear Thermal Expansion ^d	ASTM D 696	8.3x10 ⁻⁵ in/in/°F 1.2x10 ⁻⁴ in/in/°F
Long Term Strength ^e	ASTM D 2837	1,600 psi 800 psi

- a - Condition A, B & C @ 0°F; Compressed Ring @ 50°F
- b - Type IV specimen
- c - Type IV specimen
- d - Molded specimen; Extruded pipe
- e - @ 73°F; @ 140°F

2.3 JOINTS

- A. Joints in HDPE pipe shall be made using thermal butt-fusion welding equipment designed for the specific purpose of permanently connecting HDPE pipes. This equipment shall be capable of squarely facing the pipe ends to be joined, properly heating each pipe end to the temperature range specified by the pipe manufacturer, and applying and sustaining the appropriate pressure, as recommended by the pipe manufacturer. Test joints may be requested at the Inspector's discretion to ensure the quality of the joints.
- B. For main sewer installation, the butt-fusion welding machine shall be outfitted with a measuring and recording unit that documents the

conditions existing during the fusion of each individual weld. A printout that includes the date and time each joint was made, the joint number, the initials of the machine operator, the platen temperature at the time of mating, the pressure during the heating cycle, the time period for the heating cycle, the pressure during the soak cycle, and the time period of the soak cycle shall be machine-generated and delivered to CCCSD at the end of each work shift. The recording unit shall be a **DataLogger, as manufactured by McElroy Manufacturing, Inc., or approved equal.**

- C. Fusion equipment shall be operated by technicians who have been certified by a major gas public utility such as Pacific Gas and Electric or Southern California-Edison for operation of such equipment. A copy of the technician's certification shall be provided to CCCSD prior to the start of the work. Furthermore, all technicians performing butt-fusion welding on this project shall have a minimum of two (2) years experience operating the same equipment used hereon.
- D. Butt-fusion welding equipment shall be as follows, or approved equal:
 - 1. McElroy No. 412 Hydraulic Fusion Machine, McElroy Manufacturing, Tulsa, Oklahoma.
 - 2. Proweld Field 12 (315)-R, Asahi/America, Malden, Massachusetts.

2.4 FITTINGS

- A. The Contractor shall provide fabricated fittings where required. Fabricated fittings shall be of the same material as, and shall have a minimum pressure rating equal to, the pipeline material. If the fitting is in-line with the pipeline (i.e., a flange adapter), then the I.D. of the fitting shall be the same as the pipe. If the fitting is off-line (i.e., a tee), then the fitting shall have an I.D. in accordance with the plans. Unless otherwise required, all fittings shall be butt-fusion welded or flanged.
- B. Terminations to pipe or fittings made of other pipe materials shall be made by using flanges. Flanges shall consist of flange adapters butt-fusion welded to the HDPE pipe end, ductile iron back-up rings with a pressure rating of at least one-hundred and fifty (150) pounds per square inch (psi), Type 316 stainless steel bolts, nuts and washers, and one eighth (1/8) inch thick, black-reinforced rubber gaskets. In no case shall threaded fittings or adapters be used to connect HDPE materials.

PART 3 – EXECUTION

3.1 GENERAL

- A. Sewer pipelines shall be constructed in compliance with the requirements of this Section and of Section 15.15000 – Piping, General.
- B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 HANDLING AND STORAGE

- A. The Contractor shall inspect each pipe and fitting prior to butt-fusion welding and again prior to installation. Any damaged pipe or fittings shall be replaced by the Contractor.
- B. Prior to butt-fusion welding or installation, each pipe or fitting shall be thoroughly cleaned and shall be kept clean. The material used to clean the pipe and fittings shall be as recommended by the pipe manufacturer.

3.3 BUTT-FUSION WELDING

- A. Butt-fusion welds shall be performed in accordance with manufacturer's instructions. The butt-fusion welding procedures are summarized below:
 - 1. Clean each pipe end with a clean cotton cloth to remove dirt, oil, grease and other foreign materials.
 - 2. Square (face) the mating surfaces of each of the pipes to be fused.
 - 3. Bring the two (2) pipe ends together and adjust the pipe locations to ensure proper alignment.
 - 4. Verify that the surface temperature of the heater plate is between three hundred seventy five degrees Fahrenheit (375°F) to four hundred degrees Fahrenheit (400°F) and then clean the heater surface with a clean cotton cloth.
 - 5. Insert the heater plate between the pipe ends, bring the ends into firm contact with the heater plate without applying pressure and achieve a proper melt pattern.

6. After achieving the proper melt bead, remove the heater plate and quickly examine the pipe ends for complete melt.
 7. Once complete melt has been accomplished, rapidly bring the pipe ends together and apply pressure as recommended by the pipe manufacturer.
 8. Hold the pressure constant and at the proper level throughout the cooling period, for the minimum time period recommended by the pipe manufacturer or as necessary to achieve proper cooling.
- B. For main sewer installations, the Contractor shall mark each joint with the individual joint number, corresponding to the joint identification number appearing on the printout of the data logger attached to the butt-fusion welding machine. The printout shall be attached to the pipe near the joint for collection by CCCSD.
- C. For main sewer installations, the Contractor shall remove the internal melt bead from the welded joint. Bead removal shall be accomplished in a manner that does not score or gouge the pipe.

3.4 INSTALLATION

- A. The Contractor shall insert and retrieve the pipe through properly prepared insertion and receiving pits, in accordance with the requirements of ASTM F 585.
- B. All pipe bursting and directional drilling procedures that require the use of HDPE pipe, shall be executed as listed in Section 15.02330 - Directional Drilling and Section 15.02350 - Pipe Bursting.
- C. For side sewer installations, a maximum of ten (10) joints per one hundred foot (100) length of laid pipe shall be achieved, unless all joints are de-beaded.

3.5 PIPE DEFLECTION

Horizontal curves shall be installed by forced bending of the pipe. Minimum curvature radius requirements for HDPE pipe are shown on the table below. All designs of curvilinear sewers are subject to approval by CCCSD.

HDPE	
Pipe DR	Minimum Curve Radius
≤ 9	20 times pipe O.D.
> 9 - 13.5	25 times pipe O.D.
> 13.5- 21	27 times pipe O.D.
> 21	30 times pipe O.D.
Fitting or flange present in bend	100 times pipe O.D.

3.6 FIELD COUPLINGS

- A. Fittings/joints that are to be assembled after pipe bursting or directional drilling has been completed shall be butt fused where accessible. Electrofusion couplings listed in the Approved Materials List shall be used on inaccessible locations.
- B. Saddles used for taps shall be per the Approved Materials List.

- END OF SECTION -

SECTION 15.15068
CAST IRON SOIL PIPE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install cast iron soil pipe and all appurtenances as specified, complete and in place, as shown on the plans, as specified in this Section and in Section 15.15000 Piping, General.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 15.15000 – Piping, General.

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM A 74 Standard specifications for Hub and Spigot Cast Iron Soil Pipe and Fittings

CISPI 301 Hubless Cast Iron Soil Pipe and Fitting for Sanitary and Storm Drain, Waster and Vent Piping Applications

1.4 QUALITY ASSURANCE

A. Except as modified in this Section, all materials used in the manufacture or installation of the pipe shall be tested in accordance with the requirements of the referenced standards.

B. Submittals and testing shall be done in compliance with Section 15.15000 - Piping, General of these Specifications.

PART 2 -- PRODUCTS

2.1 PIPE AND FITTINGS

- A. All hub and spigot cast iron pipes (CIP) shall conform to the requirements of ASTM A 74 as it applies to single hub, extra heavy and service weight pipe.
- B. Service weight, Class SV, pipe shall be the normal requirement of CIP installations; however, the Inspector may require use of extra heavy, Class XH, pipe or ductile iron pipe under special conditions.
- C. CIP may be installed without the use of foundation bedding material where such trench bottom provides solid bearing for the full length of the pipe. The Inspector may require foundation bedding material where conditions warrant.
- D. Cast Iron "Hubless" pipe and fittings shall conform to the requirements of the Cast Iron Soil Pipe Institute, (CISPI), "Standard No. 301."

PART 3 -- EXECUTION

3.1 GENERAL

- A. Sewer pipelines shall be constructed in compliance with the requirements of this Section and of Section 15.15000 - Piping, General.
- B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.
- C. Cast Iron Soil Pipe shall not be used in food service or grease interceptor applications.

3.2 COUPLINGS

- A. Hubless pipe shall be installed in accordance with CISPI Pamphlet No. 100 using only four (4) banded couplings or approved equals per the Approved Materials List.
- B. The use of a properly calibrated torque wrench set to sixty (60) foot-pounds for jointing shall be mandatory.

- END OF SECTION -

SECTION 15.15070

STEEL PIPE

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install steel pipe and all appurtenances as specified, complete and in place, as shown on the plans, as specified in this Section and in Section 15.15000 - Piping, General.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15.09800 – Protective Coating and Painting
- B. Section 15.15000 – Piping, General

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM C 150	Standard Specification for Portland Cement
AWWA C208-07	AWWA Standard for Dimensions for Fabricated Steel Water Pipe Fittings
AWWA C205-07	AWWA Standard for Cement-Mortar Protective Lining and Coating for Steel Water Pipe – 4 in (100 mm) and Larger-Shop-Applied
AWWA C620-07	AWWA Standard for Spray-Applied In-Place Epoxy Lining of Water Pipelines, 3 In. and Larger
ANSI/AWS D1.1	Structural Welding Code

1.4 CONTRACTOR SUBMITTALS

- A. The Contractor shall submit shop drawings and material details for steel pipe and fittings for CCCSD plan review before the pipe and/or fittings are manufactured.

- B. If such shop drawings are to be submitted by the pipe fabricator or manufacturer for CCCSD's review, the District assigned Job Number and Contractor's signature must appear on each drawing, attesting the fact that the manufacturer has reviewed the drawings, and if such are accepted, installation will be in conformance therewith.

1.5 QUALITY ASSURANCE

- A. Except as modified in this Section, all materials used in the manufacture or installation of the pipe shall be tested in accordance with the requirements of the referenced standards.
- B. Submittals and testing shall be done in compliance with Section 15.15000 – Piping, General of these Specifications.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Lining refers to corrosion protection applied to the inside of a pipe. While coating refers to corrosion protection applied to the outside of pipe.
- B. Cement-Mortar protective lining and coating for steel pipe shall meet the requirements of AWWA Standard C205-07.
- C. Epoxy protective lining and coating for steel pipe shall meet the requirements of AWWA Standard C620-07.

2.2 LININGS AND COATINGS

- A. Concrete linings and coatings shall be manufactured with Type II Portland cement conforming to the requirements of ASTM C 150, Concrete linings shall extend to the ends of each pipe length. The concrete coating shall be held back three (3) inches from each end of each pipe, except where otherwise specified for abutting pipe or structure connections.
- B. Approved corrosion protective coating shall meet the requirements of Section 15.09800 - Protective Coating and Painting, and be shop applied to all exposed metal portions of pipe before shipment. Minor shop coating damage shall be repaired in the field with material consistent with that used by the pipe manufacturer as directed by the Inspector.

2.3 FABRICATION

- A. All pipe shall be clearly marked with date of manufacture, type of lining and/or coating and name or trademark of the manufacturer as identification on each individual length unless otherwise specified or shown on the plans.
- B. Fabrication of steel pipe shall be in accordance with the minimum basic requirements of the following table:

Minimum Basic Steel Pipe Fabrication Requirements					
Diameter of Pipe (in.)	6	8	10	12	14
Steel Cylinder Gauge (US Std)	10	10	7	7	7
Uniform Minimum Lining Thickness (inches)	1/2	1/2	1/2	2/3	2/3
Uniform Minimum Coating Thickness (inches)	1	1	1	1	1
Rod-Wrapping or Wire Reinforcement	7/32 inch diameter or greater at 1.75 inches maximum clear spacing. Self-furring welded fabric of 2-by-4 inch No. 13 gauge steel wire.				

Steel cylinders in the table shall be such that the lined pipe shall have the nominal pipe size within the one quarter (1/4) inch tolerance.

2.4 FITTINGS

- A. Fittings for steel pipe shall conform to the requirements of AWWA C 208. Special fittings shall be shop fabricated as detailed on the plans and approved shop drawings for construction.
- B. Steel coupling for joining steel pipe shall consist of acceptable beveled or flared sleeves, pressed or rolled steel flanges, rubber or neoprene gaskets and steel bolts with hexagon nuts.
- C. Deflection fittings shall not exceed eleven and one quarter degrees (11.25°) at any one angle break in such fitting and the minimum distance between all mitres in a fabricated fitting shall be three (3) feet.

PART 3 – EXECUTION

3.1 GENERAL

- A. Sewer pipelines shall be constructed in compliance with the requirements of this Section and of Section 15.15000 - Piping, General.

- B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 WELDING

- A. All welding shall be performed by qualified welders, welding operators, and tackers who have had prior experience with the type of materials to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local, approved testing agency not more than six (6) months prior to commencing work on the casing or pipeline. Machines and electrodes similar to those used in the work shall be used in qualification tests.
- B. Appropriately sized joint rings for joining steel pipe shall be welded to the cylinder to form a self-centering bell and spigot type joint sealed by a compressed rubber gasket. When such method of jointing is used, CLASS I mortar shall be used to point the joint on the inside and CLASS I non-shrink grout shall be used to completely fill the annular space between abutting pipe sections on the outside.
- C. Field welds will be permitted only as shown on the plans. A hand hole will be required for all field welds. Welding shall be in accordance with the AWS standards. After field welding is complete and inspected by CCCSD, all exposed portions of the cylinder and joint shall be wrapped with eighteen (18) gauge stucco wire and then cement grout band coated with CLASS I non-shrink grout. The grout band, once finished, shall immediately be coated with a membrane-type, fast curing material that will seal the band surface completely.

- END OF SECTION -

SECTION 15.15072

ACRYLONITRILE BUTADIENE STYRENE (ABS) PIPE

PART 1 – GENERAL

1.1 THE REQUIREMENT

The Contractor shall furnish and install ABS pipe and all appurtenances as specified, complete and in place, as shown on the plans, as specified in this Section and in Section 15.15000 - Piping, General.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 15.15000 - Piping, General.

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM D 1527	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
ASTM D 2235	Standard Specification for Solvent Cement for Acrylonitrile Butadiene-Styrene (ABS) Plastic Pipe and Fittings
ASTM D 2680	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping
ASTM D 2751	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings

1.4 QUALITY ASSURANCE

- A. Except as modified in this Section, all materials used in the manufacture or installation of the pipe shall be tested in accordance with the requirements of the referenced standards.
- B. Submittals and testing shall be done in compliance with Section 15.15000 – Piping, General of these Specifications.

PART 2 – PRODUCTS

2.1 GENERAL

Pre-Approved couplings, fittings, cement, etc., shall be per the Approved Materials List.

2.2 PIPE AND FITTINGS

- A. Composite ABS pipe and fittings shall conform to the requirements of ASTM D 2680.
- B. All ABS solid wall pipe and fittings less than eight (8) inches in diameter (side sewer) shall, at a minimum, conform to the requirements of ASTM D 2751 and D 1527 as they apply to schedule 40 ABS sewer pipe respectively using solvent cement joint assembly systems.

PART 3 – EXECUTION

3.1 GENERAL

- A. Sewer pipelines shall be constructed in compliance with the requirements of this Section and of Section 15.15000 - Piping, General.
- B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.2 INSTALLATION

- A. Cement used for all ABS pipe joints shall conform to the requirements of ASTM D 2235. Jointing shall be accomplished by applying a coating of cement to the inside of the socket and to the outside of the spigot end of pipe to be joined in sufficient quantity that when the spigot is fully inserted into the socket a bead of excess cement will form around the entire circumference of the outside juncture of the said spigot and socket. Excess cement shall then be removed.
- B. The Contractor shall apply a coating of cement to all pipe ends of ABS composite pipe whether within a coupling or not. The purpose is to prevent migration of groundwater into the annular space.

- C. All ABS pipe entering or leaving a concrete structure shall have a standard (water stop) manhole gasket, as supplied by the pipe manufacturer, firmly clamped around the pipe exterior and cast into the structure base or near the structure wall center as a water stop.

3.3 REPAIRS

When repairing an ABS composite pipe a standard chemically welded coupling is required for each joint. Cut each coupling at a forty five degree (45°) angle with a narrow bladed saw and deburr the edges. Each pipe shall be cut square and deburred. A minimum of a two (2) foot piece of pipe shall be used. With two (2) straps placed loosely on the edges of each repair joint, apply primer and cement to inside of the coupling and outside of the ABS pipe at each joint. Center the coupling around the repair joint placing the cut upward. Tighten the straps around the coupling allowing the coupling to slide such that there is a tight fit around the ABS pipe. Finally, dip fiberglass tape into the primer and lay over the cut applying cement over the strip. Do not apply test pressures internally or externally for sixteen (16) hours, but install bedding and backfill immediately.

- END OF SECTION -

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Standard Specifications
for Design & Construction
2014 Edition

CENTRAL CONTRA COSTA SANITARY DISTRICT

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