CITY OF REEDLEY

ENGINEERING DEPARTMENT

STANDARD SPECIFICATIONS

January, 2007
(updated January 11, 2008)

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CITY OF REEDLEY
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
1733 NINTH STREET
REEDLEY, CA 93654

RESOLUTION NO. 2007 – 008

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF REEDLEY ADOPTING THE 2007 STANDARD PLANS AND SPECIFICATIONS

WHEREAS, the City of Reedley Engineering Division has recently revised and updated a set of standard plans and specifications dated 2001; and

WHEREAS, these plans and specifications have been used since 2001 as accepted standards for subdivisions, and other building, public works and parks projects; and

WHEREAS, these same plans have not been officially adopted by the City as City of Reedley Standard Plans and Specifications; and

WHEREAS, the Engineering Division has added, deleted and modified these plans to fit the City of Reedley's unique needs; and

WHEREAS, these standard plans and specifications will be considered for updates as practices and materials change; and

WHEREAS, these updates will occur on an as needed basis but at a minimum every two years; and

WHEREAS, these updates will be automatically incorporated as part of the whole Standard Plans and Specifications.

NOW THEREFORE, BE IT RESOLVED that the City Council of the City of Reedley does hereby:

Adopts the 2007 Revised Standard Plans and Specifications as the official "City of Reedley Standard Plans and Specifications".

The foregoing resolution was adopted by the City Council of the City of Reedley at a regular council meeting on the 23rd day of January, 2007 by the following vote:

AYES: Brockett, Rapada, Betancourt, Fast, Soleno.

NOES: None.

ABSENT: None.

ABSTAIN: None.

Ray Soleno
Mayor of the City of Reedley

ATTEST:
By: Elizabeth Vines
Elizabeth Vines, City Clerk

CITY OF REEDLEY
INCORPORATED FEB. 18, 1913

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SECTION 1 - DEFINITIONS AND TERMS

1.01 GENERAL

Wherever in these Standard Specifications or the State of California Standard Specifications and other contract documents the abbreviations and terms, or pronouns in place of them, are used, the intent and meaning shall be interpreted as provided in Section 1 of the Standard Specifications of the State of California, Department of Transportation, latest edition, or as modified in these Standard Specifications.

1.02 ABBREVIATIONS

Shall conform to Section 1-1.02.

1.03 TERMS AND DEFINITIONS

The terms and definitions as used in the State of California Standard Specifications and the Standard Specifications shall be interpreted and understood as established in Section 1 of State of California Standard Specifications except as modified herein:

a. Certified Testing Laboratory: An established laboratory properly certified and approved by the Director to test materials, specimen, or work involved in the contract, and as specified herein.

b. City: The City of Reedley, California, as represented by the City Engineer.

c. City Council: The City Council of the City of Reedley, California.

d. Contractor: The person or persons, firm, partnership, corporation or combination thereof, private or municipal, who have entered into a contract with the City or a developer, as party or parties of the second part or his or their legal representative.

e. Department or Department of Transportation: The Department of Public Works, City of Reedley, California.

f. Developer: An individual or group proposing to subdivide or improve land within the City and constructing or causing to be constructed improvements to be accepted by the City.

g. Engineer: The Engineer of the City of Reedley, California, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

h. Laboratory: See "Certified Testing Laboratory."

i. Standard Plans: The Standard Plans of the Public Works Department of the City of Reedley, California.

j. Standard Specifications: The Standard Specifications of the of the City of Reedley as prepared by the Engineering Division of the City of Reedley, California.

k. State of California Standard Specifications: The latest revision of the Standard Specifications issued by the Department of Transportation (Caltrans) of the Business and Transportation Agency of the State of California. Sections 10 through 60, inclusive, Section 73 and Sections 92 through 94, inclusive, of said standard specifications are hereby incorporated and included in the Standard Specifications of the City of Reedley, California, except as modified by said City of Reedley Standard Specifications. Other sections of the State of California Standard Specifications are included in the Standard Specifications of the City of Reedley, California, by reference either in these Standard Specifications, the Special Provisions; or in the Standard Specifications of the State of California.

l. State: The City of Reedley, California.

m. Working Days: Unless otherwise designated, working day as used in these Specifications shall mean any day on which the Contractor is not prevented by inclement weather, or conditions resulting therefrom, from proceeding with substantial prosecution of the work, excluding Saturdays, Sundays, legal holidays, and any other day the Contractor is specifically required by the Special Provisions to suspend construction operations.

SECTION 2 - PROPOSAL REQUIREMENTS

2.01 GENERAL INFORMATION

The City Council of the City of Reedley, California, will receive at the City Hall, in said City, until the hour and day specified in the "Notice to Contractor," sealed proposals, for furnishing material, supplies, equipment and labor for performing the work as specified in these plans and specifications.

2.02 ENGINEER'S ESTIMATE

The items of work given in the Bid Proposal and in the specifications are given as a basis for comparison of bids and the City does not expressly or by implication agree that the actual amount of work will correspond therewith, and reserves the right to increase or decrease the amount of the work or to omit portions of the work as may be deemed advisable by the Engineer.

2.03 UNIT PRICES

Excepting the items for which lump sums are called for, the unit prices inserted in the bid form by the bidder will be considered to be the bid prices for the various work performed. In case of a discrepancy between the unit price bid and the calculated total, the unit price will govern, and the total will be recalculated. In the event of discrepancy between numbers and written prices, the written prices will govern.

2.04 EXAMINATION OF SITE OF WORK, PLANS, SPECIFICATIONS AND CONTRACT FORM

The bidder is required to examine carefully the site of the proposed work, the proposal, plans, specifications and contract forms for the work contemplated, and it will be assumed that the bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality and quantities of the work to be performed and materials to be furnished, and as to the requirements of the specifications, and the contract. The submission of a proposal shall be considered prima facie evidence that the bidder has made such examination.

2.05 FORM OF PROPOSAL

All proposals must be made upon blank forms to be obtained from the City Engineer. All proposals must give the unit price where indicated, or lump sum where unit prices are not called for, for each of the items, and must be signed by the bidder with his address. If the proposal is made by an individual, his name and post office address must be shown. If made by a partnership, the name and post office address of each member of the firm or partnership must be shown. If made by a corporation, the proposal must show the name of the State under the laws of which the corporation was chartered and the names, titles and business addresses of the president, secretary and treasurer.

All proposals must be submitted under sealed cover and the envelope properly marked "Bid (Insert Project Title)."

2.06 WITHDRAWAL OF PROPOSALS

Any bid may be withdrawn at any time prior to the time fixed in the Notice to Contractors for the opening of bids only upon written request for the withdrawal of the bid filed with the City. The request shall be executed by the bidder or his duly authorized representative. The withdrawal of a bid does not prejudice the right of the bidder to file a new bid. A bid will not be received after the time, nor any bid withdrawn after the time fixed in the public notice for the opening of bids until either all bids are rejected, or until the expiration of sixty (60) days set from the date set for the opening of bids, or until the contract has been executed and the required contractor's bonds furnished by the successful bidder or bidders, whichever occurs first.

2.07 PROPOSAL GUARANTEE

All proposals must be accompanied by either a cashier's check, certified check or bidder's bond of a corporate surety authorized to do business in the State of California and acceptable to the City in a sum equal to at least ten (10%) percent of the total amount of the bid. Checks or bonds must be made payable to the City of Reedley, such securities to be retained by the City as a guarantee that the Bidder, if his bid is accepted, will enter into a satisfactory contract within ten (10) calendar days, not including Sundays, from the date that the notice of award is mailed to the bidder, and will furnish a good and sufficient bond for the faithful performance thereof and for the payment of labor and material costs in accordance with the requirements of plans and specifications.

2.08 REJECTION PROPOSALS

The City reserves the right to reject any or all proposals.

Proposals may be rejected if they show any alteration of form, additions not called for, conditional or alternative bids, incomplete bids, erasures, or irregularities of any kind. Proposals in which the prices are obviously unbalanced may be rejected.

2.09 DISQUALIFICATION OF BIDDERS

Unless alternate bids are called for, more than one proposal for the same unit or units from an individual, firm, partnership, co-partnership, corporation, or combination thereof under the same or different names will not be considered. If there is reason for believing that collusion exists among the bidders, none of the participants in such collusion will be considered in future proposals.

2.10 SUBCONTRACTING

Should any bidder propose subcontracting any part of the work covered by these Plans and Specifications, he shall submit with his bid a description of the work to be done by each subcontractor and the name and the location of the place of business of each such subcontractor as a part of the bidder's proposal. The Contractor shall conform to the requirements of Section 8, "Prosecution and Progress" of the State of California Standard Specifications. The Contractor shall perform with his own organization contract work amounting to not less than 50 percent of the original total contract price. Attention is directed to Section 8.01 of these Specifications.

2.11 GUARANTEE OF WORK

Before any contract is awarded, the bidder may be required to furnish a complete statement or the origin, composition, and manufacturer of any or all materials to be used in the construction of the work, together with samples, which samples may be subject to the tests provided for in these specifications to determine their quality and fitness for the work.

The bidder may also be required to furnish a written guarantee covering certain items of work for varying periods of time from the date of acceptance of the contract. When such guarantee is required, the form and the time limit of the guarantee will be specified in these Specifications or in the Special Provisions. Said guarantee shall be signed and delivered to the Engineer before acceptance of the contract. The Labor and Materials bond shall not be reduced until the expiration of the time required by Section 3249 of the Civil Code.

2.12 CONTRACTOR'S LICENSE

Unless stated otherwise in the "Notice to Contractors," all prospective bidders must possess, or be able to obtain within 30 days after the bid date, a Class "A" Contractor's License issued by the State of California.

SECTION 3 - AWARD AND EXECUTION OF CONTRACT

3.01 MULTIPLE CONSTRUCTION UNITS

If there are two or more units in the construction project and the Notice to Contractors has called for separate proposals for each unit, the City reserves the right to award the contract for one unit or for more than one unit to one bidder, while awarding a contract or contracts to other bidders for other units or combinations of units.

3.02 AWARD OF CONTRACT

The award of the contract, if it is awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements described. Such award, if made, will be made within thirty (30) days after the opening of the proposals. If the lowest responsible bidder refuses or fails to execute the contract, the City may award the contract to the second lowest responsible bidder. Such award, if made, will be made within forty-five (45) days after the opening of the proposals. If the second lowest responsible bidder refuses or fails to execute the contract, the Owner may award the contract to the third lowest responsible bidder. Such award, if made, will be made within sixty (60) days after the opening of the proposals. The periods of time specified above, within which the award of contract may be made, shall be subject to extension for such further periods as may be agreed upon in writing between the Owner and Bidder concerned.

All bids will be compared on the basis of the Engineer's estimate of quantities of work to be done.

3.03 EXECUTION OF CONTRACT

The contract shall be signed by the successful bidder and returned together with the contract bonds within ten (10) calendar days, not including Sundays, from the date that the notice of award has been mailed. No proposal shall be considered binding upon the City until execution of the contract.

Failure to execute a contract and file acceptable bonds as provided herein within ten (10) calendar days, after the bidder has received notice that the contract has been awarded, shall be just cause for the annulment of the award and the forfeiture of the proposal guarantee as liquidated damages.

3.04 RETURN OF GUARANTEES

All proposal guarantees will be held until the contract has been awarded, after which the guarantees accompanying proposals no longer considered in making the award will be returned to

the bidder whose proposal they accompanies. Retained proposal guarantees will be held until the contract has been executed, after which all guarantees, except those forfeited, will be returned.

3.05 REQUIRED CONTRACT SECURITIES

The bidder to whom the contract has been awarded will be required to furnish a labor and material bond in an amount equal to fifty percent (50%) of the contract price, and a faithful performance bond in an amount equal to one hundred percent (100%) of the contract price; said bonds shall be secured from a surety company satisfactory to the City. Note: Projects funded by State and/or Federal Agencies may require labor and material bond to be equal to 100% of the contract price.

SECTION 4 - GENERAL SCOPE OF WORK AND RESPONSIBILITIES

4.01 WORK TO BE DONE

The work to be performed under this contract consists of furnishing all materials, equipment, supplies, labor and transportation, and performing all work as required by the contract in strict accordance with the specifications, schedules and drawings, all of which are made a part hereof. The work shall be complete, and all work, material and services not expressly called for in the specifications or not shown on the drawings which may be necessary for completion and proper construction to carry out the contract in good faith and leave the site of the work in a neat condition shall be performed, furnished and installed by the contractor at no increase in cost to the City.

4.02 ALTERATIONS

By mutual consent in writing of the parties signatory to the contract, alterations or deviations, increases or decreases, additions or omissions, in the plans and specifications, may be made and the same shall in no way affect or make void the contract.

The City reserves the right to increase or decrease the quantity of any item or portion of the work, or to omit portions of the work as may be deemed necessary or expedient by the Engineer.

4.03 EXTRA WORK

New and unforeseen work will be classed as extra work when such work cannot be covered by any of the various items or combination of items for which there is a bid price.

No extra work shall be done by the Contractor except upon written order from the Engineer.

Extra work, when ordered and accepted, shall be paid for under written work order in accordance with the terms therein provided. Payment for extra work will be made at the unit price or lump sum previously agreed upon by the contractor and the Engineer, and approved by the City.

4.04 PUBLIC SAFETY AND CONVENIENCE

The contractor shall so conduct his operations as to cause the least possible obstruction and inconvenience to public traffic. Unless other existing streets are stipulated in the special provisions to be used as detours, all traffic shall be permitted to pass through the work. Residents along the road or street shall be provided passage as far as practicable. Pedestrian access to all properties

along the line of work shall be provided and maintained in good condition. Not more than one crossing or intersecting street or road shall be closed at any one time without the approval of the Engineer.

The contractor shall provide such flagmen, and furnish, erect, and maintain such fences, barriers, lights, and signs as are necessary to give adequate warning to the public at all times that the road, street, or underground utility is under construction and of any dangerous conditions to be encountered as a result thereof, and he shall also erect and maintain such warning and directional signs as may be furnished by the City.

4.05 DUST CONTROL

The contractor shall maintain dust control about the site of the work, including any haul roads to or from the site, by whatever means are necessary, such as watering, sweeping or oiling, so as to cause the least possible dust nuisance to the public. Any dust control measure ordered by the Engineer shall be promptly and immediately carried out.

Water for dust control purposes will be furnished as specified in the Special Provisions or these Standard Specifications. The contractor shall furnish his own equipment for transporting and applying water. Such equipment shall meet the approval of the Engineer. The contractor shall provide, at all times, an approved backflow prevention device between the public water supply and his equipment for applying or transporting water or when the Engineer determines that a backflow condition could be caused by the method or equipment used to draw water from the public supply.

If the contractor fails to provide dust control measures so ordered within a reasonable time period as determined by the Engineer, the contractor or developer shall pay to the City a penalty of Fifteen ($15.00) Dollars for each one-half (1/2) hour, or portion thereof, that elapses from the time the penalty is ordered into effect by the Engineer, until dust control measures ordered by the Engineer are completely carried out and the dust nuisance eliminated or prevented.

Such penalty shall be deducted from any monies owed the contractor or levied as a fine against the developer. In addition to the penalty as specified above, if conditions warrant, the Engineer may order City forces to eliminate or prevent the dust nuisance. The full cost thereof, in addition to the penalty as herein provided, shall be deducted from any monies owed the contractor or shall be levied as a fine against the developer.

Full compensation for dust control shall be included in the amount bid for the various items of work and no separate payment will be made therefore, unless otherwise specified in the Special Provisions.

4.06 TRAFFIC CONTROL

All traffic and detour patterns shall be as indicated in the Special Provisions or as specified in the permit issued for the work by the city. Any deviations proposed by the contractor shall have the approval of the Engineer.

The contractor shall comply with all of the requirements of the "Manual of Warning Signs, Lights, and Devices for Use in Performance of Work Upon Highways."

Compliance with the requirements of said manual shall be considered as a minimum requirement and it shall be the responsibility of the contractor to provide additional safety devices when necessary to maintain a safe condition.

It shall be totally the responsibility of the contractor to provide and maintain adequate traffic safety devices and warning signs. If the Engineer or the Inspector of the City notes some deficiency in said devices, the situation shall be corrected immediately by the contractor.

All traffic signs used during the project shall conform in size, shape and color to the latest publication of the "State of California, Department of Public works, Division of Highways, Planning Manual of Instructions, Part 8 - Traffic."

Full compensation for all costs involved in maintaining traffic control in the vicinity of the work in accordance with the requirements specified shall be included in the lump sum price bid for traffic control. If no bid item is provided for traffic control, the cost therefore shall be included in the various bid items of work.

4.07 COOPERATION

The contractor shall cooperate in all respects with all public and private agencies, including, but not limited to, the Alta Irrigation District, Pacific Gas and Electric Company, General Telephone Company, and the Fire and Police Departments. Should construction be underway by other forces or by other contractors within or adjacent to the project area, or should work of any other nature be underway by other forces within or adjacent to said project area, the contractor shall cooperate with all such other contractors or forces to the end that any delay or hindrance to their work will be avoided.

4.08 PERMITS AND EASEMENTS

The contractor shall obtain any necessary permits from the County of Fresno, City of Reedley, California Department of Transportation, California Division of Industrial Safety as required by Section 6424 of the State Labor Code, any Railroad or Utility Company, Special District, or Agency affected by the work.

Satisfactory evidence of obtaining the required permits shall be submitted to the Engineer prior to, and as a condition of, issuance of the "Notice to Proceed." The contractor shall abide by the conditions of said permits and perform all work governed by said permits in conformance therewith and as directed by the Engineer. The contractor shall procure at no cost to the City all temporary construction easements not shown in the plans, which he may deem necessary to carry out the work to be done under the contract. Should the contractor desire to make preliminary soil investigations in public street rights-of-way, he shall secure the required permits from the appropriate department of the City and abide by the provisions of said permits.

4.09 EXISTING IMPROVEMENTS

The contractor shall preserve all curbs, gutters, sidewalks, and other existing improvements in the vicinity of the work. Any curbs, gutters, sidewalks and other existing improvements damaged by the contractor's operation shall be replaced at the contractor's expense.

The contractor shall be responsible for the protection, restoration or replacement in kind of any improvements such as, but not limited to, lawn, trees, shrubs, hedges, fences, mail boxes, signs, poles, sprinkler systems, walls, sidewalks, driveways, curb and gutter and pavement existing at the start of the work. Replacement and restoration of said improvements shall meet the approval of the Engineer and shall be made immediately upon notification by the Engineer. At locations where work occurs behind curb lines and/or within landscaped areas, all external structure patching, final backfilling, final sprinkler system repairing and lawn reseeding and mulching behind the curb lines shall be completed within fifteen (15) calendar days of beginning of the work.

Irrigation and sprinkler system lines behind the curb disturbed by the construction shall be repaired as follows:

a. Sprinkler or irrigation lines disturbed by structure construction shall be temporarily capped when first disturbed.

b. Sprinkler or irrigation lines and facilities disturbed shall be replaced to original condition using similar material as that removed. (Galvanized pipe to be replaced with galvanized pipe, brand name heads replaced with same brand name and model.) Sprinkler lines shall be realigned around structures in order to duplicate original irrigation coverage.

c. Sprinkler systems disturbed and repaired shall be water-tested by the contractor in the presence of the Engineer before acceptance of the repair.

Existing land subdivision monuments and stakes shall be fully protected from damage or displacement and they shall not be disturbed unless directed by the Engineer.

All costs involved in the protection, restoration and replacement of existing improvements as specified herein shall be considered as being included in the bid prices of the various items of work, and no separate payment shall be made therefore, unless otherwise specified in the Special Provisions.

4.10 MAINTAINING DRAINAGE

Reference is made to Section 12.05 of these Standard Specifications. The contractor shall also provide and maintain drainage to the existing street sections with no separate compensation therefore.

During and following storm conditions, the contractor shall cooperate with the Engineer in providing for temporary use, for drainage purposes, of completed or partially completed drainage facilities. Temporary provisions for drainage of any area during construction where existing facilities have been damaged or altered by the contractor during his operations shall be made by the contractor and as directed by the Engineer.

No separate payment shall be made for such maintaining of drainage and full compensation therefore shall be included in the prices bid for the various items of work.

The contractor shall be responsible for all damages to public or private property incurred due to the following: failure to provide adequate drainage within the construction area; blockage of existing drainage facilities upstream from the area of work in excess of the capacity of the existing upstream drainage facilities.

4.11 ELECTRIC AND WATER SERVICES

The contractor shall provide and pay for electric service for all purposes of power and lighting required for the construction of the work of the contract and shall maintain such service until the completion of the contract.

The contractor shall contact the Public Works Department concerning the use of the City's water for the work done under the contract. All water so used shall be paid for by the contractor as specified in the Special Provisions.

4.12 RIGHT-OF-WAY

The right-of-way for the work to be constructed will be provided for, but the contractor shall make his own arrangements and pay all expenses for additional area required by him outside of the limits of the right-of-way as shown on the plans, unless otherwise provided in the Special Provisions. Said additional right-of-way shall be brought, to the satisfaction of the Engineer, to a condition at least equal to that existing prior to its use by the contractor.

4.13 CONTRACTOR'S EQUIPMENT

The contractor shall provide adequate and suitable equipment and means of construction to meet all the requirements of the work. When ordered to do so by the Engineer, the contractor shall remove unsuitable equipment from the work and discontinue the operation of unsatisfactory equipment. The use of any means of construction which is obsolete as to type, in bad condition, or worn out will not be permitted on the work. The contractor shall, at his expense, provide off-street storage for equipment not used for that day's work.

4.14 DISPOSAL OF MATERIAL

The contractor shall make his own arrangements for disposing of materials and he shall pay all costs involved.

All material shall be disposed in accordance with Section 7-1.13 of the State of California Standard Specifications.

When any material is to be disposed of on private property, the contractor shall first obtain a written permit from the property owner of whose property the disposal is to be made, and he shall file with the Engineer said permit or a certified copy thereof if such proof is requested by the Engineer.

Unless otherwise provided in the Special Provisions, full compensation for all costs involved in disposing of materials as specified, including all costs of hauling, shall be considered as included in the price paid for the contract item of work involving such materials, and no additional compensation will be allowed therefore.

SECTION 5 - CONTROL OF WORK

5.01 AUTHORITY OF THE ENGINEER

The Engineer shall decide all questions which may arise as to the quality of acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of the work, all questions which may arise as to the interpretation of the plans and specifications, all questions as to the acceptable fulfillment of the contract on the part of the contractor, and all questions as to compensation. His decision shall be final and he shall have authority to enforce and make effective such decisions and orders which the contractor fails to carry out promptly.

5.02 PLANS

Working drawings or plans for any structure not included in the plans furnished by the Engineer shall be approved by the Engineer before any work involving these plans shall be performed, unless approval is waived in writing by the Engineer.

It is mutually agreed, however, that the approval by the Engineer of the contractor's working plan does not relieve the contractor of any responsibility for accuracy of dimensions and details, and that the contractor shall be responsible for agreement and conformity of his working plans with the approved plans and specifications.

5.03 CONFORMITY WITH PLANS AND ALLOWABLE DEVIATION

Finished surfaces in all cases shall conform with the lines, grades, cross-sections, and dimensions shown on the approved plans. Deviations from the approved plans, as may be required by the exigencies of construction, will be determined in all cases by the Engineer and authorized in writing by him.

5.04 COORDINATION OF PLANS, SPECIFICATIONS AND SPECIAL PROVISIONS

These specifications, the plans, special provisions, and all supplementary documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be cooperative, to describe, and to provide for a complete work. Plans shall govern over specifications; special provisions shall govern over both specifications and plans. The Standard Specifications shall govern over the State of California Standard Specifications.

5.05 INTERPRETATION OF PLANS AND SPECIFICATIONS

Should it appear that the work to be done, or any matter relative thereto, is not sufficiently detailed or explained in these specifications, plans and the special provisions, the contractor shall apply to the Engineer for such further explanations as may be necessary, and shall conform to such

explanation or interpretation as part of the contract, so far as may be consistent with the intent of the original specifications. In the event of doubt or question relative to the true meaning of the specifications, reference shall be made to the City Engineer, whose decision thereon shall be final.

Lists, rules and regulations referred to are recognized printed standards and shall be considered as one and part of these Specifications within the limits specified. Catalog numbers shall be likewise so considered.

In the event of any discrepancy between any drawings and the figures written thereon, the figures shall be taken as correct.

5.06 OMISSIONS IN SPECIFICATIONS AND DRAWINGS

Any material or work mentioned in the specifications and not shown on the drawings or shown on the drawings and not mentioned in the specifications shall be of the same effect as if shown or mentioned in both.

Omissions from the drawings or the specifications of the materials or details of work which are manifestly or obviously necessary to carry out the intent of the drawings and specifications, or which are customarily furnished or performed, shall not relieve the contractor of his responsibility for furnishing such omitted materials or performing such omitted work; but shall be furnished or performed as if fully shown or described in the drawings or specifications.

5.07 SURVEYING

a. **Permanent Survey Markers**: The contractor shall not disturb permanent survey monuments or benchmarks without the consent of the Engineer and shall bear the expense of replacing any that may be disturbed without permission. Any such monument disturbed without permission shall be replaced at the expense of the contractor.

When a change is made in the finished elevation of the pavement of any roadway in which a permanent survey monument is located, the contractor shall adjust the monument cover to the new grade unless otherwise specified.

b. **Lot Stakes:** The contractor shall preserve property line and corner survey markers except where their destruction is unavoidable, and the contractor is proceeding in accordance with accepted practice. Markers that otherwise are lost or disturbed by his operations shall be replaced at the contractor's expense by a Registered Civil Engineer or Licensed Land Surveyor.

c. **Survey Service**: Surveying for construction will be done by the Engineer except for private contracts. The extent that survey stakes will be provided shall be as set forth in the Special Provisions. The contractor shall be responsible for preserving construction survey stakes and marks for the duration of their usefulness. If any construction survey stakes are lost or disturbed and need to be replaced, such replacement shall be by the Engineer at the expense of the contractor.

The contractor shall notify the Engineer at least two (2) working days before he will require survey services in connection with laying out of any portion of the work. The contractor shall, upon request from the Engineer, clear the construction area prior to the setting of any stakes at no additional cost to the City.

d. **Private Engineer**: Surveying by private engineers for work under control of the City shall conform to the quality and practice required by the Engineer. The Engineer shall be notified before the stakes are set. Private engineers are required to furnish cut sheets to the Engineer immediately upon setting of the grades. On work where staking is done by other than the Engineer, the Engineer will check any staking that is in question. The Engineer shall be the authority to reset grades if a discrepancy exists or order the work corrected by the Engineer responsible for the staking work. No other work shall continue until the stakes ordered to be corrected have been reset to their proper alignment or grade or both.

e. **Line and Grade**: All work upon completion shall conform to the lines, elevations, and grades shown on the plans.

Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the contractor shall be responsible for any error in the grade of the finished work.

Grades for underground conduits will be set at the surface of the ground. The contractor shall transfer them to the bottom of the trench.

5.08 INSPECTION

The Engineer and the Inspector shall at all times have access to the work during construction, and shall be furnished with every reasonable facility for ascertaining full knowledge respecting the progress, workmanship, and character of materials used and employed in the work.

Whenever the contractor varies the period during which work is carried out each day, he shall give due notice to the Engineer, or Inspector, so that proper inspection may be provided. Any work done in the absence of the Engineer or Inspector will be subject to rejection.

The inspection of the work shall not relieve the contractor or any of his obligations to fulfill the contract as prescribed. Defective work shall be made good, and unsuitable materials may be rejected, notwithstanding the fact that such defective work and unsuitable materials have been previously overlooked by the Engineer and Inspector and accepted or estimated for payment.

Projects financed in whole or in part with State and/or Federal funds shall be subject to inspection at all times by the designated Engineer of the Agency involved or their agent.

5.09 FINAL INSPECTION

Whenever the work provided and contemplated by the contract shall have been satisfactorily completed and the final cleaning up performed, the Engineer and the Public Works Inspector will make the final inspection.

5.10 ORDER OF WORK; SCHEDULE OF OPERATIONS

When required by the Special Provisions of plans, the contractor shall follow the sequence of operations as set forth therein. The contractor shall submit a proposed schedule of operations with the executed contracts, if so required by the Special Provisions.

The Engineer shall also have the power to direct the order and sequence of work, which in general shall be to coordinate the construction of the several parts of the contract to a successful completion as rapidly as possible.

If at any time appliances used or to be used appear to the Engineer as insufficient or improper for securing the quality of work required, or the required progress, he may order the contractor to increase efficiency or to improve their appliance results and the contractor shall conform to such order but the failure of the Engineer to demand any increase of such efficiency or any improvement shall not release the contractor from his obligation to secure the quality of work or the rate of progress specified.

Full compensation for conforming with such requirements will be considered as included in the prices paid for the various contract items of work, and no additional compensation will be allowed therefore.

5.11 EMERGENCY AVAILABILITY

The contractor shall furnish to the City, prior to the issuance of the "Notice to Proceed," a list of the persons, together with their addresses and home telephone numbers, who are authorized to act on the behalf of the contractor in an emergency arising out of conditions at the work site after normal working hours.

5.12 SANITARY REGULATIONS

Necessary housing accommodations shall be provided for the workmen for changing clothes and for protection during inclement weather. Toilet accommodations shall also be maintained for the use of employees on the work. The accommodations shall be in approved locations property screened from public observation and shall be maintained in a strictly sanitary manner. The contractor shall obey and enforce all other sanitary regulations and orders, and shall take precautions against infectious diseases, and the spread of same, and shall maintain at all times satisfactory sanitary conditions around all shanties, tool and supply houses, and on all other parts of the work.

5.13 EXISTING STRUCTURES AND UTILITY FACILITIES SHOWN ON THE PLANS

a. **Location**: Where underground and surface structures of utilities are shown on the plans, the locations, depth and dimensions of such structures or utilities are believed to be reasonably correct, but are not guaranteed. Such structures or utilities are shown for the information of the contractor, but information so given is not to be construed as a representation that such structures or utilities will, in all cases, be found or encountered just where shown, or that they represent all the structures or utilities which may be encountered.

The contractor shall be responsible for precisely locating and preserving said underground or surface structures and utility lines and shall, prior to placing or constructing the proposed facilities, expose and/or verify the locations of said utilities and structures. If the contractor discovers utilities or structures not identified on the plans, he shall immediately notify the Engineer and the utility or structure owner in writing.

At least two (2) working days before entering on the work, the contractor shall request all utility owners having a possible interest in the work area to mark or otherwise indicate the location of their substructure. It shall be the contractor's responsibility to determine the true location and depth of all utilities and service connections. He shall also familiarize himself with the type, material age and condition of any utility which may be affected by the work.

The cost of verifying the locations of said utility facilities indicated on the plans, including exposing them prior to construction, shall be considered as being included in the various bid items of work and no separate payment will be made therefore.

b. **Relocation**: Whenever it is shown on the plans or Special Provisions that water, sewer, gas or other facilities or structures are to be relocated, such work shall be done by the contractor in cooperation with the owners of such utilities; provided that the owner may direct that the relocation be done by the owner's forces. In such a case, the contractor shall cooperate fully in completing the relocation. Unless otherwise specified, the cost for relocation of the utilities shall be included in the various bid items of work, and no additional payment shall be made therefore.

Should the contractor desire to have any relocation made of any utility facility, or other improvement, for his convenience in order to facilitate his construction operations, which relocation is in addition to or different from the relocations indicated on the plans or in the Special Provisions, he shall make whatever arrangements are necessary with the owners of such utility for such relocation and bear all expenses in connection therewith.

c. **Care of Existing Structures and Utilities**: The contractor shall be liable for all damage done to any structure or utility arising through his negligence and carelessness. He shall take care of and maintain all sewers, drains and culverts encountered in the performance of said work, together with the house services. The contractor shall take care of all pipes for water, sewer, steam or gas and all wire conduits as well as the underground structures crossing said work, whether shown on the plans or not.

The contractor shall repair in accordance with the requirements of the owner of the utility or structure, all damage done to any structure or utility through his acts or neglect and shall keep them in repair during the life of his contract. He shall, in all cases, leave them in as good condition as they were previous to the commencement of the work.

Care shall be taken not to move, without the consent of the Engineer, any sewers, drains, culverts, water, gas or other pipes, poles or other structures; and in crossing or running parallel with such structures, they shall be securely hung, braced and supported in place until the work is completed.

The full cost of protection, repair, or replacement of utilities shall be included in the various bid items or work and no additional compensation will be paid therefore.

d. **Utility Facilities Not Shown on the Plans; Mains and Trunklines:** The contractor will be compensated for the cost of locating, repairing damage not due to his failure to exercise reasonable care, and for removing or relocating main or trunkline utility facilities not indicated in the plans and specifications with reasonable accuracy. Said compensation will be paid for as "extra work," in accordance with Section 4.03 and 9.04 of these Specifications. Compensation shall include the cost of equipment on the project necessarily idled during such work.

In lieu of relocating an underground utility not shown on the plans, as indicated above, the Engineer may direct that the proposed underground facility be shifted in location or elevation. In such a case, the additional work resulting therefrom shall be classed as extra work and the increase in compensation will be paid for as specified above, except for shifts in depth or alignment less than one (1) foot, in which case no additional compensation will be paid.

e. **Limitation of Liability; City:** Except for the assumption of liability as may be required by statute and such liabilities assumed in accordance with Section 5.13 (d) of these Specifications, the City assumes no responsibility or liability in respect to the sufficiency or accuracy of the information or investigation of the location of structures or utility facilities made by it, or in respect to the actual or apparent location of all known structures or utility facilities as indicated on the plans, or in respect to unlooked for developments which may occur as to the location of such structures or utility facilities which may be encountered at places different from that indicated.

5.14 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK

All work which is defective in its construction or deficient in any of the requirements of these specifications shall be remedied, or removed and replaced by the contractor in an acceptable manner, and no compensation will be allowed for correction.

Upon failure on the part of the contractor to comply forthwith with any order of the Engineer made under the provisions of this article, the Engineer shall have authority to cause defective work to be remedied, or removed and replaced, and unauthorized work to be removed, and to deduct the costs thereof from any monies due or to become due the contractor.

SECTION 6 - CONTROL OF MATERIALS

6.01 SUBMISSION OF DATA WHERE "OR CITY APPROVED EQUAL" IS SPECIFIED

Wherever an article or any class of materials is specified by the trade name or by the name of any particular patentee, manufacturer, or dealer, or by reference to the catalog of any such manufacturer or dealer, it shall be taken as intending to mean and specify the article of material described or any other equal thereto in quality, finish, and durability and equally as serviceable for the purpose for which it is, or they are, intended. The intent of the plans and specifications is to specify high grade standard equipment, and it is not the intent of these plans and specifications to exclude or omit the products of any responsible manufacturer if such products are equal in every respect to those mentioned herein.

Whenever the material or article to be furnished is described in these specifications by trade name, brand name, or other reference is made to specific manufacturers or supplies, "or City approved equal," the person to whom the contract is awarded shall have thirty (30) days after the award of the contract to submit to the Engineer data substantiating a request for the substitution of a "City approved equal" item. The Engineer together with the Public Works Department of the City will make a decision as to whether the product proposed to be furnished is of equal quality and performance and equally suited for the City's purposes.

6.02 SAMPLES AND TESTS

At the option of the Engineer, the source of supply of each of the materials shall be approved by the Engineer before delivery is started and before such material is used in the work. Representative preliminary samples of the character and quality prescribed shall be submitted by the contractor or producer of all materials to be used in the work, for testing or examination as desired by the Engineer.

The cost of testing shall be borne by the City for work performed under contract by the City. The cost for repeat testing shall be borne by the contractor. All other tests required for work in City streets and not under contract with the City shall be borne by the contractor or developer.

All tests shall be made under the direction of the Engineer by a certified testing laboratory, whether the cost therefore is borne by the City or the contractor or developer, and all results shall be furnished to the Engineer when said results are available.

The contractor shall provide adequate notice to the Engineer when he desires the required testing.

Any test of materials furnished by the contractor shall be made in accordance with the commonly recognized standards of national organizations, and such special methods and tests as are prescribed in these specifications.

The contractor shall furnish such samples of materials as are requested by the Engineer without charge. No material shall be used until it has been approved by the Engineer. Samples will be secured and tested whenever necessary to determine the quality of materials by such laboratories as are authorized by the Engineer.

6.03 CERTIFICATES OF COMPLIANCE

A Certificate of Compliance stating that the materials to be used in the work comply in all respects with the requirements of the plans and specifications shall be supplied to the Engineer upon

request. The Certificate shall be signed by the manufacturer of the material or the manufacturer of assembled material delivered to the work, and the lot so certified must be clearly identified in the Certificate.

All materials used on the basis of a Certificate of Compliance may be tested and sampled at any time. The fact that the 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.

The City reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.

The form of the Certificate of Compliance and its disposition shall be as directed by the Engineer.

6.04 DEFECTIVE MATERIAL

All materials not conforming to the requirements of these specifications shall be considered as defective, and all such materials, whether in place or not, shall be rejected and shall be removed immediately from the site of the work unless otherwise permitted by the Engineer. No rejected material, the defects of which have subsequently been corrected, shall be used until approved by the Engineer.

Upon failure on the part of the contractor to comply with any order of the Engineer made under the provisions of this article, the Engineer shall have authority to remove and replace defective material and to deduct the cost of removal and replacement from any monies due or to become due the contractor.

6.05 GUARANTEE OF MATERIALS AND WORKMANSHIP

The contractor shall guarantee all materials, equipment and workmanship of the installation. Should any material or appliance or any work develop any defect or weakness due, in the opinion of the Engineer, to the use of imperfect materials, equipment or workmanship, or failure to follow the plans and specifications, the contractor shall be notified at once, and he shall immediately, at his own expense, make the necessary repairs or replacements to make the defective item or items suitable and satisfactory. Should the exigencies be such as to necessitate the repairs before the contractor could be notified, the City shall have the right to make the necessary repairs or replacements at the expense of the contractor, preserving as far as possible all available evidence of the cause of the failure.

This guarantee is not intended to include the damage by the actions of individuals other than the contractor's forces, or by damages due to the activities of other contractors working in the area, either during the time this work is under construction or after its acceptance. Attention is directed to Sections 7.11 and 7.15 of these Specifications.

6.06 SALVAGE OF MATERIALS

Where indicated on the plans, materials to be salvaged shall remain the property of the City and shall be delivered and deposited by the contractor at the location specified by the Engineer. No separate payment will be made for such salvaging and delivering of material, and the cost thereof shall be included in the various bid items of work.

6.07 PRE-JOB TESTS

In accordance with Section 2.04, the contractor shall conduct at his expense, prior to bidding any project, any tests he may deem necessary to satisfy himself as to any existing oil or underground conditions that may exist at the work site. Attention is directed to Sections 12.05 and 17.05 of these Specifications. Submission of a bid shall be deemed conclusive evidence that the contractor has conducted such tests.

SECTION 7 - LEGAL RELATIONS AND RESPONSIBILITIES

7.01 LAWS TO BE OBSERVED

The contractor shall keep himself fully informed of all existing State and National laws and all municipal ordinances and regulations of the City which in any manner affect those engaged or which in any way affect the conduct of the work, and of all such orders and decrees of bodies of tribunals having any jurisdiction or authority over the same.

7.02 ALIEN LABOR

The contractor shall forfeit as a penalty to the City, twenty-five ($25.00) dollars for each alien knowingly employed in the execution of the contract, by him or by any subcontractor under him, on any of the work herein mentioned, for each calendar day, or portion thereof, during which such alien is permitted or required to labor in violation of the provisions of the Labor Code and in particular, Sections 1850 to 1854 thereof, inclusive.

7.03 HOURS OF LABOR

Eight hours constitutes a legal days work. The contractor shall forfeit, as a penalty to the City, twenty-five ($25.00) dollars for each worker employed in the execution of the contract by the contractor or any subcontractor under him for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of the provisions of the Labor Code, and in particular, Sections 1810 and 1815 thereof, inclusive, except that work performed by employees of contractors in excess of eight (8) hours per day, and forty (40) hours during any one week, shall be permitted upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay, as provided in said Section 1815.

7.04 TRAVEL AND SUBSISTENCE

The contractor, and each subcontractor under him, shall pay travel and subsistence payments to each workman needed to execute the work, as such travel and subsistence payment are defined in the applicable collective bargaining agreements filed in accordance with Section 1773.8 of the Labor Code.

7.05 PREVAILING WAGE; PAYROLL

The contractor shall forfeit as penalty to the City twenty-five ($25.00) dollars for each calendar day or portion thereof for each worker paid less than the stipulated prevailing rates for any work done under the contract by him or by any subcontractor under him in violation of the provisions of the Labor Code, and the contractor shall comply in particular with the provisions of Section 1775 thereof.

The City will not recognize any claim for additional compensation because of the payment by the contractor of any wage rate in excess of the prevailing wage rate. The possibility of wage increases in one of the elements to be considered by the contractor in determining his bid will not, under any circumstances, be considered as the basis of a claim against the City.

In accordance with the provisions of Section 1770 of the California Labor Code, copies of the prevailing rate of per diem wages as determined by the Director of the Department of Industrial Relations are on file in the office of the City Engineer and will be made available to any interested party on request. The successful bidder shall post a copy of such determination at each job site.

If specified in the Special Provisions, or if requested by the Engineer, certified copies of payrolls shall be submitted within ten (10) calendar days following the close of the normal pay period or periods. If certified copies of the contractor's payrolls are requested by the Engineer or specified to be furnished in the Special Provisions, payment for furnishing said certified copies of payrolls shall be considered as included in the various contract items of work and no additional payment will be made therefore.

7.06 LABOR DISCRIMINATION

No discrimination shall be made in the employment of persons within public works because of race, color, or religion of such persons and every contractor for public works violating this section is subject to the penalties imposed for a violation of Chapter 1 of Part VII, Division 2 of the Labor Code, in accordance with the provisions of Section 1735 of said Code.

7.07 APPRENTICES

In accordance with the provisions of Section 1777.5 of the Labor Code, and in accordance with regulations of the California Apprenticeship Council, properly indentured apprentices shall be employed in the prosecution of the work. Information relative to number of apprentices, identification, wages, hours of employment and standards of working conditions shall be obtained from the Director of the Department of Industrial Relations of the State of California.

The contractor herein is hereby designated as the "prime contractor" and as such is responsible for the compliance with Section 1777.5 of the Labor Code relating to apprentices, craftsmen or tradesmen, and shall hold the City harmless in all respects from any failure to do so.

7.08 REGISTRATION OF CONTRACTORS

No contract will be awarded to a contractor who has not been licensed in accordance with the provisions in Chapter 791, Statutes of 1929, as amended.

7.09 PATENTS

The contractor shall assume all responsibilities and costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the work, and shall indemnify and hold harmless the Engineer, City, and their duly authorized representatives from all suits at law or actions or every nature for or on the account of the use of any patented materials, equipment, devices, or processes used on or incorporated in the work.

7.10 PERMITS AND LICENSES

The contractor shall procure all permits and licenses, pay all charges and fees, and give all notice necessary and incidental to the due and lawful prosecution of the work.

7.11 RESPONSIBILITY FOR DAMAGE

The City, the City Council, the County of Fresno, the United States of America or the Engineer shall not be answerable or accountable in any manner for any loss or damage that may happen to the work or any part thereof, or any material or equipment used in performing the work, or for injury or damage to any person or persons, either worker or public, or for damage to adjoining property from any cause whatsoever during the progress of the work or at any time before final acceptance.

The contractor shall indemnify and hold harmless the City, the City Council, the County of Fresno, the United States of America and the Engineer from any suits, claims or actions brought by any person or persons or on account of any injuries or damages sustained or arising in the construction of the work or in consequence thereof. The City Council may retain so much of the money due the contractor as shall be considered necessary, until disposition has been made of such suit or claims for damages as aforesaid.

The provisions of this section requiring indemnification of the County of Fresno and the United States of America shall apply only if Federal funding administered through the County of Fresno is funding any portion of the work to which these Standard Specifications apply.

7.12 PRESERVATION OF PROPERTY

Due care shall be exercised to avoid injury to existing highway improvements or facilities, utility facilities, adjacent property, and roadside trees and shrubbery that are not to be removed and pole lines, fences, signs, survey markers and monuments, building and structures, conduits, pipe lines under or above ground, sewer and water lines, all highway facilities, and any other improvements of facilities within or adjacent to the highway shall be protected from injury or damage, and if ordered by the Engineer, the contractor shall provide and install suitable safeguards, approved by the Engineer, to protect such objects from injury or damage. If such objects are injured or damaged by reason of the contractor's operations, they shall be replaced or restored to a condition as good as when the contractor entered upon the work, or as good as required by the specifications being performed under the contract. The Engineer may make or cause to be made such temporary repairs as are necessary to restore to service any damaged highway facility and utility facilities. The cost of such repairs shall be borne by the contractor and may be deducted from any monies due or to become due to the contractor under the contract.

7.13 CONTRACTOR'S LIABILITY

The contractor shall provide liability insurance in accordance with the provisions of the agreement pertaining to the specific project.

7.14 WORKER'S COMPENSATION INSURANCE

The contractor shall secure the payment of Worker's Compensation Insurance in compliance with the provision of the Labor Code of the State of California and during the performance of the work will continue so to comply with said provisions of said code. Contractor shall supply the City with certificates of insurance evidencing that Worker's Compensation Insurance is in effect and providing that the City will receive ten (10) days notice of cancellation. If the contractor self-insures Worker's Compensation, Certificate of Consent of Self-Insure shall be provided to the City.

7.15 CONTRACTOR'S RESPONSIBILITY FOR WORK

Except as provided in these Specifications, until the formal acceptance of the work by the City Council, the contractor shall have the charge and the care thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from execution or from the non-execution of the work. The contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof, except such injuries or damages occasioned by acts of the Federal Government or the public enemy.

The contractor shall check with the utility companies for the exact location of all existing underground installations. The lines as shown on the plans may not conform to the exact location in the field and the contractor shall protect all existing lines and shall replace or repair any damage at his expense and no additional compensation will be charge against the City.

Attention is directed to Sections 6.05 and 7.11 of these Standard Specifications.

7.16 NO PERSONAL LIABILITY

Neither the City Council, the Engineer, nor any other officer or authorized assistant or agent shall be personally responsible for any liability arising under the contract.

7.17 RESPONSIBILITY OF CITY

The City shall not be held responsible for the care or protection of any material or parts of the work prior to final acceptance except as expressly provided in these Specifications.

7.18 SAFETY PROVISIONS

The contractor shall conform to the rules and regulations pertaining to safety established by the California Division of Industrial Safety. All regulations included in the California Occupational Safety and Health Act of 1973 shall be complied with.

a. **Job Safety and Special Worker Protection from Toxic or Explosive Gases**: The contractor shall comply with the provisions of the Construction Safety Orders, Tunnel Safety Orders and General Safety Orders issued by the State Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations.

   In conformance with said Safety Orders, the contractor shall protect workers from toxic or explosive gases by providing whatever testing equipment and other special equipment that may be needed to detect the presence of and to remove such toxic or

explosive gases found to exist in any underground facilities involved in the work, whether these facilities are newly constructed or existing.

The above requirements of the State Division of Industrial Safety are minimum requirements. In addition, the contractor shall provide, for the life of the contract, similar protection for any person, including the Engineer or any of his authorized representatives, subcontractors, or any other person authorized or required to enter such underground facilities for inspection, repairs, or any other reason.

Full compensation for all costs involved in providing such job safety and special worker protection, except those pertaining to the hazards of caving ground in excavation, shall be included in the amounts bid for the various items of work, and no separate payment will be made therefore.

b. **Worker Protection at Excavations**: As required in Section 7.18 (b) of these Specifications, the contractor shall comply with the provisions of the Construction Safety Orders, Tunnel Safety Orders, and General Safety Orders issued by the State Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations, as they pertain to the protection of workers from the hazard of caving ground.

In addition, in compliance with the provisions of Section 6705 of the Labor Code of the State of California, the contractor shall obtain the approval and acceptance of the Engineer in advance of the excavation of any trench or trenches, jacking or receiving pits, or sump pump pits, five (5') feet or more in depth, of the detailed plans showing the design of shoring, bracing, sloping, or other provisions to be made by the contractor for worker protection from the hazard of caving ground during the excavation of such trenches or pits, and during any other period that workers may be exposed to such hazard. If such plan varies from the shoring system standards established by the Division of Industrial Safety, the plan shall be prepared by a Registered Civil or Structural Engineer.

The requirements as above set forth by the State Division of Industrial Safety for the provision of work protection from the hazard of caving ground are minimum requirements. In addition, the contractor shall provide, for the life of the contract, the same protection for any person, including the Engineer or any of his authorized representatives, subcontractors, or any other person required to be exposed to such hazard in the performance of the work, inspection of the work, or any other reason. The contractor's attention is also directed to Section 12.05 of these Specifications as it applies to excavation.

Payment for work protection from caving ground in excavations during construction shall be made at the lump sum price, and no additional compensation will be made therefore. Payment shall include all materials, labor and equipment necessary to adequately brace, shore, shield or slope all excavations and trenches required by the California Labor Code Section 6705. Also included are any costs incurred by the contractor in preparing a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during excavation of the trenches.

7.19 ASSIGNMENT OF CONTRACT

The contractor shall not assign this contract, or any part thereof, without the approval of the City, not without the consent of surety unless the surety has waived its rights to notice of assignment. All assignments of funds are subject to the prior lien for services rendered or materials supplied for the performance of the work called for in favor of all persons, forms or corporations rendering such services or supplying materials.

7.20 AMENDMENTS TO CONTRACTS

Each and every provisions of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and this contract shall be read and enforced as though it were included herein, and if through mere mistake, or otherwise, any such provision is not inserted, or is not correctly inserted, then upon the application of either party hereto, the contract shall forthwith be physically amended to make such insertion.

7.21 TERMINATION OR MODIFICATION OF CONTRACT, ENVIRONMENTAL REASONS

City may terminate, amend or modify the contract for environmental considerations. In the event of such termination, modifications or amendment, the notification to the contractor thereof will include a statement of the compensation payable, if any, by reason of such termination, modification or amendment. The provisions of Section 9.06 of these Specifications shall apply to the filing and determination of any claim or claims of contractor in connection with such termination, modification or amendment. In the event of termination, the thirty (30) day period therein referred to shall commence to run from the date of the notification of termination.

7.22 CITY'S RIGHT TO WITHHOLD PAYMENT

The City may withhold or nullify the whole or any part of any partial or final payment to such extent as may reasonably be necessary to protect the City from loss on account of:

a. Defective work not remedied, irrespective of when any such work be defective.

b. Claims or liens filed or reasonable evidence indicating probable filing of claims or liens.

c. Failure of the contractor to make payments properly for labor, material, equipment, or other facilities, or to subcontractors.

d. A reasonable doubt that the work can be completed for the balance unearned.

Whenever the City shall, in accordance herewith, withhold any monies otherwise due the contractor, written notice of the amount withheld and the reason therefore shall be given to the contractor and when the contractor shall remove the grounds for such withholding, the City shall promptly pay to the contractor the amount withheld.

7.23 PROPERTY RIGHTS OF MATERIALS

Nothing in the contract shall be construed as vesting in the contractor any right of property in the materials used after they have been attached or affixed to the work or the soil, or after payment has been made for ninety (90%) percent of the value of materials delivered to the site of the work, or stored subject to or under the control of the City. All such materials shall become the property of the City upon so being attached or affixed or upon payment of ninety (90%) percent of the value of the materials delivered to the site of the work or stored subject to or under the control of the City.

7.24 RIGHTS IN LAND AND IMPROVEMENTS

Nothing in these specifications shall be construed as allowing the contractor to make any arrangements with any person to permit occupancy or use of any land, structure, or building within the limits of the contract for any purpose whatsoever, either with or without compensation, in conflict with any agreement between the City, and Owner, former owner, or tenant or such land, structure or building.

The contractor shall not occupy property outside the right-of-way as shown on the plans or maps unless he enters into a rental agreement with the Owner. The agreement will be based on the fair rental values.

7.25 ACCEPTANCE OF CONTRACT

When the Engineer has made the final inspection and determines that the contract has been completed in all respects in accordance with the plans and specifications, the City Council, through the City Clerk, will issue a Notice of Completion of the contract, and immediately upon and after issuance of said Notice of Completion, unless otherwise provided in the Special Provisions, the contractor will be relieved of the duty of maintaining and protecting the work as a whole, will not be required to perform any further work thereon, and will be relieved of his responsibility for injury to persons or property or damage to the work which occurs after the formal acceptance by the City Council.

7.26 FINAL PAYMENT TO RELEASE THE CITY

The acceptance by the contractor of the final payment shall be and shall operate as a release to the City of all claims and all liability, to the contractor for all things done or performed for or relating to the work, and for every act and neglect of the City and others relating to or arising out of the work, excepting only his claims, if any, for amounts withheld by the City, upon final payment. No payment, however final or otherwise, shall operate to release the contractor nor his Sureties from any obligation upon or under this contract of the contractor's bond.

SECTION 8 - PROGRESS AND PROSECUTION

8.01 SUBCONTRACTORS

The contractor shall indicate on the proposal form if provision is made thereon, or as soon as practicable after the signature of the contract, notify the Engineer in writing of, the names of subcontractors proposed for the work and shall not employ any that the Engineer may, within a reasonable time object to, as incompetent or unfit. Any substitution of subcontractors shall be submitted in writing to the City Engineer for his review and approval.

The contractor agrees that he is fully responsible to the City for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

Nothing contained in the Contract Document shall create any contractual relation between any subcontractor and the City.

The purchase of concrete, liquid asphalt, paving asphalt, pipelines, valves, fire hydrants, casing, or any other materials produced at and supplied from established and recognized commercial plants together with delivery of such materials to the site of the work by means of vehicles owned or operated by such plants, or by recognized commercial hauling companies, shall not be considered as subcontracting under these specifications.

8.02 COMMENCEMENT OF THE WORK

Unless otherwise provided in the Special Provisions for a project, contractor shall commence work under the contract within fifteen (15) calendar days after issuance of the Notice to Proceed and shall diligently prosecute the same to completion within the time limit provided in the Special Provisions. Should the contractor begin work in advance of receiving the Notice to Proceed, as above provided, any work performed by him in advance of said date of approval shall be considered as having been done by him at his own risk and as a volunteer unless said contract is approved.

8.03 PROGRESS OF THE WORK

The contractor shall notify the Engineer forty-eight (48) hours prior to beginning any work and in accordance with Section 5.10 of these Standard Specifications the contractor shall submit for the Engineer's approval a schedule of operations at the time notification of commencement of work is given.

8.04 CLEAN-UP DURING CONSTRUCTION

Clean-up during construction shall include, but not be limited to, the removal of all excess soil and other materials or debris from the construction area, and sweeping and cleaning affected streets, and shall be accomplished as soon as practicable and as public necessity and convenience require, as determined by the Engineer.

Failure to comply with the time requirements set forth by the Engineer shall be sufficient cause for the Engineer to temporarily suspend any portion of the work, or all work, until deficiencies are corrected, in accordance with Section 8.07 of these Specifications.

Haul roads to and from excavation sites shall be cleaned and swept periodically during hauling operations. The Engineer may specify, whenever conditions warrant, the intervals at which cleaning and sweeping shall occur. Such prescribed intervals may vary between daily cleaning to weekly cleaning, as conditions may warrant.

No separate payment for clean-up during construction shall be made, and full compensation therefore shall be considered to be included in the various contract bid items of work.

8.05 FINAL CLEAN UP

The contractor shall clean up and dispose of all excess materials and other debris in any right-of-way or ground occupied by him, and shall restore utilities and improvements on public or private property which have been damaged by his operations except for such items as have been specifically excepted in these specifications. The paved or oiled roadway in the work area shall be swept clean of dirt and debris upon completion of the work.

Should the Engineer determine that the contractor or a developer's contractor is not diligently carrying out the required clean-up operations, the Engineer shall, in writing, notify the contractor or developer of the determination. The notification shall state the final date upon which the clean-up shall be completed and if the clean-up is not complete, the Engineer shall have the authority to order the work done by City forces and the cost thereof shall be deducted from any monies owed by contractor or shall be levied as a fine against the contractor.

Full compensation for final clean-up shall be included in the prices bid for the various items of work, and no separate payment will be made therefore unless otherwise specified in the Special Provisions.

8.06 CHARACTER OF WORKMEN

If any subcontractor or person employed by the contractor shall fail or refuse to carry out the directions of the Engineer or shall appear to the Engineer to be incompetent or to act in a disorderly or improper manner, he shall be discharged immediately on the requisition of the Engineer, and such person shall not again be employed on the work.

8.07 TEMPORARY SUSPENSION OF WORK

The Engineer shall have the authority to suspend the work wholly or in part, for such period as he may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as he may deem necessary, due to the failure on the part of the contractor to carry out orders given, or to perform any provisions of the work. The contractor shall immediately obey such order of the Engineer and shall not resume the work until the conditions are favorable and methods are corrected, as ordered or approved in writing by the Engineer.

Should the contractor continue working after receiving a written order from the Engineer to suspend such work, no payment will be made to the contractor for that portion of the work performed during such suspension.

Should the contractor temporarily suspend work for any reason for a period of twenty-four (24) hours or more, exclusive of Saturdays, Sundays or Holidays, he shall notify the Engineer twenty-four (24) hours in advance of reinstituting any construction activity.

8.08 TIME OF COMPLETION AND LIQUIDATED DAMAGES

It is agreed by the parties to the contract that in case all the work called for under the contract is not completed before or upon expiration of the limit as set forth in the Special Provisions, damage will be sustained by the City, and that it is and will be impracticable to determine the actual damage which the City will sustain in the event of and by reason of such delay; and it is therefore agreed that the contractor will pay to the City the sum of two-hundred and fifty ($250.00) dollars per day for each and every days delay beyond the time prescribed to complete the work; and the contractor agrees to pay such liquidated damages as herein provided, and in case the same are not paid, agrees that the City may deduct the amount thereof from any money due or that may become due the contractor under the contract. It is further agreed that in case the work called for under the contract is not finished and completed in all parts and requirements within the specified time, the City shall have the right to extend the time for completion or not, as may seem best to serve the interest of the City; and if the City decides to extend the time limit for the completion of the contract; the City shall further have the right to charge the contractor, his heirs, assigns or sureties, and to deduct from the final payment for the work, all or in any part, as the City may deem proper, of the actual cost of engineering, inspection, superintending, and any overhead expense which are directly chargeable

to the contract, and which accrue during the period of such extension, except that the cost of final surveys and preparation of final estimate shall not be included in such charges.

The contractor shall not be assessed with liquidated damages nor the cost of engineering and inspection during any delay in the completion of the work caused by an act of God or of the public enemy, acts of the City, fire, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather or delays of subcontractors due to such causes; provided, that the contractor shall, within ten (10) days from the beginning of such delay notify the Engineer in writing of the causes of the delay, and his finding of the facts thereon shall be final and conclusive.

8.09 USE OF COMPLETED PORTIONS

The City shall have the right to take possession of, use, or maintain and protect any completed portions of the work, however, taking possession, use, or maintenance and protection shall not be deemed an acceptance of any work not completed in accordance with the contract documents.

8.10 TERMINATION OF CONTRACT

If the contractor should be adjudged as bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he or any of his subcontractors should persistently violate any of the provisions of the contract, or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough skilled workmen or proper materials, or if he should fail to make prompt payment to the subcontractors or for materials or labor, or persistently disregard laws, ordinances or the instructions of the Engineer, then the City may, upon certificate of the Engineer when sufficient cause exists to justify such action, serve written notice upon the contractor and his surety of its intention to terminate the contract, and unless within five (5) days after the serving of such notice, such violations shall cease and terminate.

In the event of such termination, the City shall immediately serve written notice thereof upon the surety and the contractor, and the surety shall have the right to take over and perform the contract, provided, however, that if the surety within ten (10) days after the serving of the notice of termination does not give the City written notice of its intention to take over and perform the contract or does not commence performance thereof within the ten (10) days stated above from the date of serving of such notice, the City may take over the work and prosecute the same to completion by contract or by any other method it may deem advisable, for the account and at the expense of the contractor, and the contractor and the surety shall be liable to the City for any excess cost occasioned the City thereby, and in such event the City may, without liability for so doing, take possession of and utilize in completing the work such materials, appliances, plant and other property

belonging to the contractor as may be on the site of the work and necessary therefore, In such case the contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price shall exceed the expenses of finishing the work, including compensation for additional managerial and administration services, such excess shall be paid to the contractor. If such expense shall exceed such unpaid balance, the contractor shall pay the difference to the City. The expense incurred by the City, as herein provided, and damage incurred through the contractor's default, shall be certified by the Engineer.

SECTION 9 - MEASUREMENT AND PAYMENT

9.01 COST BREAKDOWN

Upon request of the Engineer, the contractor shall submit in a form acceptable to the Engineer, a schedule showing the subdivision of his contract into its various parts, stating quantities and prices for each item, to be made a basis for checking or computing monthly estimates, if such payments are specified. The prices shall include all costs of each item. No payment will be made to the contractor until such schedule has been submitted to and approved by the Engineer, if required by him.

9.02 CERTIFIED WEIGHTS

When payment is to be made on the basis of weight, the weighing shall be done on certified platform scales or, when approved by the Engineer, on a completely automated weighing and recording system and in accordance with Section 9 of the State of California Standard Specifications.

The contractor shall furnish the Engineer with duplicate licensed weighmaster's certificates showing the actual weights. The City will accept the certificates as evidence of the weights delivered.

9.03 FULL COMPENSATION INCLUDED IN BID AMOUNT

The lump sums and/or unit prices shown in the proposal shall include full compensation for all work and expenses appurtenant to the accomplishment of the project described in these specifications in the manner indicated herein including, but not limited to, all items delineated in these contract documents for which specific bid items are not set up in the Proposal.

9.04 EXTRA WORK

Extra work, when ordered and accepted, shall be paid for under a written work order in accordance with the terms therein provided. Payment for extra work will be made at the unit price or lump sum price previously agreed upon by the contractor and the Engineer and approved by the City.

When extra work is to be paid for on a force account basis, the contractor shall receive actual cost of all materials furnished by him as shown by his paid vouchers, plus fifteen (15%) percent, and

for all labor for the said extra work he shall receive the actual wages paid in the accomplishment of said work, the rates for which shall have been previously determined and agreed to in writing by the Engineer and by the contractor plus fifteen (15%) percent. The price paid for labor by the contractor shall include all payments imposed by State and Federal laws. The contractor will be paid for the use of equipment at the rental rates listed for such equipment in the Department of Transportation publication entitled "Labor Surcharge and Equipment Rental Rates: which is in effect on the date upon which work is accomplished regardless of ownership of such equipment and any rental or other agreement, if such may exist, for use of such equipment entered into by the contractor. Said publication is hereby made a part of these Standard Specifications. If it is deemed necessary by the Engineer to use equipment unlisted in the said publication, a suitable rental rate for such equipment will be established by the Engineer. The contractor may furnish any cost data which might assist the Engineer in the establishment of such rental rate. The rental rates paid as above provided shall include the cost of fuel, oil, lubrication supplies and small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals. To the equipment rental rate thus established shall be added the amount of fifteen (15%) percent.

The contractor shall maintain his records in such a manner as to provide a clear distinction between the direct costs of extra work paid for on a force account basis and the costs of other operations.

The contractor shall furnish the Engineer report sheets in duplicate of each day's extra work paid for on a force account basis no later than the working day following the performance of said work. The daily report sheets shall itemize the materials used, and shall cover the direct cost of labor and the charges for equipment rental, whether furnished by the contractor, subcontractor, or other forces. The daily report sheet shall provide names or identifications and classifications of workmen, the hourly rate of pay and hours worked, and also the size, type and identification number of equipment and hours operated.

Material charges shall be substantiated by valid copies of vendor's invoices. Such invoices shall be submitted with the daily report sheets, if available. Said daily report sheets shall be signed by the contractor or his authorized agent.

The Engineer will compare his records with the daily report sheets furnished by the contractor, make any necessary adjustment, and compile the costs of work to be paid for on a force account basis. The Compilation, when agreed upon and signed by both parties, shall become the basis of payment for the work performed.

Payment as provided above shall constitute full compensation for the contractor for performance of work paid for on a force account basis, and no additional compensation will be allowed therefor.

9.05 NOTICE OF POTENTIAL CLAIM

The contractor shall not be entitled to the payment of any additional compensation for any act or failure to act by the Engineer including failure or refusal to issue a change or order, or for the happening of any event, thing, occurrence, or other cause unless he shall have given the Engineer due written notice of potential claim as hereinafter specified.

The written notice of potential claim shall set forth the reasons for which the contractor believes additional compensation will or may be due, the nature of costs involved, and, in so far as possible, the amount of the potential claim. The said notice as above required must have been given to the Engineer prior to the time that the contractor shall have performed the work giving rise to the potential claim for additional compensation.

It is the intention of this Section 9.05, that differences between the parties arising under and by virtue of the contract, be brought to the attention of the Engineer at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken. The contractor hereby agrees that he shall have no right to additional compensation for claim that may be based on any such act, failure to act, event, thing, or occurrence, for which no written notice of potential claim as herein required was filed.

9.06 PROGRESS PAYMENTS

The contractor shall, once each month, cause an estimate in writing to be made of the total amount of the work done and acceptable material furnished and delivered by the contractor on the ground and not used, or acceptable materials furnished and stored for use on the contract, if such storage is within the limits of the project, and is subject to or under the control of the City at the time of such estimate, and the value thereof. Such estimate shall be submitted to the Engineer for his review 10 days in advance of the date of the City Council meeting at which payment will be authorized. The Engineer shall have the authority to adjust the items as submitted on the estimate in accordance with his judgement of the amount of work performed or materials on hand.

The City shall retain ten (10%) percent of the value of the materials so estimated to have been furnished and delivered and unused or furnished and stored as afore-mentioned as part security for the fulfillment of the contract by the contractor. The City shall also retain ten (10%) percent of the value of all work done from each monthly payment. In accordance with the provisions of California Government Code Section 4590, substitution of securities may be made for any monies withheld by the City to insure performance under this contract. At the request and expense of the contractor, securities equivalent to the amount withheld pursuant to this Section 9.06 shall be deposited with the City or with a State or Federally chartered bank as the escrow agent, who shall pay such monies to the contractor upon satisfactory completion of the contract and the expiration of the specified time following recordation of the Notice of Completion as set forth in these Standard

Specifications or the Special Provisions during which said amounts are subject to lien by labor and materials suppliers. Securities eligible for investment under this Section shall include those listed in California Government Code Section 16430, or bank or savings and loan certificates of deposit. The contractor shall be the beneficial owner of any securities substituted for monies withheld and shall receive the interest thereon.

The City shall pay monthly to the contractor while carrying on the work the balance not retained, as aforesaid, after deducting therefrom all previous payments and all sums to be kept or retained under the provisions of the contract. No such estimate or payment shall be required to be made when, in the judgement of the Engineer, the work is not proceeding in accordance with the provisions of the contract, or when, in his judgement, the total value of the work done since the last estimate amounts to less than three hundred ($300.00) dollars.

No such estimate or payment shall be considered to be an acceptance of any defective work or improper materials.

The contractor shall request such payment on a form approved by the Engineer which shall be properly completed and executed.

The estimated value of the work shall in no case exceed the price for the contract item of work in which the material is to be incorporated.

9.07 FINAL PAYMENT

The Engineer shall, after the completion of the contract, make a final estimate of the amount of work done thereunder, and the value of such work, and the City shall pay the entire sum so found to be due after deducting therefrom ten (10%) percent of the final estimate to be retained following final acceptance of the work. The final retained payment shall not be due and payable until the expiration of thirty-five (35) days from the date of recordation of the notice of completion.

It is mutually agreed between the parties to the contract that no certificate given or payments made under the contract, except the final certificate or final payment, shall be conclusive evidence of the performance of the contract, either wholly or in part, and no payment shall be construed to be an acceptance of any defective work or improper materials.

And the contractor further agrees that the payment of the final amount due under the contract, and the adjustment and payment for any work done in accordance with any alterations of the same, shall release the City, the City Council, and the Engineer from any and all claims or liability on account of work performed under the contract or any alteration therefore.

SECTION 10 - PORTLAND CEMENT CONCRETE; CEMENT MORTAR

10.01 DESCRIPTION

Portland Cement Concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate and water, portioned and mixed as herein specified.

Class A - Concrete shall contain 564 pounds (6 sacks) of Portland Cement per cubic yard.
Class B - Concrete shall contain 470 pounds (5 sacks) of Portland Cement per cubic yard.
Class C - Concrete shall contain 376 pounds (4 sacks) of Portland Cement per cubic yard.

The class and minimum compressive strength of concrete shall be as required in these Specifications for the items of work requiring Portland Cement Concrete.

10.02 MATERIALS

The materials for manufacturing Portland Cement Concrete shall conform to the following requirements:

Portland Cement, including Portland Cement used in precast products, shall be Type II cement conforming to the Specifications of ASTM Designation: C150, unless otherwise specified.

The Contractor shall make arrangements with the manufacturer of ready mixed concrete, or precast products to provide adequate facilities to assure that cement meeting the requirements specified herein will be kept separate from other cement in order to prevent any but specified cement from entering the work.

All cement not conforming to the specifications and all cement contaminated shall be removed immediately and not used in the work.

Water for washing aggregates and for mixing with concrete shall be free from oil or other impurities in sufficient amount to cause a significant change in the true setting, reduction in the compressive strength, discoloration of the concrete, or etching of the surface.

Coarse aggregate shall consist of gravel, crushed gravel, crushed rock, or combination thereof. It shall be free from deleterious coatings, roots, barks, sticks, rags and other extraneous materials.

Regardless of source, all coarse aggregate shall be thoroughly and uniformly washed before delivery to the work.

Coarse aggregate, when sampled at the batching bin, shall have a cleanness value of not less than 75 when subjected to the cleanness test performed in accordance with Test Method No. California 227.

Coarse aggregates shall be furnished in the following sizes determined in accordance with ASTM Designation: C136, as follows:

Size of Aggregate

Sieve Size	1-1/2" to #4	1" to #4	3/4" to #4
		% Passing Sieves	
2"	100		
1 - 1/2"	90 - 100	100	
1"	20 - 55	90 - 100	100
3/4"	0 - 15	60 - 95	90 - 100
3/8"	10 - 30	15 - 40	20 - 55
#4	0 - 5	0 - 10	0 - 10

The maximum size of coarse aggregate shall be as required in these Specifications for the items of work requiring Portland Cement Concrete.

Coarse aggregate, when tested for soundness by the sodium sulphate test, ASTM Designation: C88, shall lose not more than ten (10%) percent by weight after five (5) cycles.

Fine aggregate shall be natural sand, or a combination of natural and manufactured sand. The aggregate shall be of such character that makes possible the production of a workable concrete within the limits of water content provided in Section 10.05. It shall be free from deleterious coatings, roots, barks, sticks, rags, and other extraneous material.

When testing in accordance with the test method of ASTM Designation: C40, fine aggregate shall not indicate a color darker than the reference standard color solution unless it is determined by the Engineer that a darker color is acceptable.

The fine aggregate shall contain not more than three (3%) percent by weight of materials passing the two hundred (200) mesh screen when tested in accordance with the test method of ASTM Designation: C136.

Fine aggregate shall be well graded and shall range in size uniformly within the following limits when tested in accordance with ASTM Test Method Designation: C136.

Sieve Size	Percentage Passing Sieves
3/8"	100
#4	90 - 100
8	65 - 90
16	45 - 75
30	20 - 45
50	10 - 20
100	0 - 8

10.03 READY MIXED CONCRETE

Ready mixed concrete shall be delivered to the job site of the work and discharge shall be completed within one and one-half (1½) hours after the addition of the cement to the aggregates or before the drum has been revolved two hundred and fifty (250) revolutions, whichever comes first. In hot weather or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall be less than one and one-half (1½) hours, as directed by the Engineer, except that concrete shall not be discharged once the temperature of the concrete has reached eighty-five (85^{o}) degrees Fahrenheit.

Should water be added at the job site, the drum shall be revolved a minimum of twenty-five (25) revolutions after the introduction of such water.

The maximum size of coarse aggregate shall be as required in these Specifications for the items of work requiring Portland Cement Concrete.

10.04 ADMIXTURES

No admixture shall be used without written permission from the Engineer or unless elsewhere provided for in these Specifications or in the Special Provisions.

a. **Calcium Chloride**: When the use of calcium chloride is permitted or is specified in the Special Provisions, the calcium chloride shall conform to the specifications of ASTM Designation: D98.

b. **Air-Entraining Agent**: When the use of an air-entraining agent is permitted, or is specified in the Special Provisions, it shall be added at the rate designated by the Engineer to result in an air content of from three (3%) to six (6%) percent by volume in the freshly mixed concrete.

10.05 AMOUNT OF WATER AND SLUMP TEST

The amount of water required for the proper consistency of concrete shall be determined by means of the Slump Test made in accordance with the Standard Method of Slump Test for Consistency of Portland Cement Concrete of the AASHO Serial Designation T-119-42 with subsequent amendments.

The amount of slump shall be twelve (12") inches minus the height after subsidence.

The allowance for slump shall be as follows:

Cast-in-place pipe and concrete paving	- not more than 3 inches.
All concrete structures	- not more than 3 inches.
Concrete curbs, gutters and sidewalks	- not more than 5 inches.

The amount of water used shall not exceed six and one-half (6½) gallons including moisture in the aggregate, per sack of cement for Class A concrete, and seven (7) gallons per sack of cement for Class B concrete.

10.06 PROTECTING CONCRETE

Concrete for structures shall not be placed on frozen ground nor shall it be mixed or placed while the atmospheric temperature is below thirty-five (35^{o}) degrees Fahrenheit, unless adequate means are employed to heat the aggregates and water, and satisfactory provisions have been made for protecting the work. Provisions satisfactory to the Engineer shall be taken to protect concrete about to be poured when there is danger of temperature dropping below thirty-five (35^{o}) degrees Fahrenheit within the next twenty-four (24) hours. Concrete damaged by frost action shall be replaced by the contractor at his expense. Concrete shall not be placed when the atmospheric temperature in the shade in the vicinity of the work exceeds ninety-five (95^{o}) degrees Fahrenheit, or when the temperature of the concrete exceeds eight-five (85^{o}) degrees Fahrenheit.

All surfaces against which concrete is to be placed shall be free from standing water, mud, debris, and shall be firm enough to prevent contamination of the concrete by earth or other foreign material.

Absorptive surfaces against which concrete is to be placed shall be moistened thoroughly so that moisture will not be drawn from the freshly placed concrete.

10.07 FORMS

Forms shall be smooth, mortar right, true to the required lines and grades, and of sufficient strength to resist springing out of shape during the placing of the concrete. All dirt, chips, sawdust, nails, and other foreign matter shall be completely removed from the forms before any concrete is deposited therein. Forms previously used shall be thoroughly cleaned of all dirt, mortar, and foreign matter before being reused. Before concrete is placed in forms, all surfaces against which the concrete will be placed shall be thoroughly coated with form oil.

Prior to placing concrete, the contractor shall have all forms checked by the Engineer for alignment and grade. Forms, reinforcing steel, or earth surfaces to receive concrete shall be wet prior to concrete placement.

10.08 CURING CONCRETE

Immediately after finishing, the exposed exterior surfaces of the concrete shall be cured by either the water method, pigmented curing compound method, or the waterproof membrane method, in accordance with Section 90-7, "Curing Concrete" of the State of California Standard Specifications, except that for cast-in-place concrete pipe only the waterproof membrane method shall be used as provided in Section 17.05(h) of these Specifications.

10.09 VIBRATOR

Whenever a structure requiring reinforcement is to be constructed, the contractor shall provide one or more portable vibrating machines to be used on such structures as directed by the Engineer. Full compensation for providing vibrating machines shall be considered as being included in the various bid items of work and no additional payment will be made therefore.

10.10 CEMENT MORTAR

Cement mortar shall be composed of one part Portland Cement and two parts of clean, well-graded sand of such a size that it will pass a No. 8 sieve. An admixture of hydrated lime, fire clay or diatomaceous earth may be used in the mortar to facilitate workability, and the amount of such material used will be limited as ordered by the Engineer. Quick setting cement may be used when necessary to facilitate the early backfilling of trench.

No mortar shall be used in which water has been added to the dry ingredients for a period of over thirty (30) minutes.

The consistency of mortar shall be such as to adhere to the ends of the pipe while being laid and be easily squeezed out of the joint when the pipe sections are squeezed together. Jointing and banding mortar shall be of such consistency that it will readily adhere to the pipe and/or structure.

10.11 CEMENT REQUIREMENTS

Concrete compressive strength requirements shall be the minimum strength at the age of twenty-eight (28) days as required in these Specifications for the items of work requiring Portland Cement Concrete. The compressive strength of concrete will be determined from test cylinders which have been fabricated from concrete sampled and made in accordance with these Specifications and with ASTM Designation: C31. Cylinders shall be tested in accordance with ASTM Designation: C39. Should the concrete used in the work fail to meet the minimum strength requirements as specified for the items of work, the Contractor shall, at his expense, make corrective changes in the material mix proportions or in the concrete fabrication procedures, before placing additional concrete.

In addition to the aforementioned requirements, all such concrete represented by test cylinders which indicate a strength of less than the specified strength for the item of work will be rejected in accordance with the provisions of Sections 6.04, "Defective Materials." Such rejection shall prevail unless the Contractor, at his expense, obtains and submits evidence of a type acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable, or undertakes remedial action to correct the deficiency in a manner acceptable to the Engineer.

10.12 MEASUREMENT AND PAYMENT

Portland Cement Concrete will be measured and paid for in accordance with the provisions specified in the various sections of these Standard Specifications or the Special Provisions covering construction requiring concrete. Full compensation for cement mortar shall be considered as included in the bid items of work requiring the use therefore.

SECTION 11 - CLEARING AND GRUBBING

11.01 DESCRIPTION

This work shall consist of removing all objectionable material from within the street or alley right-of-way, along the site of pipeline construction or fence construction, and such other areas as may be designated on the plans or Special Provisions to be cleared and grubbed. Clearing and grubbing operations shall be performed in advance of construction operations and in accordance with these Standard Specifications and with the appropriate sections of the State of California Standard Specifications.

11.02 PROTECTION OF EXISTING IMPROVEMENTS

The contractor's attention is directed to Section 7.12, "Preservation of Property" of these Standard Specifications. Only those items or areas designated or marked shall be removed or cleared.

11.03 CONSTRUCTION

Clearing and grubbing shall conform to the provisions in Section 16 of the State of California Standard Specifications and these provisions.

Unless otherwise specified, the entire area within the project limits shall be cleared and grubbed. No payment will be made to the contractor for clearing and grubbing outside these limits, unless such work is authorized by the Engineer.

All of the work shown on the plans and included in these Standard Specifications and the Special Provisions that is located in the public streets in the City of Reedley shall be done in accordance with City Ordinances regulating the use of public streets within the City, except as otherwise provided herein. (See Title 10, Chapter 8, City Code of the City of Reedley, California.)

The contractor shall inform himself as to all regulations and requirements of the City of Reedley and shall conduct his operations in compliance therewith.

The contractor shall remove and dispose of all pavement, vegetation growth, such as brush, trees, stumps, roots, grass, and all rubbish, debris, or structures from the work site or other areas designated to be cleared and grubbed. No such material will be allowed in or under backfill material or embankments. Trees and other vegetation not to be removed shall be protected from damage in accordance with Section 7.12 of these Specifications.

Within the limits of clearing, all stumps, large roots, buried logs, and all other organic material shall be removed three (3) feet below the existing ground surface or six (6) feet below finished grade, whichever is deeper.

Concrete removal shall conform to the provisions in Section 15 of the State of California Standard Specifications and these provisions. Where a portion of an existing concrete facility is to be removed, it shall be cut to a minimum depth of one and one-half (1 1/2") inches with an abrasive type saw at the first scoring line at, or outside, the planed joint and removed without damage to any portion that is to remain in place. If curbs and gutters cannot be cut off square and neat, the entire curb and gutter shall be removed to the nearest weakened plane or expansion joint. No patching at expansion joints will be permitted.

All concrete (Portland or Asphalt) and oil dirt within the right-of-way shall be removed by the contractor unless designated to remain on the plans. Existing drain wells, drainage structure, irrigation lines, structures and headwalls to be abandoned shall be removed to at least two (2') feet below the surface and backfilled. Manholes to be abandoned shall be abandoned as specified in Sections 19.02(e) of these Standard Specifications.

Where existing house foundations and floor slabs overlap into the project area, the whole foundation will be removed. The portion beyond and outside the project area will be considered within the project area and included in the bid price of removing concrete.

Tree branches extending over the roadway which interfere with the work shall be trimmed by the City at the request of the contractor upon 48 hours prior notice to the time such removal is required.

11.04 REMOVAL AND DISPOSAL OF MATERIALS

Disposal of removed material shall be done in accordance with State of California Standard Specifications, Section 7-1.13 and the Special Provisions.

Compensation for all costs involved in disposing of materials as specified including all costs of hauling shall be included in the payment for clearing and grubbing as stated herein or in the Special Provisions and no additional payment will be made therefore.

11.05 PAYMENT

Where a contract item is provided, clearing and grubbing will be paid for on a lump-sum basis. Where no contract item is provided, the cost for clearing and grubbing shall be included in

the various bid items requiring clearing and grubbing or as set forth in the Special Provisions and no additional payment will be made therefore.

The lump-sum price paid, or the price paid when included with other items, for clearing and grubbing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in clearing and grubbing as shown on the plans, as specified in these Specifications, or the Special Provisions, and as directed by the Engineer, including the removal and disposal of all the resulting materials.

SECTION 12 - EARTHWORK

12.01 DESCRIPTION

This work shall consist of performing all excavation and/or placing compacted fill to prepare the roadway prism and area adjacent thereto for the placement of improvements as shown on the plans. The work shall also include any excavation and backfilling required to install structures, sewer pipelines, storm drain pipelines, water lines, and other underground conduits, and their appurtenances at the locations and to the lines and grades as shown on the plans, as shown on the Standard Plans, and as specified in these Standard Specifications, the Special Provisions, and in conformance with Section 19 of the State of California Standard Specifications and as directed by the Engineer.

12.02 PRESERVATION OF PROPERTY

The contractor's attention is directed to Section 7.12 regarding preservation of existing improvements and utilities.

Prior to starting excavation and subgrade preparation, the contractor shall lower all existing manholes and water valve casings and lids to a depth of six (6") inches below the finish elevation of the subgrade.

All frames and lids for manholes and water valves shall be inspected by the Engineer and judged as to their suitability for reuse on the job. If they are found unsuitable, they shall be salvaged in accordance with Section 6.06 of these Standard Specifications. New lids and frames will be supplied by the City. No additional payment will be made to the contractor for salvaging the unsuitable frames and lids and utilizing those supplied by the City.

The existing frame and lid for manholes, if in acceptable condition, may be temporarily mortared to the existing manhole cone or the contractor shall supply a temporary metal lid to cover the opening of the manhole and store the existing manhole frame and lid for use later to raise the manhole to grade.

Water valve casings shall be lowered to six (6") inches below the finish elevation for the subgrade and covered, if in acceptable condition, with the existing valve cover or covered with some other means acceptable to the Engineer.

Prior to covering up any manholes or water valves that have been lowered, the contractor shall reference their locations so as to facilitate the raise of the manholes or water valves to grade at a later date.

The contractor shall return after the final street paving has been placed and raise to grade in accordance with Sections 13, 14, 19, and 20 of these Standard Specifications all manholes and water valves lowered as a result of roadway excavation.

Payment for lowering, protecting and returning to raise to grade manholes and water valves shall be made on the unit price bid per each and shall include full compensation for furnishing all labor, materials, tools, equipments, and incidentals, and doing all work involved in lowering, protecting, covering, and returning to raise to grade all manhole and water valves as shown on the plans, on the Standard Plans, and as specified in these Standard Specifications, the Special Provisions, and as directed by the Engineer.

12.03 DISPOSAL OF UNSUITABLE AND EXCESS MATERIAL

All excess and unsuitable material shall be removed and disposed of in accordance with Section 7-1.13 of the State of California Standard Specifications.

12.04 ROADWAY EXCAVATION

a. **Description**: Roadway excavation shall consist of all excavation involved in the grading and construction of roadway improvements, including paving, concrete curbs and gutters, sidewalks, alley approaches, driveway approaches, and valley gutters. All work shall conform to Section 19-2 of the State of California Standard Specifications and these provisions.

b. **Compaction**: Relative compaction within the public right-of-way shall be determined by Test Method California No. 216.

Compactive effort shall be applied to all areas where pavement or concrete improvements are to be placed or constructed. The relative compaction under paving areas and under curb and gutter shall be ninety (90%) percent and under sidewalks shall be eighty-five (85%) percent to a depth of six (6") inches below the finish grade of the subgrade in excavation. The relative compaction of all embankment material shall be ninety (90%) percent.

The cost of compaction under paving areas shall be included in the cost of roadway excavation.

The cost of compaction under concrete improvements shall be included in the various bid items for concrete improvements.

No compaction tests of subgrade shall be made until such time as the subgrade is finished to within one-tenth of one foot (0.1') of finished subgrade and the Engineer has been notified of the time that such compaction tests will be made. The Engineer shall specify the locations where compaction tests are to be made.

Compaction testing shall be provided in accordance with Section 6.02 of the Standard Specifications.

c. **Imported Borrow**: All imported borrow shall have a minimum "R" value of 50 unless the Plans or Special Provisions indicate otherwise. Testing to determine the "R" value of the imported borrow shall be made in accordance with Test Method California No. 301 of the State of California Standard Specifications and shall be at the expense of the Contractor.

d. **Subgrade**: The preparation of subgrade for all paved areas shall conform to the provisions of Section 19 of the State of California Standard Specifications and these provisions. Relative compaction of the subgrade shall be 90% as previously specified.

The subgrade shall be accurately graded and compacted to proper profile and cross section and at elevations which will result in the proper final grades when the specified thicknesses of aggregate subbase, base, and/or paving have been applied. The finished subgrade shall not vary from the planned grade by more than 0.05 foot at any point. The contractor shall not place any aggregate subbase or base material or asphalt paving until the subgrade is in a condition satisfactory to the Engineer.

e. **Miscellaneous Highway Facilities**: The removing, reconstructing, adjusting, remodeling, and salvaging of the various highway facilities shall conform to the provisions in Section 15 of the State Standard Specifications and these provisions.

All miscellaneous highway facilities within the highway right-of-way noted on the plans to be removed, shall be removed and disposed of by the contractor.

f. **Payment**: Quantities of roadway excavation shall be paid at the contract unit price per cubic yard and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals required to excavate, grade, and compact the subgrade and to remove, replace, adjust, remodel, and salvage any existing highway improvements designated in the Special Provisions in order to perform the required work on the subgrade and no additional payment will be made therefore.

12.05 TRENCH AND STRUCTURE EXCAVATION

a. **Description**: Trench and structure excavation shall consist of performing all excavation required to properly install or construct the various types of pipelines, conduits, and their appurtenant structures. All excavations shall be made in accordance with the Trench Construction Safety Orders issued by the Division of Industrial Safety of the Department of Industrial Relations of the State of California and these Standard Specifications.

b. **Permits**: The contractor shall obtain permits from the State Division of Industrial Safety or any other permit that may be required by the work or as required by law, prior to commencing any excavation within the street, with no additional compensation therefore.

c. **Trench and Structure Excavation**: Excavations shall be made to the depths and widths required to accommodate construction of pipelines and structures to specified dimensions, and to the lines and grades indicated on the plans and, in the case of sewer and water house branches, in accordance with the Standard Plans. Storm drain laterals, (pipelines that connect the storm drain inlet to the main storm drain) shall be installed at the depth and grade specified by the Engineer after exposing of existing intersecting utilities by the contractor.

The location of subsurface utilities or other obstructions may necessitate a change in location or depth of the main pipeline, house service or lateral, which depth or surface location shall be determined in the field by the Engineer. Changes in main line pipe alignment either horizontally or vertically shall be paid as specified in Section 5.13(d) of these Standard Specifications.

The contractor, however, shall allow in his bid price for the various house service or lateral pipe installation quantities full compensation for any increase or decrease in anticipated depth of trench because of the location of intersecting utilities, shown on the plans or not.

When a trench or structure site is to be located in an existing paved area, the existing paving to be removed shall be cut by methods approved by the Engineer along neat lines on each side of the trench or around the structure site. Existing paving at any location shall be removed from proposed trench areas or structure sites no sooner than forty-eight (48) hours prior to excavation at that location. No paving shall be removed on Friday unless excavation and follow-up work will occur the same day.

Existing paving, when removed, shall be kept separated from the material which is to be returned to the excavation. Failure to comply with this requirement shall be grounds for rejection of the material for use as backfill.

Structures and pipes shall be constructed or placed as soon as practicable after excavation, but in no case shall a trench be excavated more than sixteen (16) hours before pipe construction. No trench shall be excavated on Friday that is not to receive pipe on the same day.

Not more than 600 linear feet of trench shall be open ahead of any storm drain, sewer water pipeline, or any conduit in any street or alley, except that upon written permission of the City Engineer such trenches may be opened for a distance of not more than 1,200 linear feet where public traffic will not be seriously inconvenienced.

Trenches for pre-cast pipe shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe.

Trenches for cast-in-place pipe shall be graded and prepared to provide full, firm and uniform support by undisturbed earth or compacted fill throughout the bottom two hundred and twenty (220^{o}) degrees of the pipe periphery.

For pre-cast pipe trenches, if rock, hardpan or like materials are encountered, it shall be removed to a depth of six (6") inches below the grade of the bottom of the pipe. The space shall be backfilled with suitable material containing sufficient moisture to produce maximum compaction, and shall be free from lumps or other unsuitable material. The imported earth shall be compacted to the satisfaction of the Engineer, and finish graded to the original lines and grades as provided above for pre-cast and cast-in-place pipe. No additional payment will be made for such excavation or backfill.

In all trenches or structure sites where a firm foundation is not encountered, such as soft, spongy, or otherwise, unsuitable material, the material shall be removed to a minimum of twelve (12") inches, or to a depth determined by the Engineer, below the bottom of the pipe or structure, and the space backfilled with suitable material containing sufficient moisture to produce maximum compaction. The backfill material shall be free from lumps or other unsuitable material, and when compacted to the satisfaction of the Engineer shall be finish graded as provided above for pre-cast and cast-in-place pipe, or as required by the Engineer for structures. No additional payment will be made for such additional excavation or backfill.

All existing gas pipes, water pipes, conduits, sewers, drains, fire hydrants, and other structures which are not, in the opinion of the Engineer, required to be changed in location shall be carefully supported and protected from injury by the contractor, and in case of injury, shall be restored by him, without additional compensation, to as good a condition as that in which they were found and to the satisfaction of the

owner and the Engineer, in accordance with Section 7.12, of these Standard Specifications.

d. **Maintaining Drainage Within Trenches and Structures**: Reference is made to Section 4.10 of these Standard Specifications. The contractor shall keep trench and structure excavations as dry as practicable throughout the construction period, subject to the requirements of Section 10, "Portland Cement Concrete." Payment for cost or repair of trenches damaged because of failure to provide temporary drainage control shall be included in the various bid items of work and no additional compensation will be paid therefore.

e. **Disposal of Excess Materials**: The contractor shall acquire a suitable site for the disposal of excess material, including existing paving removed for trenching operations, in accordance with Section 7-1.13 of the State of California Standard Specifications.

Full compensation for acquiring the site and disposing of excess material shall be included in the prices paid for the various items of work requiring excavation.

f. **Payment**: Trench excavation and structure excavation will be paid for in accordance with the provisions specified in the various sections of these Standard Specifications covering construction requiring trench or structure excavation.

12.06 TRENCH AND STRUCTURE BACKFILL

a. **Description**: Trench and structure backfill shall consist of the proper backfilling of trenches and around structures after the placement or construction of the various types of pipelines, conduits and their appurtenant structures. All work shall be done in accordance with these Standard Specifications.

b. **Material for Trench and Structure Backfill**: Unless otherwise specified, shall be native material free from debris, lumps, hardpan chunks, paving material, organic matter or other deleterious or unsuitable substances. Backfill material shall be approved by the Engineer before being used in the work.

c. **Trench Backfill; Pre-Cast Pipe**: Backfill for trenches in which pre-cast pipe has been installed shall be placed in two phases, classified as Initial Backfill and Final Backfill.

Initial backfill for pipes up to and including fifteen (15") inches in inside diameter shall consist of placing and firmly compacting by hand tamping, in six (6") inch lifts,

select native material at optimum moisture under the haunches, on each side, and on the top of the pipe to an elevation of six (6") inches above the top of the pipe.

Initial backfill for pipes of inside diameter greater than fifteen (15") inches shall consist of placing and firmly compacting backfill material under the haunches of the pipe, as directed by the Engineer, so as to form a firm bedding for the pipe. The material shall be placed and compacted to a depth sufficient to prevent movement of the pipe during jointing operations or during final backfill and compaction operations.

Final backfill shall consist of placing backfill material into the remaining trench cavity following completion of initial backfill. Backfill material shall be returned to the trench in lifts not to exceed nine (9") inches in depth. Each lift shall be jetted to the bottom of the lift prior to placement of the next lift of backfill material. In no case shall backfill material be allowed to free-fall directly onto the pipe. Final backfill shall be accomplished as soon as practicable, except that for mortar joint concrete pipe final backfill shall not be placed until, in the opinion of the Engineer, the cement in the joints has acquired a suitable degree of hardness. In no case, however, shall final backfill follow initial backfill by more than twenty-four (24) hours, not initial excavation by more than forty-eight (48) hours.

At locations where traffic, safety, or other considerations warrant, the Engineer may order the immediate backfill of trenches, regardless if the pipe was installed or not. Where pipe was not installed, the trench shall not be re-excavated until provisions are made to prevent the conditions which caused the backfill to be ordered. No additional compensation will be paid for backfill and re-excavation.

d. **Trench Backfill; Cast-in-Place Concrete Pipe**: Backfill for trenches in which cast-in-place concrete pipe has been constructed shall consist of placing backfill material into the remaining trench cavity. Backfill shall be accomplished as soon as practicable and shall follow pipe construction by no more than two (2) working days, provided that in no case shall backfill material be placed over the pipe sooner than twenty-four (24) hours following construction of the pipe. Backfill material shall be returned to the trench in lifts not to exceed none (9') feet in depth. Each lift shall be jetted prior to placement of the next lift of backfill material. In no case shall backfill material be allowed to free-fall directly onto the pipe.

Compaction of backfill shall conform to the requirements of Sections 12.06(g) of these Standard Specifications.

e. **Structure Backfill**: Structure backfill shall consist of placing and compacting backfill material around structures to the lines designated on the plans or directed by the Engineer.

Compaction shall conform to the requirements of Section 12.06(g) of these Specifications.

f. **Backfilling; General**: Where as excavation or trench crosses a street or alley intersection, the excavation and backfilling shall be completed within twenty-four (24) hours, or bridging capable of supporting vehicular traffic shall be provided for access across said excavation or trench.

An excavation within a street or alley for the purpose of boring or jacking pits or for the installation of structures shall be properly barricaded and protected and may be left open for a period of seven days and then must be backfilled, unless an extension of time is approved by the Engineer in writing.

Within 24 hours after the trench has been backfilled, all street crossing shall be surfaced with temporary surfacing of two (2") inches of cold mix surfacing which shall be placed and maintained as specified in Section 15.03 of these Standard Specifications. Nothing herein shall be construed to mean that permanent surfacing cannot immediately be placed provided subgrade, subbase, and base compaction requirements are satisfied.

g. **Compaction**: Trench and structure backfill shall be placed and compacted in uniform layers and shall be brought up uniformly on all sides of the structure, facility, or pipe utilizing approved compaction equipment. The thickness of each layer of backfill shall not exceed 0.67 feet before compaction except that when compaction by ponding or jetting is permitted, said thickness shall not exceed four (4') feet. Compaction of trench and structure backfill may be accomplished by jetting only with prior approval of the Engineer. Such jetting, if approved, shall be supplemented by approved compaction equipment. Relative compaction of trench and structure backfill shall be determined by the laboratory standard of test procedure Test Method California No. 216. Trench or structure backfill shall have a relative compaction of not less than eighty-five (85%) percent to within twenty-four (24") inches of the surface, and the remaining top twenty-four (24") inches shall have a relative compaction of not less than ninety (90%) percent, except that base material shall have a minimum relative compaction of ninety-five (95%) percent.

The contractor shall contact the Department of Public Works concerning the use of water from the City's water system for any construction activities.

Compaction for trenches in which pre-cast pipe has been placed may proceed immediately following placement of final backfill.

Compaction for trenches in which cast-in-place pipe has been placed or excavation sites in which structures have been constructed shall proceed according to the following requirements. Jetting may proceed no sooner than forty-eight (48) hours after construction of the pipe or structure; follow-up compaction using equipment which imparts load on the pipe or structure shall not proceed for a minimum of seven (7) days following placement of the pipe or structure, unless this requirement is specifically waived by the Engineer, or is otherwise specified.

Compaction testing shall be provided as specified in Section 6.02 of these Standard Specifications.

h. **Measurement and Payment**: Trench and Structure backfill and compaction will be paid for in accordance with the provisions specified in the various sections of these Specifications covering construction requiring trench or structure backfill.

SECTION 13 - AGGREGATE SUBBASES AND BASES

13.01 DESCRIPTION

This work shall consist of furnishing, spreading, and compacting aggregate subbases and bases as specified in Sections 25 and 26 of the State of California Standard Specifications and in these Standard Specifications.

13.02 MATERIALS

Aggregate for subbases and bases shall be clean from vegetable matter and other deleterious substances, and shall be of such nature that it can be readily compacted under watering and rolling to form and firm, stable base.

13.03 GRADING

Aggregate subbase or base shall not be placed until the subgrade has been finished to a condition satisfactory to the Engineer and when placed, shall be accurately graded and compacted to proper profile and cross section and at elevations which will result in the proper final grades when the specified thickness of paving has been applied and shall not vary from the planned grade by 0.08 foot at any point for aggregate subbase and 0.05 foot for aggregate base.

Placing of the aggregate subbase or base shall conform to the requirements of Sections 25-1.04 and 26-1.04 respectively of the State of California Standard Specifications except that use of a motor grader will be permitted.

13.04 COMPACTION

The relative compaction of each layer of compacted aggregate subbase material shall not be less than ninety (90%) percent and each layer of aggregate base shall be not less than ninety-five (95%) percent as determined by Test Method California No. 216. Compaction testing shall be provided as specified in Section 6.02 of these Standard Specifications.

13.05 AGGREGATE SUBBASE

Aggregate subbase shall conform to Section 25 of the State of California Standard Specifications. The class of aggregate subbase shall be as specified in the Special Provisions.

13.06 AGGREGATE BASE

Aggregate base shall be Class 2 and shall conform to the provisions in Section 26 of the State of California Standard Specifications. The gradation of the Class 2 aggregate base shall be as specified for one and one-half (1½) inch maximum aggregate.

13.07 SALVAGING EXISTING PAVEMENT

Where allowed, aggregate subbase or base may be composed of salvaged oiled earth and asphalt concrete from the existing roadway, supplemented with imported aggregate base material. The Engineer may require a thicker base section in order to compensate for a decreased "r" value of salvaged pavement. Unless otherwise specified, the Contractor shall pay for testing of "R" values for salvaged materials. When this system is used, the salvaged oiled earth material to be used by the contractor shall be pulverized to a maximum diameter of two inches. This pulverized, salvaged material shall be spread and compacted evenly over the entire subgrade area to the depth specified in the Special Provisions. The imported aggregate base is then to be spread and compacted evenly over the top of the compacted, pulverized, salvaged material to provide the required depth of base.

Where salvaging existing oil or A.C. for base is allowed, this salvaged material will not be allowed in the top two (2") inches of the base section; a minimum of two (2") inches of imported aggregate base will be required to insure a smooth, uniform surface on which to place pavement. Any surplus oil or pavement created because of this requirement shall be removed and disposed of by the contractor as specified in Section 7-1.13 of the State of California Standard Specifications and no additional payment will be made therefore.

13.08 ADDITIONAL QUANTITIES

In the event that soil conditions are encountered such that a satisfactory subgrade, subbase or base for pavement may not be obtained, the material lying below the subgrade shall be removed and the additional subbase or untreated base material, as directed by the Engineer, shall be placed in accordance with the provisions of this section. All additional roadway excavation will be paid on a cubic yard basis. The additional volume of work shall be calculated by the "Average End Area" method.

Additional aggregate subbase or base shall be paid on the basis of bid item specified.

13.09 MEASUREMENT AND PAYMENT

a. **Aggregate Subbase**: Aggregate subbase shall be paid by the cubic yard. Quantities shall be calculated by the "Average End Area" method on the basis of the dimensions shown on the plans, adjusted by the amount of any change ordered by the Engineer. Payment for aggregate subbase shall be made at the contract unit price per cubic yard for the class specified and shall include full compensation for furnishing all labor, materials (or processing selected materials), tools, equipment, and incidentals, and doing all work involved in hauling and constructing aggregate subbase, including pulverizing existing surfacing if required, completed, in place, as shown on the plans, as specified in these Standard Specifications and the Special Provisions, and as directed by the Engineer.

b. **Aggregate Base**: Aggregate base shall be paid by the ton. Quantities shall be measured in accordance with the provisions of Section 9.02 of these Standard Specifications.

Payment for the weight of material will be determined by deducting from the weight of material delivered to the work, the weight of water in the material at the time of delivery to the job, as determined by Test Method California No. 226, in excess of one (1%) percentage point more than the optimum moisture content as determined by Test Method California No. 216. Payment for the weight of water deducted as provided herein shall not be made. Tests ordered by the City Engineer shall be made at the expense of the City. Payment for aggregate base shall be made at the contract unit price per ton and shall include full compensation for furnishing all labor, materials, (including water in the material at the time the material is delivered to the job as previously provided), tools, equipment, and incidentals, and for doing all work involved in hauling and constructing aggregate base, (including pulverizing existing surfacing), complete, in place, as shown on the plans, and as specified in these Standard Specifications and the Special Provisions, and as directed by the Engineer.

SECTION 14 - ASPHALT CONCRETE PAVEMENT

14.01 DESCRIPTION

Asphalt concrete pavement shall consist of furnishing and mixing aggregate and asphalt binder at a central mixing plant and spreading and compacting the mixture and applying prime coat, paint binder, and seal coat to or with the mixture, in accordance with Section 39 of the State of California Standard Specifications and these Standard Specifications.

14.02 AGGREGATE MATERIAL

All aggregates shall be clean and free from decomposed materials, organic materials, and other deleterious substances and conform to the specifications of Section 39 of the State of California Standard Specifications. Gradation of the aggregate shall conform to the grading requirements for three-quarter (¾") inch maximum aggregate (medium) and one-half (½") inch maximum aggregate (medium).

14.03 ASPHALT CONCRETE

Asphalt concrete shall be Type B and shall conform to the provisions of Section 39 of the State of California Standard Specifications. The asphalt binder shall be steam refined paving asphalt classified as AR4000 in accordance with Section 92 of the State of California Specifications.

14.04 SPREADING AND LAYING

Spreading and laying operations shall conform to the requirements of Sections 39-5 and 39-6 of the State of California Standard Specifications. Where the total depth of paving exceeds two-tenths (0.20') foot, the top layer of asphalt concrete shall not exceed two-tenths (0.20') foot in compacted thickness. The aggregate for this layer shall be one-half (½") inch maximum aggregate (medium). The next lower layer shall not exceed twenty-five hundredths (0.25') foot in compacted thickness. The aggregate for this layer and all lower layers shall be three-quarter (¾") inch maximum aggregate (medium). Any lower layers shall not exceed four-tenths (0.40') foot in compacted thickness.

No asphalt concrete paving shall be placed when the atmospheric temperature is below 50◦F and at the discretion of the Engineer.

14.05 PRIME COAT

Prime coat shall be applied as specified in the Special Provisions.

14.06 SEAL COAT

Seal coat shall be applied as specified in the Special Provisions.

14.07 PAINT BINDER

Paint binder shall be furnished and applied in accordance with the provisions in Section 94, "Asphaltic Emulsions," of the State of California Standard Specifications, and shall be applied to all vertical surfaces of existing pavement, curbs, gutters, and construction joints in the surfacing against which additional material is to be placed, to a pavement to be surfaced, and to other surfaces designated by the Engineer.

The rate of application of the paint binder shall be five one hundredths (0.05) gallons per square yard of surface covered. Full compensation for furnishing and applying the paint binder shall be included in the price bid for items requiring its application and no additional payment will be made therefore.

14.08 ASPHALT CONCRETE DIKES

Asphalt concrete dikes shall be constructed as shown on the plans and in accordance with the Special Provisions. Only equipment specifically designed to install dikes shall be used for such installation. Payment for the specified asphalt concrete dike shall be as specified in the Special Provisions.

14.09 MEASUREMENT AND PAYMENT

Asphalt concrete pavement shall be measured by weight of the mixture complete, as specified in Section 9.02 of these Standard Specifications. Payment for the installation of asphalt concrete pavement shall be made at the contract unit price per ton and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, including furnishing and applying asphalt paint binder, and for doing all work involved in constructing and placing asphalt concrete paving complete, as shown on the plans, as specified in these Standard Specifications and the Special Provisions, and as directed by the Engineer.

SECTION 15 - RESTORATION OF SURFACES

15.01 DESCRIPTION

Restoration of surfaces shall consist of restoring the surfaces of all trenches, surfaces at or around structure sites, or any other surfaces damaged or disturbed by the work, to the condition existing prior to commencement of the work, or to such condition specified by any encroachment permit issued by the City for the work, or as specified in the Special Provisions. Surfaces shall include, but not be limited to, pavement of any kind, grass, shrubbery or other landscaping, gravel, treated or untreated soil. All work shall be done in accordance with these Standard Specifications.

15.02 PAVEMENT REPLACEMENT

Replacement of pavement shall conform to the minimum requirements specified herein, and to the requirements of Sections 13 and 14 of these Standard Specifications and the Standard Plans, unless modified by the Special Provisions, or encroachment permit issued by the City. Deviation from these requirements, unless approved by the Engineer shall be cause for rejection of the work.

If aggregate base material is removed, it may be allowed to be replaced in like depth with new aggregate base in accordance with Section 13 of these Standard Specifications provided the same gravel equivalent thickness of base and paving as shown on the Standard Plan sections is maintained as determined by the Engineer.

Replacement of pavement shall be performed in a manner consistent with good construction practices and methods, shall be approved by the Engineer, and which, when completed, shall leave all areas requiring replacement of pavement with as neat an appearance as possible.

Pavement replacement shall be accomplished as soon as possible and practicable, and within the time limits specified in the Special Provisions.

Areas to receive pavement replacement shall be completely cleaned of all debris, rubbish, dirt, temporary paving, or any other deleterious material which might affect the quality of the work in any way. Cleaning shall be accomplished to a minimum of six (6') feet outside the edges of trenches or other areas to receive pavement replacement. This distance may be increased by the Engineer as necessary to prevent contamination of the new work.

Where saw-cutting of existing pavement edges is specified, the cut shall be made on a straight line along both sides of trenches, and to neat lines around structures or other locations requiring pavement replacement. The cut shall be made a minimum of three (3") inches in depth, or such other depth as may be specified in the Special Provisions, and shall encompass all pavement damaged by the work or specified to be removed or replaced.

All edges of existing pavement, whether trimmed or saw-cut, shall be protected from damage. Any edges damaged from any cause prior to or during paving operations, shall be re-cut or re-trimmed as directed by the Engineer, and no additional payment will be made therefore.

A paint binder of asphaltic emulsion shall be furnished and applied in conformance with Section 14.07 of these Standard Specifications to all vertical surfaces of existing pavement, curbs, gutters, or other surfaces against which asphalt concrete pavement is to be placed. Paint binder shall also be applied to the top surface of the initial layer of asphalt concrete if the pavement is to be replaced in lifts.

When replacing pavement in areas where sawcutting of existing pavement is specified, the new pavement material shall overlap the existing pavement edge as directed by the Engineer to a maximum of six (6") inches and "feathered" to match the existing paving. When compacted, the surface shall be smooth and without humps or depressions.

15.03 TEMPORARY PAVEMENT REPLACEMENT

Unless otherwise specified or unless otherwise required by an encroachment permit for the work, temporary replacement of existing pavement, where specified or directed to be placed by the Engineer, shall consist of a minimum thickness of two (2") inches of cut-back or "cold mix" asphalt concrete. The temporary pavement shall be diligently maintained by the contractor until permanent pavement is installed.

15.04 MISCELLANEOUS SURFACE RESTORATION

Restoration of miscellaneous surfaces shall consist of replacing or restoring in-kind of any surface damaged or disturbed by the work, including, but not limited to, grass, landscaping of any kind, gravel, oiled dirt, concrete, or soil.

The surfaces of all trenches, excavations or other areas damaged or disturbed by the work, upon completion of miscellaneous surface restoration, shall conform to the elevations and character of the areas which existed before work commenced. Excess trench or excavation material shall not be spread over any part of the project site, unless authorized by the Engineer, and shall be disposed of in accordance with Section 7-1.13 of the State of California Standard Specifications.

15.05 MEASUREMENT AND PAYMENT

Pavement replacement will be paid for at the price bid per lineal foot or per square foot, as specified in the Special Provisions, and shall include full compensation for furnishing all labor,

materials, tools and equipment, and doing all the work, including sawcutting or trimming of edges, involved in replacing pavement in place as specified in these Standard Specifications and the Special Provisions, and as directed by the Engineer.

Temporary pavement replacement and miscellaneous surface restoration shall be included in the various bid items of work, with no additional payment made therefore unless otherwise specified in the Special Provisions.

SECTION 16 - CONCRETE IMPROVEMENTS

16.01 DESCRIPTION

Concrete improvements shall consist of the construction of Portland cement concrete curb, gutters, sidewalks, driveway approaches, handicap ramps, valley gutters, and mow strips in place and complete in accordance with these Standard Specifications, the Standard Plans, and Sections 52 and 73 of the State of California Standard Specifications.

16.02 PORTLAND CEMENT CONCRETE

Portland cement concrete shall be Class B (five sack) concrete that meets the requirements of Section 10 of these Standard Specifications.

16.03 REINFORCEMENT

Reinforcement bar shall conform to the provisions of Section 52 of the State of California Standard Specifications.

16.04 SUBGRADE PREPARATION

The subgrade beneath concrete improvements shall be prepared true to grade and cross section. It shall be compacted to a minimum of ninety (95%) percent relative compaction to a depth of six (6") inches beneath sidewalks, curbs and gutters, valley gutters, commercial and residential driveway approaches. Relative compaction shall be determined by Test Method No. California 216.

All soft and spongy material shall be removed to a depth of not less than six inches (6") below subgrade elevation for all concrete improvements except sidewalks and three (3") inches below for sidewalks, and the resulting space filled with earth, sand or gravel then compacted to form a firm and solid foundation. The forms and subgrade shall be wet immediately prior to placing concrete.

Compaction testing shall be provided as specified in Section 6.02 of these Standard Specifications.

16.05 DRIVEWAY AND ALLEY APPROACHES, MOWSTRIP, EXISTING CURBS, GUTTERS, VALLEY GUTTERS AND SIDEWALKS

Where the plans provide for the reconstruction of a portion of an existing curb, gutter, valley gutter, sidewalk or mowstrip, the existing section shall be cut to a minimum depth of one and one half (1½") inches with an abrasive type saw at the line shown on the plans or as determined by the Engineer, and the entire section to be reconstructed shall be removed. Sawcuts shall also be of sufficient depth to leave an even, straight line. The new curb, gutter, valley gutter, sidewalk or mowstrip shall join the original at this line. Full compensation for the removal and disposal of existing concrete improvements shall be included in price bid for the various items of work requiring the removal or as specified in the Special Provisions.

16.06 FORMS

Forms shall be of the quality and set in place as specified in Section 10.07 of these Standard Specifications and in Section 73-1.04 of the State of California Standard Specifications.

16.07 EXPANSION JOINT

Expansion joints and weakened plane joints shall be placed and spaced as shown on the Standard Plans for the item of work. Expansion joints shall be one-fourth (¼") inch wide and shall be filled with a premolded expansion joint filler conforming to ASTM Designation: D1751. The expansion joint filler shall conform to the cross-section of the curb, gutter, sidewalk, or other concrete item being constructed. Expansion joints shall be tooled with a one-fourth (¼") inch maximum radius edger.

Traverse weakened plane joints shall be constructed at the intervals shown on the Standard Plans. Weakened plane joints shall insure a free movement of the concrete at the joint. Weakened plane joints may be made by the use of a hand tool or plastic material. Weakened plane joints made with a hand tool shall be constructed by scoring the concrete to a minimum depth of one (1") inch. The tool shall form rounded corner of a radius not exceeding one-eight (1/8") inch as the score line is made. Plastic weakened plane joint materials shall be at least one inch deep. T-shaped 1/16" thick plastic strip, with a minimum 3/4" wide pull-top stiffener. This plastic strip shall have suitable anchor to prevent vertical movement. After preliminary troweling, the concrete shall be parted to a depth of approximately 2" at the joint with a thin metal straight edge. The plastic strip shall then be inserted in the impression so that the upper surface of the pull-top stiffener is flush with the concrete. The pull-top stiffener shall then be immediately peeled off. After the pull-top is removed, the concrete shall be floated to fill all voids adjacent to the strip. During final troweling, the edges at the plastic control joints shall be finished to a radius not t exceed 1/8" using a slit jointer tool. The finished joint opening shall not be wider than 1/8" exclusive of radii.

16.08 IMPROVEMENTS; CONSTRUCTION OF CONCRETE IMPROVEMENTS

Curbs, gutters, sidewalks, driveway and alley approaches, valley gutters and mowstrips shall conform to Section 73 of the State of California Standard Specifications, the Standard Plans, and these Standard Specifications.

Extruded curb and gutter shall be constructed with Class B concrete.

All concrete work shall be finished with a steel trowel and given a brush finish except that concrete gutters, valley gutters, wheel chair ramps and driveway and alley approaches may be given a wood float finish.

16.09 CURING

The concrete shall be cured in accordance with Section 10.08 of these Standard Specifications.

16.10 ROCK POCKETS

Immediately upon stripping curb forms and prior to backfill, all rock pockets or honeycombs shall be repaired to the satisfaction of the Engineer.

16.11 BACKFILLING

After removal of forms, the area behind the sidewalk shall be cleaned of all surplus concrete and other debris and the area filled with clean earth suitable for planting. If the excavation for gutter has been made in a bituminous surfaced street, the space occupied for forms shall be backfilled with freshly prepared bituminous surfacing material thoroughly tamped into place and leveled off to meet the existing street surface.

16.12 MEASUREMENT

The length of concrete curbs, gutters and mowstrips to be paid for shall be the length in feet designated by the Engineer. The area of concrete sidewalk, driveway and alley approach, and valley gutter to be paid for shall be the area in square feet designated by the Engineer.

16.13 PAYMENT

The price paid per linear foot of concrete curb, gutter, valley gutters in alleys, or mowstrip and the price paid per square foot of concrete sidewalk, driveway, alley approach, and valley gutter shall include full compensation for furnishing all labor, material, tools and equipment and doing all the work involved in constructing concrete curbs, gutters, mow strips, valley gutters and sidewalks, including curing, all as shown on the plans, as specified in these Standard Specifications and in the Special Provisions, and as directed by the Engineer.

SECTION 17 - SEWER AND STORM DRAIN PIPE

17.01 DESCRIPTION

This work shall consist of furnishing and installing sewer and storm drain pipe as shown on the plans, as directed by the Engineer, and as specified in these Standard Specifications.

All precast pipe shall be of the size and class shown on the plans or specified in the Special Provisions. The pipe class, as designated on the plans, has been determined for vertical load under average trench conditions. The contractor shall exercise precautionary measures against trench cave-ins by providing adequate shoring or other devices to minimize the development of adverse trench conditions. Should the trench condition exceed in width the average trench condition, the contractor shall provide a recognized special bedding, approved by the Engineer, which is adequate to maintain pipe strength equivalent to the average trench condition. No additional compensation will be paid for such special bedding. In lieu of special bedding and the class of pipe designated in the plans, the contractor may provide a class of pipe in accordance with the manufacturer's recommendation for the conditions under which the pipe is placed, with no additional payment therefore.

17.02 TYPES OF PIPE

a. **Storm Drain Pipe:** Where "storm drain pipe" is specified on the plans, the Contractor will be allowed to install either reinforced concrete pipe, non-reinforced concrete pipe, or polyvinyl chloride pipe (PVC) conforming to these Standard Specifications except where a particular type of pipe is specified on the plans or in the Special Provisions. Where a particular type of pipe is specified on the plans or in the Special Provisions, only that type of pipe shall be installed and no substitution will be allowed except as specified in Section 17.05 of these Standard Specifications. Once pipe laying operations have begun, the contractor will not be allowed to switch to a type of pipe different from that laid without prior approval from the Engineer.

Rubber gasketed concrete pipe conforming to these Standard Specifications shall be installed if "rubber gasketed storm drain pipe" is specified on the plans. Where a particular type of pipe is specified on the plans or in the Special Provisions, only that type of pipe shall be installed and no substitution will be allowed except as specified in Section 17.05 of these Standard Specifications.

The strength of pipe to be installed shall be specified on the plans as either Class II (Cl II), Class III (Cl III), Class IV (Cl IV) or Class V (Cl V). These strength classifications are based on the D-Load to produce the ultimate load in the 3-edge bearing strength test, ASTM Designation: Test Method C497 or C500. The following table shall be used to determine the strength class of pipe to be installed by the contractor to meet the class specified on the plans:

Pipe Class on Plans	CL II	CL III		CL IV	CL V
Reinforced Concrete Pipe	CL II	CL III		CL IV	CL V
(C76)	1500D	2000D		3000D	3750D
Nonreinforced Concrete Pipe	E.S.	E.S.		N/A	N/A
(C14)	1500D	2000D	3	000D	3750D

E.S. means Extra Strength
N/A means Not Available

The contractor's attention is called to Section 17.01 of these Standard Specifications in regards to strength requirements specified on the plans.

b. **Sewer Pipe:** Where "sewer pipe" is specified on the plans, the contractor will be allowed to install either vitrified clay pipe, or poly vinyl chloride (PVC) pipe conforming to these Standard Specifications except that once pipe laying operations have begun, the contractor will not be allowed to switch to a type of pipe different from that being laid without prior permission from the Engineer. The final determination as to the suitability of any pipe for use as sewer pipe shall be made by the City Engineer.

Sewer pipe shall be designed such that the slope of the proposed line will create a velocity of two feet per second when the pipe is flowing half full using a Manning's "N" of 0.011.

Minimum Acceptable Slopes For Sewer Pipe

Pipe Diameter (inches)	Slope at 2 F.P.S. Velocity (percent) (for vitrified clay pipe)
6	0.35
8	0.24
10	0.18
12	0.14

Where a particular type of pipe is specified on the plans or in the Special Provisions, only that type of pipe shall be installed and no substitution will be allowed.

17.03 REINFORCED CONCRETE PIPE

a. **Materials:** Reinforced concrete pipe shall be manufactured in accordance with ASTM Designation: C76, as amended or revised.

Upon demand, the manufacturer of pre-cast concrete pipe shall furnish to the Engineer a Certificate of Compliance in accordance with the provisions in Section 6.03 of these Standard Specifications.

b. **Joints:** The ends of reinforced concrete pipe sections shall be of such design that when properly laid they shall have a smooth and uniform interior surface. Both ends of pipe sections shall be substantially free of cracks and broken edges. Pipe so found to be damaged shall be rejected for use in the work. Each joint shall be sealed to prevent leakage. Sealing of joints shall be accomplished with cement mortar or rubber gaskets, as indicated on the plans or specified in the Special Provisions, and shall conform to the following specifications:

c. **Cement Mortar Joints:** Mortar shall conform to the requirements of Section 10.10 of these Specifications. The ends of the concrete pipe shall be thoroughly wetted and cleaned prior to the application of mortar.

The ends of the pipe, after being wetted and cleaned, shall be completely filled with mortar for the full periphery of the joint. The two sections to be joined shall be firmly placed together in such a manner that the bell or groove end of the pipe fits truly and snugly over the tongue end so that mortar completely fills the joint. The interior surface of the joint shall be brushed smooth and all surplus mortar removed. The completed interior surface of the joint shall be as flush as possible with the pipe walls.

An external mortar band at least four (4") inches wide and three-fourths (3/4") inches thick shall be applied to the joint by first thoroughly cleaning and wetting the areas immediately adjacent to the joint and placing mortar round the upper two hundred seventy (270°) degrees of the pipe at the joint. The width and thickness of the external bank shall be completely and immediately covered with an impervious membrane, which shall be adequately anchored, or with moist earth.

In no case shall water be allowed to rise in or about the pipe before the mortar of the joint has become thoroughly set.

d. **Rubber Gasketed Joints:** Rubber gasketed joints shall conform to the requirements of ASTM Designation: C443 and shall be flexible and able to withstand expansion, contraction and settlement.

The ends of the pipe shall be thoroughly cleaned immediately prior to joining sections of pipe. The two sections joined shall be firmly placed together in such a

manner that the tongue or gasket end of the pipe "homes" on the bell end of the pipe. No appreciable gap shall exist at the completed joint, except as permitted by the Engineer at locations where curves in the pipe alignment are specified or required. Excessive gaps in any case shall be cause for rejection of the work, and corrective measures shall be taken when ordered by the Engineer.

e. **Construction Joints:** Whenever two sections of pipe are to be joined where standard joints are not available, such as joining reinforced concrete pipe to cast-in-place or asbestos cement pipe, a concrete collar shall be constructed around the full periphery of the pipe and extending one (1') foot each side of the joint. The collar shall be of a minimum thickness equal to that of the concrete pipe, but in no case less than four (4") inches thick. The interior of the joint shall be smoothed with cement mortar and brushed. The area to receive the collar shall be thoroughly cleaned and dampened immediately prior to construction of the collar. The cost of constructing concrete collars shall be considered as included in the cost of the items requiring the collar, and no additional payment will be made therefor.

f. **Pipe Laying:** Pipes shall be laid in conformity with the prescribed lines and grades obtained from stakes set by the Engineer. The pipe shall be laid uphill from structure-to-structure with the bell (or groove) end up-grade. Pipe with elliptical reinforcement shall be placed with the minor axis in a vertical position. Adjustments of pipes to line and grade shall be made under the body of the pipe throughout its entire length and not by blocking or wedging. Bell holes shall be accurately placed and shall not be larger than is reasonably required to make the joint. Before the pipe is laid, the interior of the bell of the preceding pipe shall be carefully cleaned. After each section of pipe has been laid to line and grade, it shall be joined to the preceding section as required in Section 17.03(b), "Joints." After jointing procedure has commenced, there shall be no movement of the pipe whatsoever in subsequent operations. Material shall be placed uniformly on either side of the pipe to prevent any movement, in accordance with Section 12.06 of these Specifications. For mortar joint pipe, no walking in the trench or working over the pipe after it has been laid, except as may be necessary in tamping the earth and refilling, will be permitted until the pipe has been braced as specified above.

17.04 NON-REINFORCED CONCRETE PIPE

a. **Materials:** Non-reinforced concrete pipe shall be manufactured in accordance with ASTM Designation: C14, as amended or revised.

Upon demand, the manufacturer of pre-cast concrete pipe shall furnish to the Engineer a Certificate of Compliance in accordance with the provisions in Section 6.03 of these Standard Specifications.

b. **Joints:** The ends of non-reinforced concrete pipe sections shall be of such design that when properly laid they shall have a smooth and uniform interior surface. Both ends of pipe sections shall be substantially free of cracks and broken edges. Pipe so found to be damaged shall be rejected for use in the work. Each joint shall be sealed to prevent leakage. Sealing of joints shall be accomplished with cement mortar as indicated on the plans or specified in the Special Provisions, and shall conform to the following specifications:

c. **Cement Mortar Joints:** Mortar shall conform to the requirements of Section 10.10 of these Specifications. The ends of the concrete pipe shall be thoroughly wetted and cleaned prior to the application of mortar.

The ends of the pipe, after being wetted and cleaned, shall be completely filled with mortar for the full periphery of the joint. The two sections to be joined shall be firmly placed together in such a manner that the bell or groove end of the pipe fits truly and snugly over the tongue end so that mortar completely fills the joint. The interior surface of the joint shall be brushed smooth and all surplus mortar removed. The completed interior surface of the joint shall be as flush as possible with the pipe walls.

An external mortar band at least four (4") inches wide and three-fourths (3/4") inches thick shall be applied to the joint by first thoroughly cleaning and wetting the areas immediately adjacent to the joint and placing mortar around the upper two hundred seventy (270°) degrees of the pipe at the joint. The width and thickness of the external band shall be completely and immediately covered with an impervious membrane which shall be adequately anchored, or with moist earth.

In no case shall water be allowed to rise in or about the pipe before the mortar of the joint has become thoroughly set.

d. **Construction Joints:** Whenever two sections of pipe are to be joined where standard joints are not available, such as joining non-reinforced concrete pipe to cast-in-place or asbestos cement pipe, a concrete collar shall be constructed around the full periphery of the pipe and extending one (1') foot each side of the joint. The collar shall be of a minimum thickness equal to that of the concrete pipe, but in no case less than four (4") inches thick. The interior of the joint shall be smoothed with cement mortar and brushed. The area to receive the collar shall be thoroughly cleaned and dampened immediately prior to construction of the collar. The cost of constructing concrete collars shall be considered as included in the cost of the items requiring the collar, and no additional payment will be made therefore.

e. **Pipe Laying:** Pipes shall be laid in conformity with the prescribed lines and grades obtained from stakes set by the Engineer. The pipe shall be laid uphill from

structure-to-structure with the bell (or groove) end upgrade. Adjustments of pipes to line and grade shall be made under the body of the pipe throughout its entire length and not by blocking or wedging.

Bell holes shall be accurately placed and shall not be larger than is reasonably required to make the joint. Before the pipe is laid, the interior of the bell of the preceding pipe shall be carefully cleaned. After each section of pipe has been laid to line and grade, it shall be joined to the preceding section as required in Section 17.03A(c), "Joints." After jointing procedure has commenced, there shall be no movement of the pipe whatsoever in subsequent operations. Material shall be placed uniformly on either side of the pipe to prevent any movement, in accordance with Section 12.06 of these Specifications. No walking in the trench or working over the pipe after it has been laid, except as may be necessary in tamping the earth and refilling will be permitted until the pipe has been braced as specified above.

17.05 CAST-IN-PLACE CONCRETE PIPE

a. **Materials:** Concrete used in the construction of non-reinforced cast-in-place concrete pipe and cement mortar used for patching, smoothing or repair of cast-in-place concrete pipe shall conform to the requirements of Section 10 "Portland Cement Concrete; Cement Mortar," of these Specifications.

Concrete shall be either Class "A" (6 sack mix), or Class "B" (5 sack mix), and shall develop a minimum compressive strength of 2800 psi at 28 days.

Admixtures shall be used only in conformity with the requirements of Section 10.04 of these Specifications.

Coarse and fine aggregate gradation shall conform to the requirements of Section 10.02 "Materials," and these coarse aggregate maximum size limitations:

Pipe Diameter	Maximum Aggregate Size
24" to 48"	1" maximum
48" and over	1 1/2" maximum

Coarse and fine aggregate shall also conform to ASTM Designation: C-33-57 as revised.

Reinforced concrete pipe may be substituted for cast-in-place concrete pipe at any location and shall comply with the following provisions:

Reinforced concrete pipe shall conform to the requirements of Section 17.02 of these Specifications.

Substituted pipe shall have the same internal diameter as specified for cast-in-place pipe. The pipe class shall be as specified or as determined by the Engineer.

Joints on substituted pipe shall be of the cement mortar type unless otherwise indicated on the plans or in the Special Provisions.

Payment shall be at the unit price bid for cast-in-place concrete pipe with no additional compensation paid therefore, except as provided in Section 17.05 of these Specifications.

b. **Nominal Internal Diameter:** The nominal internal diameter shall be the size indicated on the plans. The actual internal diameter of the pipe at any point shall not be more than five (5%) percent less than the nominal internal diameter, and the actual internal cross-sectional area of the pipe at any point shall not be less than the cross-sectional area of a circle computed from the nominal internal diameter. The contractor may be allowed to construct pipe of larger sizes than that specified on the plans; however, any and all deviations in sizes from that specified must be approved by the Engineer.

c. **Wall Thickness:** Minimum wall thickness for the various sizes of pipe shall conform to the following table:

Internal Diameter	**Minimum Wall Thickness of Pipe**
24"	2 1/2"
30"	3"
33" - 36"	3 1/2"
42"	4"
48"	5"
54"	5 1/2"
60"	6"
66"	6 1/2"
72"	7"
78"	7 1/2"
84"	8"
90"	8 1/2"
96"	9"

d. **Excavation:** Excavation shall conform to the requirements of Section 12.05, "Trench and Structure Excavation."

e. **Bedding:** Bedding shall conform to the requirements of Section 12.05, 17.05, and 17.11 of these Specifications, unless otherwise specified in the Special Provisions.

Pipe Construction; Feasibility: The City makes no guarantee as to the types of soil or of soil conditions within the project limits. The contractor shall perform whatever soils or other tests as he deems necessary to make himself fully aware, prior to submitting a bid proposal, of the soil types or conditions which may prevail throughout the project site. Tests so performed shall be conducted at the contractor's expense, and no compensation will be paid therefore.

Where unstable trench conditions are encountered, the contractor shall attempt to stabilized the trench by shoring or, wherever practical, by sloping the sides of the trench above the top of the pipe.

Where the Engineer determines, due to unstable trench conditions or other reasons, that it is not feasible to place cast-in-place concrete pipe, the contractor shall place reinforced concrete pipe of the same size and class indicated on the plans or bidder's proposal, or a specified in the Special Provisions. The contractor will be paid for reinforced concrete pipe so placed at the unit price bid for cast-in-place pipe and no additional compensation paid therefore.

Construction of cast-in-place concrete pipe may be considered as not feasible when the trench walls are not stable below a distance above the bottom of the trench equal to one-half the diameter of the pipe. The Engineer, however, shall be the sole judge as to the feasibility of constructing cast-in-place concrete pipe as shown on the plans. Construction of cast-in-place concrete pipe shall be considered as feasible where fifty (50') feet or more of stable trench is encountered.

f. **Pipe Construction:** Pipes shall be constructed in conformity with the prescribed lines and grades obtained from stakes set by the Engineer.

All surfaces against which concrete is to be placed shall be free from standing water, mud and debris and shall be firm enough to prevent contamination of the concrete by earth or other foreign material.

Absorptive surfaces against which concrete is to be placed shall be moistened thoroughly so that the moisture will not be drawn from the freshly placed concrete.

When placing operations cease or are delayed for any reason for more than thirty (30) minutes, the end of the pipe shall be left rough with a slope of approximately thirty (30°) degrees and the ends of the pipe shall be securely closed by heavy canvas or other acceptable material to prevent excessive dehydration of the concrete already

placed. The joint so formed when placing operations again commence shall conform to the requirements of Section 17.05 of these Specifications.

Cast-in-place pipe shall be constructed in one placement around the complete periphery of the pipe by means of a traveling pipe-casting-machine approved by the Engineer. The bidder may be required to furnish evidence of successful in-service performance of pipe produced by the pipe-casting-machine under similar working conditions.

Pipe shall be cast-in-place in a manner such that as forms are lapped, the lap ridges formed in the interior walls of the pipe face downstream in the direction of flow.

Forms used in the work shall be clean and reasonably free of concrete adhering to the surface of the forms from previous operations. Immediately prior to use in the work, work, each form shall be sprayed or otherwise coated with an approved form oil. Forms used shall be of sufficient strength to withstand vibrating of concrete and which will provide interior dimensions of the pipe in accordance with the tolerances of Section 17.05 of these Specifications. Damaged forms shall not be used in the work and shall be removed from the job site.

g. **Construction Joints:** Where construction of cast-in-place concrete pipe stops short of a manhole or other structure and construction will continue at a later time, or where cast-in-place pipe is to be jointed to pre-cast pipe, the resulting joint shall be reinforced by constructing a concrete collar around the joint. This collar shall extend one (1') foot each side of the joint around the full periphery of the pipe, and shall be equal in thickness to the wall thickness of the joined pipe, but in no case less than four (4") inches. The area to receive the collar shall be thoroughly cleaned and dampened immediately prior to constructing the collar. The cost of constructing concrete collars shall be considered as included in the cost of the various items requiring construction of concrete collars, and no additional payment will be made therefore.

h. **Curing:** Immediately after finishing of the exposed exterior surface of the pipe, it shall be covered with an approved polyethylene or plastic membrane which shall be anchored sufficiently to keep the surface covered.

Unless the pipe terminates at a structure which is closed to the air, the ends of the pipe, as well as any other openings, shall be securely closed with an impermeable membrane for a minimum of seven (7) days or until the structure is constructed, if sooner. Precaution shall be used to make the structure reasonably air-tight for a minimum of seven (7) days, except when work is taking place inside the pipe.

i. **Finish:** The exterior exposed surface of the pipe shall have a steel screeded finish. A hand trowel shall be used, as construction progresses, to smooth areas not sufficiently smoothed by the pipe-casting machine. All finishing of the exterior shall be accomplished immediately as pipe construction progresses.

The interior surface of the pipe shall be equivalent to a steel screeded finish. All honey-combed or minor voids shall be chipped out, filled and smoothed with cement mortar. Major voids shall be repaired with Portland Cement Concrete (Class A or B) in a manner prescribed by the Engineer.

Excessive longitudinal ridges along the sides of the interior of the pipe shall be chipped back and smoothed with cement mortar as directed by the Engineer. Form lap offsets exceeding the limits established below shall be chipped back and smoother with mortar.

Pipe Diameter	**Maximum Offset**
24" - 30"	3/8"
33" - 42"	1/2"
48" - 66"	5/8"
72" - 90"	7/8"
96" -	1"

Interior finishing shall be accomplished as soon as possible or practical after placing of the pipe and shall be subject to the provisions of Section 17.16, "Payment Retention," of these Specifications.

j. **Concrete Tests:** During the placing operations, the contractor, if requested, shall assist the Engineer in securing three (3) standard test cylinders for each fifty (50) cubic yards, or portions thereof, per day. Test cylinders shall be tested for strength by a recognized testing laboratory. The cost of such tests will be at the contractor's expense and certified copies of the results will be submitted to both the contractor and the Engineer. One of the cylinders will be tested at the end of seven (7) days; one of the test cylinders will be tested at the end of twenty-eight (28) days; and one of the test cylinders will be held to be tested at the discretion of the Engineer, all in accordance with the procedures established by the ASTM Designation: C39.

k. **Hydrostatic Tests:** When hydrostatic testing is specified and when the concrete has reached a compressive strength of 2,800 pounds per square inch, the contractor shall test the pipe with water to the maximum operating head. The line may be tested in one length or in sections, as approved by the Engineer. Each test shall be maintained for twenty-four (24) hours at the maximum operating head.

All leaks creating wet spots at the soil surface, or otherwise exposed by the test, shall be repaired by and at the expense of the contractor. Leakage loss during this test period shall not exceed one thousand (1,000) gallons per inside diameter inch diameter inch per mile of pipe installed, for a period of twenty-four (24) hours.

Where leakage exceeds the allowable, the contractor shall discover the cause and remedy it before the line is offered for retesting and acceptance. If the leakage is less than the allowable, and individual leaks are observed, such leaks shall be repaired in a manner satisfactory to the Engineer.

17.06 VITRIFIED CLAY PIPE AND FITTINGS

a. **Materials:** Vitrified clay pipe and fittings shall be extra strength bell and spigot pipe manufactured in accordance with ASTM Designation: C200.

Upon demand, the manufacturer of vitrified clay pipe shall furnish to the Engineer a Certificate of Compliance in accordance with Section 6.03 of these Standard Specifications.

b. **Joints**: Joints shall be performed factory fabricated plastisol joints manufactured in accordance with ASTM Designation: C425.

Joints shall be of such a design that when the pipe is properly laid there shall be a smooth and uniform interior surface. Ends of pipe sections and fittings shall be free of cracks and broken edges. Pipe so found shall be rejected for use in the work.

The ends of the pipe shall be thoroughly cleaned immediately prior to joining sections of pipe. The two sections joined shall be firmly placed together in such a manner that the spigot end of the pipe "homes" on the bell end of the pipe. No appreciable gap shall exist at the completed joint, except as permitted by the Engineer at locations where curves in the pipe alignment are specified or required. Excessive gaps in any case shall be cause for rejection of the work, and corrective measures shall be taken when ordered by the Engineer.

c. **Pipe Laying:** Pipes shall be laid in conformity with the prescribed lines and grades obtained from stakes set by the Engineer. The pipe shall be laid uphill from structure to structure. Occasional variations in grade will be permitted as follows: Above grade 1/4 inch; below grade not to exceed 1/2 inch; alignment not to exceed 3 inches if gradual over a distance of 20 feet. Adjustments of pipes to line and grade shall be made under the body of the pipe throughout its entire length and not be blocking or wedging. Bell holes shall be accurately placed and shall not be larger than is reasonably required to make the joint. Before the pipe is laid, the interior of the bell

of the preceding pipe shall be carefully cleaned. After each section of pipe has been laid to line and grade, it shall be joined to the preceding section as required in Section 17.06(b), "Joints." After jointing procedure has commenced, there shall be no movement of the pipe whatsoever in subsequent operations. Material shall be placed uniformly on either side of the pipe to prevent any movement, in accordance with Section 12.06 of these Specifications. No walking in the trench or working over the pipe after it has been laid, except as may be necessary to tamping the earth and refilling, will be permitted until the pipe has been braced as specified above. The open ends of all sewer lines being installed shall be covered to keep out animal life, etc., whenever the line is left unattended for any length of time, such as overnight.

17.07 POLY VINYL CHLORIDE (PVC) SEWER PIPE AND FITTINGS

a. **Materials**: Poly vinyl chloride (PVC) pipe and fittings shall be manufactured in accordance with ASTM Designation: D3034 - SDR35.

The minimum allowable pipe stiffness (F/AY) for all sizes shall be forty-six (46 psi) pounds per square inch at five (5%) percent deflection when tested in accordance with ASTM Test Method D2412. Pipe and fittings shall be manufactured and supplied with bell and spigot joints which are an integral part of the pipe or fitting.

Upon demand, the manufacturer of PVC pipe shall furnish to the Engineer a Certificate of Compliance in accordance with the provisions of Section 6.03 of these Standard Specifications.

b. **Joints:** Joints for PVC pipe and fittings shall be elastomeric gasket type able to withstand contraction and expansion and be able to prevent displacement during assembly after the pipe has been locked into place. Joints shall be water tight when tested in accordance with ASTM Test Method D2855.

Joints shall be of such a design that when the pipe is properly laid, there shall be a smooth and uniform interior surface. Ends of pipe sections and fittings shall be free of cracks and broken edges. Pipe found to be so damaged shall be rejected for use in the work.

The ends of the pipe shall be thoroughly cleaned immediately prior to joining sections of pipe. Pipe shall then be joined together as recommended by the manufacturer. Gaskets shall be properly lubricated and the pipe "homed" as far as recommended. No appreciably gap shall exist at the completed joint, except as permitted by the Engineer. Excess gaps in any case shall be cause for rejection of the work, and corrective measures shall be taken when ordered by the Engineer.

c. **Pipe Laying:** Pipes shall be laid in conformity with the prescribed lines and grades obtained from stakes set by the Engineer. The pipe shall be laid uphill from structure to structure with the bell (or groove) end up-grade. Occasional variations in grade will be permitted as follows: Above grade, one-fourth (1/4") inch, below grade, not to exceed one-half (1/2") inch; alignment, not to exceed three (3") inches or uniform deflection in a distance of twenty (20') feet. Adjustments of pipes to line and grade shall be made under the body of the pipe throughout its entire length and not by blocking or wedging. Bell holes shall be accurately placed and shall not be larger than is reasonably required to make the joint. Before the pipe is laid, the interior of the bell of the preceding pipe shall be carefully cleaned. After each section of pipe has been laid to line and grade, it shall be joined to the preceding section as required in Section 17.07(b), "Joints." After jointing procedure has commenced, there shall be no movement of the pipe whatsoever in subsequent operations. Material shall be placed uniformly on either side of the pipe to prevent any movement, in accordance with Section 12.06 of these Specifications. No walking in the trench or working over the pipe after it has been laid, except as may be necessary in tamping the earth and refilling, will be permitted until the pipe has been braced as specified above. The open ends of all sewer lines being installed shall be covered to keep out animal life, etc., whenever the line is left unattended for any length of time, such as overnight.

d. **Bedding:** Bedding for PVC pipe shall conform to the requirements of ASTM Designation: D2321, for the type and class of material encountered in the trench. These specifications shall take precedence over other bedding requirements specified in those Standard Specifications, but not exclude them.

e. **Backfill:** Backfill shall be performed as specified in Section 12.06 of these Standard Specifications except that the initial backfill operation shall conform to the requirements of the "Haunching and Initial Backfill" section of ASTM Designation: D2321.

f. **Deflection Test:** Deflection testing shall be provided by the contractor for all PVC installations. The contractor shall demonstrate that the maximum pipe deflection does not exceed five (5%) percent of the diameter of the pipe installed by pulling a properly sized solid ball or mandril or a rigid set of discs, as approved by the Engineer, through the pipe.

Where deflection of the pipe exceeds the allowable, the contractor shall, at his own expense, make suitable repairs to the line before it is offered for retesting and acceptance. All repairs shall be made to the satisfaction of the Engineer. Deflection testing shall be paid for at the unit price bid per linear foot of pipe when the items of work are included in the bid proposal. When no item of work is included in the bid proposal, payment for the testing shall be considered to be included in the price bid for the various items of work requiring the testing and no additional payment will be

made therefor. Full compensation for providing deflection testing, including furnishing all labor, materials, tools, equipment, and incidentals, and doing all work involved in performing the required testing shall be included in the unit price bid per linear foot for deflection testing or included in the various items of work requiring the testing and no additional payment will be made therefore.

17.08 WYES, GENERAL

Wyes shall be of the same material as the main sewer line and be manufactured to be compatible with the pipe with which they are installed. They shall conform to the strength and jointing requirements of the Standard Specifications that covers the type of pipe with which they are to be installed.

The contractor shall place wyes of the size specified at the locations shown on the plans or as directed by the Engineer. Wyes, unless otherwise specified, shall be inclined at an angle from the horizontal of not greater than forty-five (45°) degrees.

Each wye that does not terminate in a manhole shall be closed at the bell with a cap made for that purpose.

a. **Payment**: Payment for wyes shall be made on a unit price per each basis, or as otherwise specified in the Special Provisions, and shall include full compensation for supplying all labor, materials, tools, caps, equipment, and incidentals, and doing all work involved in furnishing and installing the wye as shown on the plans and as specified in these Standard Specifications and in the Special Provisions, and as directed by the Engineer, and no additional payment will be made therefore.

17.09 HOUSE BRANCHES, GENERAL

Sewer house branches shall be installed at the locations shown on the plans and in conformance with the Standard Drawings.

Four (4") inch and six (6") inch diameter branches may be connected directly to sewer mains eighteen (18") inches or greater in diameter providing that the type of connection to the main is approved by the Engineer. Other means of making connections to sewer mains will not be allowed.

House branches eight (8") inches or greater in diameter must connect to mains with a manhole structure. Installation of house branches shall commence at the bell of the wye or from the manhole and extend to a point (10') feet inside the property line. At this point, the branch shall be

plugged to seal the ends with a plug that is approved by the manufacturer of the pipe for use with his product.

a. **Marking:** The location where the sewer crosses beneath curb and gutter shall be marked on the curb with the letter "S". In cases where a concrete curb does not exist or will not exist in the near future, the contractor shall mark the end of the house branch with a 2" x 4" board, three (3') feet long that extends one (1') foot above the ground.

House branches shall be installed in existing streets in such a manner that the street will be open to traffic at all times.

17.10 SEWER LINE ACCEPTANCE TEST

The sewer line acceptance test shall be a low pressure air test performed under the supervision of the Engineer and utilizing the following procedure:

Test shall not be made until the section of pipe to be tested, including house branches, has been cleaned, completely backfilled and the trenches compacted as specified in Section 12.06 of these Standard Specifications.

Plugs to be used in the test shall be the pneumatic type equipped with pressure gauges for measuring air pressure in the sewer pipe to be tested. The pressure gauges shall be calibrated in one-half (1/2 psi) pound per square inch increments and connected to the plug in such a way that when the plug is placed in the installed line, the gauge can be located outside of the manhole.

All plugs shall be seal tested before being used in the actual test installation. The seal test shall be conducted by placing in both ends of a pipe laying on the ground, the plugs to be tested. The plugs shall then be inflated to twenty-five (25 psi) pounds per square inch-gauge. The sealed pipe shall then be pressurized to give (5 psig) pounds per square inch-gauge. The plugs shall not move when subjected to this pressure.

Pipe shall be tested between consecutive manholes. Prior to testing, the line shall be thoroughly wetted to minimize any loss of air through the pipe wall. After the pipe has been wetted, the plugs shall be installed and inflated to twenty-five (25 psig) pounds per square inch-gauge. Low pressure air shall then be introduced into the sealed line until a constant pressure of four (4 psig) pounds per square inch-gauge is maintained. The pressure in the line shall be maintained at this level for a minimum of two (2) minutes to allow the air pressure to stabilize in the pipe. During the stabilization period, the plugs shall be tested for air tightness. If a plug is found to be faulty, the pressure in the line shall be released, the faulty plugs reinstalled, and the process begun over again.

After the stabilization period, the air supply shall be disconnected. When the air supply is disconnected, the air pressure in the line shall be four (4 psig) pounds per square inch-gauge. After the air supply is disconnected, the gauge shall be watched until the air pressure reaches three and one-half (3.5 psig) pounds per square inch-gauge. At this point, the time required for the air pressure to drop from three and one-half (3.5 psig) to two and one-half (2.5 psig) pounds per square inch-gauge for asbestos cement and vitrified clay pipe and three (3 psig) pounds per square inch-gauge for PVC pipe shall be recorded.

The pipe reach being tested shall be considered as having passed the test when the time recorded for the pressure to drop one (1 psi) or one-half (1/2 psi) pound per square inch as previously specified is not less than the time shown for the given type and diameter of pipe in the following tables:

Clay Pipe and Asbestos Cement Pipe
Minimum Acceptable Time Required for Pressure
Decrease from 3.5 to 2.5 Psig

Pipe Diameter in Inches	Time (Minutes)
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.0
24	11.5

Plastic Gravity Sewer Pipe
Minimum Acceptable Time Required for Pressure
Decrease for 3.5 to 3.0 Psig

Pipe Diameter in Inches	Time (Minutes and Seconds)
4	2 minutes 32 seconds
6	3 minutes 50 seconds
8	5 minutes 6 seconds
10	6 minutes 22 seconds
12	7 minutes 39 seconds

a. **Air Test**: The air test is to be made on the pipe installation without the addition of seals to the pipe interior. The application of mortar, epoxy, caulking compounds, or

other material to the pipe will be prohibited. Failure to meet the air test will require the contractor to replace sections as required. Any broken pipe, separation of joints, or any pipe not laid true to line and grade, shall be replaced. All test expenses are to be borne by the contractor.

17.11 BEDDING

Bedding for all pipe, unless specified otherwise in these Standard Specifications or the Special Provisions, shall conform to the requirements of Section 12.06 of these Standard Specifications.

17.12 BACKFILL

Backfill for all pipe, unless specified otherwise in these Standard Specifications, shall conform to the requirements of Section 12.06 of these Standard Specifications.

17.13 PROTECTION OF PIPE

The requirements of this Section 17 shall not relieve the contractor of the provisions of Section 7.11 of these Standard Specifications.

The contractor shall exercise every precaution against damage to the pipe, including damage from subsequent backfill or compaction operations. Any damaged pipe shall be removed from the work or repaired as directed by the Engineer.

17.14 WATER/SEWER SEPARATION

Water and sewer mains and house services shall maintain minimum vertical and horizontal separation between each other as required by Title 17 of the State of California Administrative Code, Section 7081 (b). Attention is called to Section 20.08 of these Standard Specifications.

17.15 PAYMENT

The length of pipe to be paid for will be the slope length designated by the Engineer. When pipes are laid through structures as shown in the Standard Plans or as directed by the Engineer, the payment quantity will include those quantities within the structure. When pipes begin and/or terminate at structures, the payment quantity shall be exclusive of structures. When pipes enter a structure from a right angle and are cut to conform to the faces of the structure or of a slope, the

quantity to be paid for will be measured along the center line of the pipe to the inside face of the structure, or to the face of the slope.

The price paid per linear foot of pipe shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, including, but not limited to, all fittings and couplings as may be required, and doing all work involved in installing the pipe complete and in place, including, but not limited to, excavation and backfill, and for all tests as herein specified, all as shown on the plans, and as specified in these Standard Specifications and in the Special Provisions, and as directed by the Engineer.

SECTION 18 - BORING AND JACKING PIPE

18.01 GENERAL

This work shall consist of furnishing, boring, and jacking into place the type of pipe shown on the plans or specified in the Special Provisions at locations and between the limits shown on the plans or specified, and in accordance with these Specifications.

18.02 MATERIALS

The pipe designated on the plans shall be of the size and class shown on the plans or specified, except to the class of pipe designated has been determined for vertical loads only.

Additional facilities, reinforcement, or strength of pipe required to withstand jacking pressure shall be determined and furnished by the contractor at his expense.

Any sleeves for joints shall be manufactured of galvanized steel, stainless steel, or fiberglass, sufficient in strength to withstand all loads, and which will maintain a water tight joint.

18.03 JOINTS

Joints for sewer and storm drain pipe shall be of the rubber gasket type and shall conform to the requirements of the various pipe sections of these Specifications, except as herein modified.

If the annular space in the joints on the inside of sewer or storm drain pipe exceeds one (1") inch, the space shall be filled with cement mortar for the full periphery of the joint and finished smooth and flush with the interior walls of the pipe. Filling and finishing annular spaces shall be accomplished after the entire installation is completed for larger pipe.

18.04 EXCAVATION OF JACKING AND RECEIVING PITS

Jacking and receiving pits shall be excavated and sheathed, shored or braced in accordance with the Safety Regulations of the State of California, Department of Industrial Relations, Division of Industrial Safety, and in accordance with Section 7.18 of these Specifications.

18.05 JACKING AND BORING

Pipe shall be jacked in conformity with the prescribed lines and grades obtained from the stakes set by the Engineer. Excavation for the pipe shall be accomplished by boring or by hand digging. Jetting with water will be permitted with the approval of the Engineer.

The excavated hole, whether bored or hand dug, shall not be more than one-tenth (0.1') foot greater than the outside limits of the pipe, or where the contractor elects to use a conductor pipe, no more than one-tenth (0.1') foot greater than the outside limits of the conductor.

If the nature of the material is such that caving will likely occur and which will result in a greater space than specified above, a metal shield or jacking head shall be installed which extends a minimum of eighteen (18") inches ahead of the jacked piped or conductor. The metal shield shall cover a minimum of the upper one-half (1/2) of the periphery of the jacked pipe or conductor. Excavation shall not proceed beyond the shield.

Cavities or voids outside the limits specified above, regardless of cause, shall be backfilled with sand, soil, cement, or cement mortar as directed by the Engineer. The method by which backfill is to be performed shall be approved by the Engineer.

18.06 BACKFILL OF JACKING AND RECEIVING PITS

Jacking and receiving pits shall be backfilled in accordance with Sections 12.06 of these Specifications.

18.07 PAYMENT

The price paid per linear foot of pipe, shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in furnishing and installing the pipe in place, including, but not limited to, excavating, constructing and backfilling jacking and receiving pits, constructing metal shields (jacking heads), and backfill of voids or cavities, all as shown on the plans, as specified in these Standard Specifications and in the Special Provisions, and as directed by the Engineer.

SECTION 19 - SEWER AND STORM DRAIN STRUCTURES

19.01 DESCRIPTION

This work shall consist of constructing Portland cement concrete sewer and storm drain manholes, storm drain inlets and outlets and any miscellaneous structures appurtenant to sewers and storm drain all complete and in place at the locations shown on the plans, on the Standard Plans and as specified in these Standard Specifications and in Section 51 of the State of California Standard Specifications.

19.02 MANHOLES AND MATERIALS

a. **Manholes:** Manholes shall consist of a poured-in-place concrete base section, (except as otherwise provided by the Standard Plans), a pre-cast or cast-in-place riser

section, a reinforced concrete taper section, grade rings, cast iron frame and cover, and poured-in-place concrete collars.

Where specified on the plans or directed by the Engineer, manholes shall be left a minimum of one (1') foot and a maximum of eighteen (18") inches below final finish grade of streets or other areas to be reconstructed or where new streets or other facilities are to be constructed. The manhole frame and cover shall be temporarily set as specified by the Engineer. Unless otherwise specified, the Contractor will be required to raise these manholes to grade in accordance with the Standard Plans for raising manholes to grade, including returning after construction or reconstruction of streets or other areas, shall be included in the price paid per manhole, and no additional payment will be made unless a bid item is provided therefore.

Where existing manholes need to be raised or lowered to meet a new street grade, they will be lowered below the grading plane as specified in Section 12.02 of these Standard Specifications and marked until the street has been paved. After the paving material has been compacted, they will be dug out, the frame and cover removed and raised to grade as shown on the Standard Plans.

In all cases where manhole covers are to be brought to grade in areas with existing pavement, the repair shall be done in accordance with Sections 13 and 14 and shall equal in thickness and quality with the type of base, if any, and paving, that was existing or in accordance with the trench resurfacing requirements for the pipeline construction.

b. **Materials:** Concrete and mortar shall conform to the requirements of Section 10, "Portland Cement Concrete, Cement Mortar," of these Specifications. Concrete for base and cast-in-place riser sections shall be Class "A".

Pre-cast riser sections, tapered cones of flat tops, and grade rings shall be reinforced concrete and shall conform to ASTM Designation: C478, using Type II cement.

Metal frames and covers shall be cast iron meeting the requirements of ASTM Designation: A48, Class 25. Frames and covers shall be manufactured in accordance with the Standard Plans.

c. **Construction:** Manholes shall be constructed in accordance with Standard Plans and as herein specified.

All entering and leaving storm drain pipes shall be placed flush with the inside edge of the manhole, except that all edges shall be rounded with cement mortar to a three (3") inch radius as specified in the Standard Plans.

The base of sewer manholes shall be formed to create invert channels which shall be smooth and semi-circular in shape conforming to the size and flow line of the entering and leaving pipes.

If a sewer main is laid through a manhole, the top of the pipe shall be carefully broken out and removed, leaving the bottom half of the pipe to form the flow line of the manhole. Rubber weep rings are required where PVC pipe is joined to concrete manholes.

Changes in size and grade of invert channels shall be made gradually and evenly. Changes in direction shall be made with a smooth curve of as large of a radius as the size of the manhole will permit.

The top of the base section shall be keyed to receive the tongue end of the riser section. The key shall be formed in the freshly poured concrete by using a template manufactured to the dimensions of the riser section. If the riser is cast-in-place monolithically with the base section by using a slip form or other means, the key may be omitted between the base and the riser. If the base and riser sections are not poured monolithically but separately, a key shall be provided in the base section. In either case, a key will be required in the top of the riser section to receive the tongue end of the tapered cone. Cast-in-place riser sections shall have the minimum wall thickness specified in the Standard Plans.

The joints between the base and all pre-cast elements of the manhole, including adjustment rings and manhole frame, shall be filled with cement mortar prior to joining the elements.

The interior of the manhole shall be troweled smooth with a wooden trowel, removing excess mortar extruded out of joints for the entire height of the manhole, from the manhole frame to the floor. All excess mortar and any other debris shall be removed from the manhole.

d. **Raising to Grade:** Manholes constructed in finished roadway areas, or other finished areas, shall be brought to the same elevation as the surrounding finished surface in accordance with the Standard Plans.

e. **Abandoning Manholes:** Manholes abandoned in place shall be broken out within two (2') feet of the finished grade. The manhole frame and cover will be delivered to the City corporation Yard. Any pipes entering the manholes shall be sealed with concrete and the manhole backfilled with sandy soil and compacted to a relative compaction of ninety (90%) percent using optimum moisture and tested in accordance with Test Method No. California 216. Tests shall be provided in accordance with Section 6.02 of these Standard Specifications.

Manholes to be removed shall have the barrel and tapered section removed and the base broken up and disposed of. The manhole frame and cover will be delivered to the City Corporation Yard. After the complete manhole has been removed, the excavation will be backfilled in accordance with backfill requirements. Before backfilling, all sewer or storm drain pipes that have entered the manhole will be sealed with concrete. The cost of plugging existing pipes shall be included in the cost of removing the manhole and no additional payment will be made therefore.

19.03 STORM DRAIN INLETS AND OUTLETS

a. **Materials**: Concrete and mortar shall conform to the requirements of Section 10, "Portland Cement concrete; Cement Mortar," of these Specifications. Concrete shall be Class "A" using Type II Cement.

All metal parts shall be structural grade steel, except those permitted to be cast iron by the project plans or Standard Plans, and bar reinforcement shall conform to the requirements of Section 52, "Reinforcement," of the State of California Standard Specifications. All exposed metal parts, unless otherwise specified, shall be painted or dipped with an asphaltum paint approved by the Engineer.

b. **Forms:** Forms shall conform to the requirements of Section 10.07 of these Specifications. The Contractor shall not place concrete in any forms until the forms have been approved for line and grade by the Engineer.

c. **Construction:** Storm drain inlets or outlets may be constructed either by completely forming the interior and exterior of the structure, or by forming only the interior and upper section and neat pouring concrete for the lower section against undisturbed earth that has been excavated to the lines and grades indicated on the plans or as directed by the Engineer.

Storm drain inlets and outlets shall be constructed monolithically (one pour), or if the Contractor elects, the structures may be constructed in two sections (two pour) as provided in the details of the Standard Plans, with no additional payment made therefore. Rubber weep rings are required where PVC pipe is joined to concrete manholes or storm drain inlets.

The surface finish of the exterior exposed surfaces of concrete shall conform to the sidewalk, curb and gutter finish as required in Section 16.08 of these Specifications. The interior surface shall have a wood trowel finish. Excessive voids shall be chipped and repaired as directed by the Engineer.

Depths of the storm drain inlets and outlets may vary according to the depth and grade at which the lateral pipe must be installed in order to avoid existing utilities. The Contractor shall allow in his bid price for the various inlet or outlet structures full compensation for any possible increase or decrease in the anticipated depth because of adjustment in depth of lateral pipes.

Lateral pipes connecting to storm drain inlets and outlets shall be installed flush with the inside walls of the structure, except that pipe edges shall be smoothed and rounded with cement mortar to a three (3") inch radius as specified in the Standard Plans for the type of inlet or outlet installed.

Existing concrete work shall be removed and replaced as necessary to install proposed inlets and outlets, with full compensation therefore included in the unit price bid for said inlets and outlets.

A concrete pavement saw shall be used, unless determined to be impractical by the Engineer or unless some other method approved by the Engineer, such as removal of concrete to an adjacent expansion joint, obtains as satisfactory a result as saw cutting in removing of all existing concrete pavements, curbs, gutters, and sidewalks. A minimum of one and one-half (1½") inch depth of saw cut shall be used.

No separate payment shall be made for concrete saw cutting and full compensation therefore shall be included in the various bid items of work involving sawcutting.

Grading work in the immediate vicinity of the installed inlet structures shall be done by the Contractor as directed by the Engineer so as to provide for the movement of surface water to the newly installed inlet. Full compensation for said grading work shall be included in the price bid for inlet structures, and no separate payment will be made therefore.

At locations where inlets and outlets are constructed behind curb lines and within landscaped areas, all structure patching, final backfilling, final sprinkler system repairing and lawn reseeding and mulching behind the curb line shall be completed within fifteen (15) calendar days of placing the structure.

Where it is necessary to construct the curb and gutter portions of storm drain inlets and outlets on disturbed earth, a foundation for the curb and gutter shall be prepared by thoroughly compacting the disturbed material to the satisfaction of the Engineer.

19.04 MISCELLANEOUS STRUCTURES

a. **Materials:** Concrete and cement mortar shall conform to the requirements of Section 10 "Portland Cement Concrete; Cement Mortar," of these Specifications. Concrete shall be Class "A", unless otherwise specified.

Bar reinforcement shall conform to the requirements of Section 52, "Reinforcement," of the State of California Standard Specifications. All metal parts shall be of structural grade steel, except those parts that may be cast iron as provided by the details in the project plans or Standard Plans.

All exposed metal parts, except as provided below, or unless otherwise provided in these Specifications or the Special Provisions, shall be painted or dipped with an asphaltum paint approved by the Engineer.

Exposed metal parts for all outfall cages shall be galvanized by the hot dip method with the large pieces meeting the requirements as set forth in ASTM Designation: A123, and nuts, bolts and small pieces meeting the requirements as set forth in ASTM Designation: A153.

b. **Construction:** Miscellaneous facilities shall be constructed in accordance with the applicable portions of the Section 19.02 and 19.03 of these Specifications, and in accordance with the details and notes of the project plans or Standard Plans, or as directed by the Engineer.

The surface finish of the concrete shall conform to the sidewalk finish required in Section 16.08 of these Specifications, or as required by the Engineer. The interior surface of the concrete shall have a wood trowel finish.

The cost of connecting storm drain or sewer laterals or pipelines to miscellaneous facilities shall be included in the prices bid for the various items of work requiring the connections and no additional compensation will be paid therefor.

19.05 EXCAVATION

Excavation for all structures shall conform to Section 12.05 of these Specifications.

19.06 FORMS

Forms shall conform to the requirements of Section 10.07 of these Specifications.

19.07 BACKFILL

Backfill for all structures shall conform to the requirements of Section 12.06 of these Specifications.

19.08 CURING

Curing of exposed concrete surfaces shall comply with the requirements of Section 10.08 of these Specifications.

19.09 PAYMENT

Payment for all structures, unless otherwise specified in the Special Provisions, will be made on a unit price per each basis and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all work involved in constructing the structure in place complete, including, but not limited to, any and all structural elements, frame and cover assemblies, removal of existing concrete, excavation for the structure, excavating, connecting, existing or new lateral or main pipes, unless specified otherwise herein, and backfilling, all as shown on the plans, the Standard Plans, and as specified in these Standard Specifications, in the California Standard Specifications, the Special Provisions, and as directed by the Engineer.

SECTION 20 - DOMESTIC WATER FACILITIES

20.01 DESCRIPTION

This work shall consist of the furnishing and installing of water main, water services, fire hydrants, and their appurtenant valves, stops and structures including excavation and backfill, at the locations and of the sizes shown on the plans. All work shall be done in accordance with these Standard Specifications.

20.02 WATER PIPE AND FITTINGS

a. **Materials:** Water main pipe shall be Poly Vinyl Chloride (PVC) pipe conforming to AWWA Standard: C900. Pipe shall be Class 150, or Class 200 when required by the State of California Health Department as specified in Section 20.08 of these Standard Specifications. Poly Vinyl Chloride (PVC) pipe (SDR-PR) shall conform to the provisions of ASTM D2241. Joints shall be bell and spigot conforming to ASTM D2122 and shall be provided with flexible elastomeric seal conforming to the provisions of ASTM F477. Said pipe joints for said PVC shall conform to the provisions of ASTM D3139. PVC pipe shall conform to the dimension ratio as set forth in ASTM Standard C900, Table 2 for the class and size of pipe specified. Elastomeric gasketed couplings may be used.

Upon demand, the manufacturer of PVC pipe and couplings, if utilized, shall furnish to the Engineer a Certificate of Compliance in accordance with the provisions of Section 6.03 of these Standard Specifications.

Fittings for water pipe shall be mortar lined ductile iron. The ductile iron wall thickness shall conform to AWWA Standard: C110 (laying length waived) and the fitting shall be able to withstand a water pressure of two hundred and fifty (250 psi) pounds per square inch plus water hammer as specified by A.S.A. Standard: A21.10.

Cement mortar lining for cast iron fittings shall be installed on fittings whose interior has been sandblasted to the base metal and the thickness shall conform with AWWA Specifications: C104.

All fittings shall have bell ends designed for rubber gasket joints suitable for connecting to the PVC pipe being furnished or flanged ends suitable for connecting to other flanged fittings.

Upon demand, the manufacturer of mortar lined cast iron water fittings shall furnish to the Engineer a Certificate of Compliance in accordance with Section 6.03 of these Standard Specifications.

PVC pipe shall be of the size and class specified herein or otherwise specified in the Special Provisions. The pipe class or strength, as designated, has been determined for vertical load under average trench conditions. The Contractor shall exercise precautionary measures against cave-ins by providing adequate shoring or other devices to minimize the development of adverse trench conditions. Should the trench conditions exceed the average trench conditions, in lieu of the class or strength of pipe designated, the Contractor shall provide a class or strength of pipe in accordance with the manufacturer's recommendation for the conditions under which the pipe is placed, with no additional payment therefore. In lieu of providing a stronger class of pipe, the Contractor may provide a recognized special bedding approved by the Engineer, which is adequate to maintain pipe strength equivalent to average trench conditions. No additional compensation will be paid for such special bedding.

b. **Joints**: The ends of PVC pipe shall be of such a design that when properly laid they shall have a smooth and uniform interior surface. Ends of the pipe sections shall be free to cracks and broken edges. Pipe so found to be damaged shall be rejected for use in the work. Each joint shall be sealed to prevent leakage. Sealing of joints shall be accomplished with a sleeve coupling designed to maintain alignment and ensure tight flexible joints. Couplings shall be the rubber gasket type and shall conform to the requirements of Section 20.02 of these Specifications.

The ends of the pipe shall be thoroughly cleaned immediately prior to joining sections of pipe and installation of the coupling. The two sections joined shall be firmly placed together in such a manner that each succeeding section of pipe is forced "home" as far as possible into the coupling. No appreciable gap shall exist at the completed joint, except as permitted by the Engineer at locations where curves in the pipe alignment are specified or required. Excessive gaps in any case shall be cause for rejection of the work, and corrective measures shall be taken when ordered by the Engineer.

c. **Excavation:** Excavation shall conform to the requirements of Section 12.05, "Trench and Structure Excavation," of these Specifications.

d. **Pipe Laying:** Pipes shall be laid in conformity with the prescribed lines and grades obtained from stakes set by the Engineer.

Pipe shall be carefully lowered into place and adjusted to line and grade by scraping away or filling in and tamping material under the body of the pipe throughout its entire length and not by blocking or wedging. Depressions in the trench bed for pipe couplings shall be accurately placed and shall not be larger than is reasonably required to make the joint.

The Contractor may choose to use earth mounds to support the pipe slightly above the trench bottom in lieu of excavating bell holes. Mounds shall be constructed of select material free from rocks, large stones, and lumps or hardpan. They shall extend the total width of the trench and provide a minimum of six (6") inches of support for the pipe. The mound shall be of sufficient height to provide at least two (2") inches of clearance under couplings. Mounds shall be located as recommended by the pipe manufacturer. Before the pipe is laid, the interior of the preceding pipe and the ends of the pipes to be joined shall be carefully cleaned and lubricated. As each section of pipe is laid to grade, it shall be jointed to the preceding section as required in Section 20.02(b), "Joints." After jointing of each section of pipe is complete, there shall be no appreciable movement of the pipe in subsequent operations.

A single strand 14 gauge copper wire shall be laid along the top of and attached to all nonmetallic water pipe. The wire shall be held to the pipe at five (5') foot intervals with duct tape or plumbers tape or be wrapped around the pipe as directed by the Engineer to maintain the wires position on the top surface of the pipe being installed. The copper wire shall be attached to the flange or body of all metallic valves as directed by the Engineer. Other methods of providing means of detection of nonmetallic pipe with conventional metal detectors may be considered by the Engineer and shall be submitted for his review and approval prior to incorporation in any construction.

e. **Water/Sewer Separation**: Water mains shall maintain minimum vertical and horizontal separation from new or existing sewers as required by Title 17 of the State of California Administrative Code, Section 7081 (b), which is included in Section 20.08 of these Standard Specifications.

f. **Bedding:** Bedding for pipe shall conform to the requirements of Section 12.06 of these Standard Specifications or, with the permission of the Engineer, where well drained soil is present, the Contractor may use water tamping to bed the pipe.

Water tamping shall be carried out by first placing approved backfill material under and along both sides of the pipe and couplings to an elevation equal to, but not higher than the top of the pipe. Water shall then be flushed into the trench. The Contractor shall control the water in the trench by the use of dikes in order to insure that water does not run off before seeping through and compacting the backfill material.

g. **Concrete Thrust Blocks:** Concrete thrust blocks shall be provided on water mains at all points in the line where a change in direction more than five (5^{o}) degrees occurs, at all gate valves twelve (12") inches and larger, fire hydrant bends and at all dead ends. Thrust blocks shall be installed between the fittings and undisturbed earth of the trench wall and shall be at least the minimum dimensions shown on the Standard Plans. Thrust blocks shall be installed at tees created by a tapping sleeve and value placed on an existing main. For conditions not covered on the Standard Plans, the bearing area shall be computed and approved by the Engineer. Concrete for thrust blocks shall be Class B as defined in Section 10.01 of these Standard Specifications.

All concrete thrust blocks shall be allowed to cure for five (5) days prior to pressurizing the respective section of the pipeline.

h. **Testing and Sterilization**: All water mains and fittings shall be tested and sterilized in accordance with Section 20.07 of these Standard Specifications.

i. **Backfill:** Backfill shall be performed in accordance with Section 12.06 of these Specifications.

j. **Protection:** The Contractor shall exercise every precaution against damage to the pipe, including damage from subsequent backfill or compaction operations. Any damaged pipe shall be removed from the work or repaired as directed by the Engineer, at no cost to the City.

k. **Payment:** Payment for poly vinyl chloride water mains and fittings will be made on the basis of the slope length designated by the Engineer and shall be measured along the centerline of the pipe and through all fittings and valves.

The price paid per linear foot of pipe shall include full compensation for furnishing all labor, materials, (including couplings), fittings, (unless otherwise specified in the Special Provisions), thrust blocks, tools, equipment, incidentals, and doing all work involved in installing the pipe complete and in place, including excavation and backfill, and for all tests and sterilization of pipeline as herein specified, all as shown on the plans, the Standard Plans, and as specified in these Standard Specifications, the Special Provisions, and as directed by the Engineer.

20.03 BLOW-OFF VALVE AND ASSEMBLIES

a. **Description:** This work shall consist of furnishing and installing temporary or permanent blow-off valves, including service connection, service box, and fittings in place and complete at the locations shown on the plans, at low points, and at dead ends, all as shown on the Standard Plans and as specified in these Standard Specifications.

b. **Materials:** All materials shall be those designated on the Standard Plans and as specified herein:

1) Service Pipe and Fittings: Pipe and fittings shall be Schedule 80 galvanized steel pipe installed in accordance with ASTM Designation A120.

2) Valves, Valve Casing, Valve Box and Lid: Valves, valve casings, and valve boxes and lids shall be of the type specified in Section 20.04 of these Standard Specifications.

3) Curb Boxes: Curb boxes shall be of the type shown on the Standard Plans or City approved equal.

c. **Excavation:** Excavation shall conform to the requirements of Section 12.05 of these Standard Specifications.

d. **Installation:** Blow-off assemblies shall be installed complete and in place as herein specified, and as shown on the Standard plans and as directed by the Engineer.

Valves, valve casings, valve boxes and covers shall be furnished, installed, and brought to grade as shown on the Standard Plans and as specified in Section 20.04 of these Standard Specifications.

Curb boxes shall be installed as shown on the Standard Plans and as specified in Section 20.05 of these Standard Specifications.

e. **Backfill:** Backfill shall be performed in accordance with Section 12.06 of these Standard Specifications.

f. **Payment:** Payment for water blow-off assemblies will be made at the contract unit price per each and shall include furnishing all labor, tools, materials, including pipe, fittings, valves, stops, adapters, and collars, and all equipment, and incidentals, and doing all the work involved in installing the assembly, including, but not limited to, excavation, backfilling, raising valve covers to grade, and any testing and sterilization, all as shown on the plans, the Standard Plans, and as specified in these Standard Specifications, in the Special Provisions, and as directed by the Engineer.

20.04 VALVES

a. **Description:** This work shall consist of furnishing and installing resilient seat gate valves, valve casings and valve boxes and lids all complete and in accordance with the plans, the Standard Plans, and as specified in these Standard Specifications, the Special Provisions, and as directed by the Engineer.

b. **Valve Operators:** Valve operators shall be of the manual type. The operators shall be totally enclosed, self-locking, worm gear or screw type with adjustable stops to limit disc travel. The number of complete turns of the operator required to rotate the disc 90^{o} shall be approximately the same as an equivalent sized gate valve. Direction to open valve shall be counter clockwise. All valve operators shall be fully gasketed, weatherproof and factory packed with grease. Operators shall be of the size required for opening and closing the valve against 150 psi water pressure, and they shall have a torque rating not less than that shown in AWWA Standard C-504, Table 1, Class 150-B.

Should the distance between the operating nut and the valve cover exceed forty (40") inches, an extension mast shall be installed in order that the operating nut not exceed forty (40") inches from the valve cover.

Buried operators shall be worm gear or screw type and shall be equipped with standard AWWA two inch (2") operation nuts. All exposed fastenings shall be NI-Cad steel or City approved equal. Operators shall be specifically designed and suitable for permanent buried service. Operators for valves located above ground shall have dis-position indicators and a hand-wheel.

c. **Exterior Coating:** Valve bodies and operator housings and extension shall receive two exterior coats of heavy duty coal tar equal to Kopper's Bitumastic No. 505. Minimum thickness shall be 15 mills per coat. Application shall be at the place of manufacture. The coating shall be applied after the surface has been sand blasted to "commercial" standard as defined in SSPC Specification No. 6. The paint manufacturer's application recommendations shall be followed.

d. **Resilient Seat Gate Valves; Materials:** Resilient seat gate valves shall be tight closing equipment with a rubber seating ring and conforming to AWWA Standard: C500 and C504. The valve shall provide a tight shut-off against maximum differential pressures across the seat of two hundred (200 psi) pounds per square inch.

The valve stem and thrust collar shall be a single piece manufactured from modified manganese bronze, AB Alloy 676. The valve stem nut shall be manufactured from bronze, AB Alloy 676. The valve stem nut shall be manufactured from bronze conforming to ASTM Standard: B-62 and shall be integrally cast with the valve stem. The body, bonnet, stuffing box, and disc shall be manufactured from gray iron conforming to ASTM Standard: A-126 Class B.

The disc seating ring shall be internally reinforced molded natural rubber manufactured in accordance with ASTM Standard D2000, 4AA 730 and shall be attached to the disc by stainless steel screws manufactured from Type 304, 18-8 Stainless Steel.

All exposed nuts, bolts, cap screws, and fasteners shall be of a material approved by the City. The resilient seat gate valve shall be the type shown on the Standard Plans or City approved equal.

e. **Coatings:** The exterior of the body shall be coated with Asphalt Varnish conforming to Jan-P-450 and shall have a minimum thickness of coating of 30 mils. Prior to coating, the body shall be sandblasted to "commercial" standard as defined in SSPC Specification No. 6. The coating shall be installed at the place of manufacture in accordance with the manufacturer's recommendations.

The interior of the body and the valve disc shall be coated with a City approved two-part, thermosetting epoxy which is approved for contact with potable water.

f. **Operations:** The resilient seat gate valve shall be a non-rising stem gate valve which has an unobstructed passage when fully open. Valve shall be operable against 150 psi water pressure.

All buried valves shall be equipped with a two (2") inch wrench nut and shall close in the clockwise direction.

The valve shall be equipped with a two (2") inch wrench nut and shall close in the clockwise direction.

The valve shall be supplied with the proper connections as shown on the plans.

Should the distance between the operating nut and the valve cover exceed forty (40") inches, an extension mast shall be installed in order that the operating nut not exceed forty (40") inches from the cover.

g. **Nuts and Bolts:** Used for bolting flanged-end valves to pipeline flanges above ground, shall be hexagonal head machine bolts and hexagonal nuts conforming to ASTM Designation: A307, Grade B. All buried flanged-end valves shall be bolted to the pipe line flanges with City-approved stainless steel or teflon-coated nuts and bolts. All bolt threads shall be lubricated with graphite and oil.

h. **Valve Casings and Valve Boxes and Lids:** Valve casings shall be eight (8") inch Class 150 asbestos-cement pipe, manufactured in accordance with AWWA Standard C400 or Poly Vinyl Chloride (PVC) pipe manufactured in accordance with AWWA Standard C900. Valve boxes and lids shall be the type shown on the Standard Plans or City approved equal. The cast iron lid shall be marked "Water."

i. **Excavations:** Excavation shall conform to Section 12.05 of these Standard Specifications.

j. **Installation:** Valves shall be installed complete with valve casing and cover as shown on the Standard Plans and as directed by the Engineer. Valve casings and lids shall be installed and brought to grade as shown in the Standard Plans and as specified herein:

After the water main and valves have been installed and backfilling has commenced, the Contractor shall install, in a timely manner, the valve casings centered squarely over the operating nut and in a vertical plumb position. Valve operating nuts shall be free of any dirt or debris and the valves shall be in a wide open position.

Casing shall extend from the operator to just below any subgrade which may be subject to removal or compaction and capped.

After the base material is brought to grade and compacted, the casing shall be raised to a minimum height of eight (8") inches below the finished paving surface and capped. Extension of the existing casing shall be made with a standard coupling as specified for the type of pipe used to form the casing.

After paving operations have been completed, the Contractor shall return and raise the valve casing to grade with a valve box and lid as shown on the Standard Plans.

Any disturbed subgrade and/or base shall be replaced and compacted in accordance with Section 12.06 of these Standard Specifications, and the paving replaced as required to complete the installation, in accordance with Section 15 of these Standard Specifications.

k. **Backfill:** Backfill shall be accomplished in accordance with Section 12.06 of these Standard Specifications.

l. **Testing and Sterilization:** All valves shall be tested and sterilized in accordance with Section 20.07 of these Standard Specifications.

m. **Payment:** Payment for valves shall be made at the contract unit price per each and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all work involved in installing the valve complete and in place, including but not limited to, placing water valve casing and returning to raise the valve box to finish grade, all as shown on the plans, the Standard Plans, and as specified in these Standard Specifications, in the Special Provisions, and as directed by the Engineer.

20.05 WATER SERVICE ASSEMBLIES

a. **Description:** This work shall consist of furnishing and installing water service assemblies including service tap with saddle, corporation stop, service line, meter stop, or gate valve, fittings, meter and meter box, in place and complete at the locations shown on the plans or as established in the field by the Engineer, all as shown on the Standard Plans and as specified in these Standard Specifications.

b. **Materials:** All materials shall be as those designated on the Standard Plans or as specified herein:

1) Pipe and Fittings. Service pipe shall be Polyethylene (PE) 3408 CTS tubing manufactured and supplied to meet the requirements of ATM D2737, ASTM D3350, AWWA C-901. Tubing shall be tested and certified to NSF Standard #14 and #16 to meet 200 PSI at 73.4˚F maximum pressure rating and carry the logo of the NSF.

Fittings shall be new brass AWWA inlet compression connection type to be used with PE 3408 CTS tubing. They shall be manufactured and supplied in conformance with ASTM Designation: B62. Solder fittings shall be soldered with ninety-five (95%) percent tin and five (5%) percent lead or silver solder (pure).

Upon demand, the manufacturer of Polyethylene service tubing and brass fittings shall furnish to the Engineer, a Certificate of Compliance in accordance with the provisions of Section 6.03 of these Standard Specifications.

2) Meters. Meters, when required to be installed by the Contractor, unless otherwise directed by the City Engineer, shall be the cold water displacement type meter conforming to AWWA Standard: C700. The meter shall be the same size as the service being installed and shall be supplied with either flanged or threaded ends compatible with the type of service valve. Meters may be of the split case type with cast iron bottoms.

The meter shall be actuated by an oscillating type of piston. Replaceable change gears need not be supplied with the meter.

The register shall be calibrated in U.S. gallons and have a test sweep hand. The meter shall be tested for accuracy of registration in accordance with AWWA Standard: C705 and shall meet or exceed the accuracy limits set for in AWWA Standard: C700. Meters shall be as manufactured by Invensys, Golden State Flow Measurement, 8155 Belvedere Avenue #100, Sacramento, CA 95826 (916)732-9090; local supplier: Groeniger & Company, 2812 S. Orange Avenue, Fresno, CA 93725 (559)442-3333. Said meters shall be of the type designated in the Special Provisions or as designated by the City Engineer or as shown on the Standard Plans for the particular application.

3) Service Taps. All service taps shall be made with a single (1" service) or double (2" service) strap ductile or malleable iron saddle and shall be of the type shown on the Standard Plans or City approved equal.

4) Curb Boxes. Curb boxes shall be sufficient in size to contain the curb stop assembly and a meter. Curb boxes shall be of the type shown on the Standard Plans or City approved equal.

c. **Excavation:** Excavation shall conform to the requirements of Section 12.05 of these Standard Specifications.

d. **Installation:** Water service assemblies shall be installed as shown on the Standard Plans.

Service pipe, corporation stop, and curb fitting shall be installed as indicated in the following table:

Service Size	Corporation Stop	Service Pipe	Curb Fitting
1"	1"	1"	1" x 1" (Meter stop)

2"	2"	2"	2" x 2" (Gate valve)

1) Service Taps. In no case shall a service tap be made in a main closer than 18 inches to a bell coupling joint, or fitting. Service taps shall not be less than two feet (2') apart. Service taps shall be located opposite the service locations so that the service laterals will be perpendicular to the street center line. Service tap locations varying more than two feet (2') from the perpendicular must be approved by the Engineer prior to installation. Service taps shall be in accordance with the Standard Plans. Where dissimilar metals are joined, a dielectric connection, approved by the Engineer, shall be provided. Hole size drilled in the pipe shall be the same size as the corporation stop.

2) Water Service Lines. Water service lines may be installed by either standard excavation methods or by jetting or boring, with approved machinery, a hole of sufficient size through which the service line can be installed. The bore hole shall be straight, of uniform diameter, and true to grade. The cavity created by the jetting or boring shall not exceed, in diameter, the service line to be installed by more than one (1") inch. If the bore hole exceeds the diameter of the service pipe by more than one (1") inch, then a conduit of approved material shall be installed in the bore hole. The conduit shall be of sufficient size to fit snugly in place in the bore hole and act as a liner in which the service line shall be installed. Any conduit which is required to be installed due to the bore hole diameter exceeding the above criteria shall be furnished and installed at the Contractor's expense and no additional payment will be made therefore. Prior to installing any service line into an unlined bore hole, the lead end of the line shall be capped to insure no soil or other matter is scraped into the line.

e. **Curb Boxes:** Curb boxes and covers and meter boxes and covers shall be furnished and installed by the Contractor as shown on the Standard Plans or as specified in the Special Provisions. All curb boxes shall be installed completed and in place at the proper grade at the time of acceptance of the work. All service shall be marked by a "W" clearly visible on the curb face. When service lines or service gate valves fall within driveways, the Contractor shall either supply a traffic type curb box and lid or relocate one foot from the edge of the service box to the edge of the driveway and no additional payment will be made therefore.

f. **Backfill:** Backfill shall be performed in accordance with Section 12.06 of these Standard Specifications.

g. **Testing and Sterilization:** All water service assemblies and fittings shall be tested and sterilized in accordance with Section 20.07 of these Standard Specifications.

h. **Payment:** Payment for water service assemblies and fittings will be made at the contract unit price per each, and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all work involved in installing the water service assembly in place and complete, including excavation and backfill, and for all tests and sterilization of the assembly as herein specified, all as shown on the plans, on the Standard Plans, and as specified in these Standard Specifications, in the Special Provisions, and as directed by the Engineer.

20.06 FIRE HYDRANT ASSEMBLY

a. **Description:** This work shall consist of furnishing and installing fire hydrants, connector pipe, valves and fittings, complete and in place at the locations shown on the plans, as shown in the Standard Plans, and as specified in these Standard Specifications.

b. **Materials; Fire Hydrants:** Fire hydrants shall be of the wet barrel type conforming to AWWA Standard: C503 with traffic breakaway flange. Hydrants shall be the type shown on the Standard Plans with standard operating nut, nozzle cap, and two (2) standard, two and one-half (2½") inch nozzles and one (1), four and one-half (4½") inch pumper nozzle. Threading on nozzles shall be National Standard. The bottom of the hydrant shall be manufactured with a rubber gasketed inlet connection that will accept Class 150 asbestos-cement water pipe or Class 200 if specified on the plans.

c. **Connection Pipe:** Connection pipe from the water main fitting to the fire hydrant shall be six (6") inches (in diameter), Class 150 asbestos-cement pipe or Class 200 pipe if specified on the plans, furnished and installed in conformance with Section 20.02 of these Standard Specifications.

d. **Thrust Blocks:** Thrust blocks shall be placed as shown on the Standard Plans and shall conform to Section 20.02 of these Standard Specifications.

e. **Valves, Valve Casings, and Valve Boxes and Lids:** Valves, valve casings, and valve boxes and lids shall be furnished, installed and brought to grade as shown on the Standard Plans and as specified in Section 20.04 of these Standard Specifications.

f. **Excavation:** Excavation shall conform to Section 12.05 of these Standard Specifications.

g. **Installation:** Fire hydrant assemblies shall be installed complete and in place as specified herein, and as shown on the plans and on the Standard Plans and as directed by the Engineer. Valves shall be installed complete with casings, box and lid and the

casing brought to grade as specified in Section 20.04 of these Standard Specifications. The asbestos-cement connector pipe shall be installed as recommended by the manufacturer and in accordance with Section 20.02 of these Standard Specifications.

A blue reflective pavement marker, State of California Type C, shall be placed 1' (1 foot) from centerline on fire hydrant side of street.

The standard fire hydrant bury shall be thirty (30") inches. However, the length may be adjusted to achieve the grade specified on the Standard Plans with the "Extension Kit" supplied by the hydrant manufacturer. No other extension kit will be allowed to be used to extend the bury.

Hydrants shall be adjusted such that the pumper nozzle faces the street.

h. **Backfill:** Backfill shall conform to Section 12.06 of these Standard Specifications.

i. **Testing and Sterilization:** All fire hydrant assemblies shall be tested and sterilized in accordance with Section 20.07 of these Standard Specifications.

j. **Payment:** Payment for fire hydrant assemblies will be made at the contract unit price per each and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all work involved in installing the fire hydrant assembly complete and in place, including excavation, placing the connector pipe, thrust block, valve, and the valve casing, and bringing the valve casing to grade, and backfill, and for all tests and sterilization of the assembly, all as shown on the plans, on the Standard Plans, and as specified in these Standard Specifications, in the Special Provisions, and as directed by the Engineer.

20.07 TESTING AND STERILIZATION

a. **Description:** This work shall consist of testing the installed water system under a hydrostatic head for leaks and faulty workmanship and the sterilization of the installed water system prior to its use for transporting potable water. All work shall be performed by the Contractor under the direction of the Engineer in conformance with these Standard Specifications.

b. **Sterilization:** After the pipe and all appurtenances have been installed and backfilled, but prior to pressure testing and acceptance of any work, the entire water system installation, including all valves, fittings, hydrant runs, service laterals, and other accessories shall be sterilized in accordance with AWWA Specification: C601 and as specified as follows:

During laying operations, the Contractor shall attach chlorine pellets in each pipe section by means of glue. These pellets shall be HTH Pittabs, seventy (70%) percent chlorine, as manufactured by the Los Angeles Chemical Company, or City approved equal.

All mains shall be flushed with potable water after completion of construction and prior to disinfection. The Contractor shall provide a sufficient number of suitable outlets at the end(s) of the line(s) being sterilized in addition to those required by the plans, to permit the main to be flushed with water at a velocity of at least 5.5 feet per second over its entire length. The outlets provided shall meet the requirements for fittings as specified in these Standard Specifications. Temporary blow-offs may be installed during the sterilization and flushing to satisfy these requirements. Drainage facilities shall be constructed such that the water lines cannot be contaminated through the flushing outlet.

The pellets shall then be dissolved by filling the pipeline with potable water. The chlorine residual shall be between fifty (50) and one hundred (100) parts of chlorine per million. This residual shall be retained in the line for twenty-four (24) hours. Valves shall be opened and closed during the chlorine contact time.

After twenty-four (24) hours, the treated water shall be flushed from the water mains with potable water until the water being flushed from the line is equal chemically and bacteriologically with that of the permanent supply.

Forty-eight (48) hours after chlorination has commenced, the Contractor shall have a certified testing laboratory collect and analyze samples of water from the main. Samples shall be collected from blow-off valves, corporation stops, or curb stops installed for that purpose and as directed by the Engineer.

The laboratory shall furnish the results of the bacteriological tests to the Contractor and the Engineer seventy-two (72) hours after chlorination has commenced.

Should any of the foregoing periods fall on a City non-working day, the order of procedure will be continued to the next regular City working day.

The City Engineer may authorize, in writing, alternate methods of sterilization of pipe lines by the Contractor.

The pipe line will be considered as having been adequately sterilized if the bacteriological tests show a coliform M.P.N./100 mil. of water, less than two and two-tenths (2.2) on all samples. In the event the coliform number is above two and two-tenths (2.2), the lines shall be resterilized within twenty-four (24) hours as directed by the Engineer. The cost of all resterilization of the line as directed by the

Engineer shall be at the expense of the Contractor and no additional payment will be made therefore.

Payment for sterilization of water system facilities shall be considered to be included in price bid for the various items of work requiring the sterilization and shall include full compensation for providing all labor, tools, materials, chemicals, bacteriological tests, water equipment, and incidentals, and doing all work involved in performing the required sterilization as herein specified, as specified in the Special Provisions, and as directed by the Engineer.

Laboratory Testing shall be provided as specified in Section 6.02 of these Standard Specifications.

c. **Hydrostatic Pressure and Leakage Tests:** After the pipe and all appurtenances have been installed, backfilled, and compacted, and the pipe has been sterilized, the entire line shall be subjected to a hydrostatic pressure test in the manner specified as follows:

The line shall be filled with water at least twenty-four (24) hours prior to performing the test. All air shall be expelled from the line during the filling of the line. Where air valves or other suitable outlets are not available for introducing water or releasing air for test purposes, taps and fittings approved by the Engineer shall be installed and later securely plugged.

Pressure gauges calibrated to one (1 psi) pound per square inch shall be properly attached to the pipe line to be tested and the pressure in the pipe line shall be increased from the filled condition to one hundred (100 psig) pounds per square inch gauge. At this pressure, the addition of water to the line shall be discontinued and the line sealed. The line shall remain sealed for a period of thirty (30) minutes at which time the pressure in the line shall be recorded.

Water shall then be added to the line to repressurize it to one hundred (100) pounds per square inch - gauge and the amount of water required to repressurize the line shall be recorded. This amount of water shall be considered to be the amount of leakage that occurred during the test.

The line will be considered as having passed the Hydrostatic Pressure and Leakage Test if the leakage does not exceed the amounts in the following table:

Pipe Diameter	**Leakage Allowance at 100 psig gpm/100 coupling/30 min.**
4	0.50
6	0.75

8	1.00
10	1.25
12	1.50
14	1.75
16	2.00

Any failures or imperfect construction revealed by this test shall be promptly corrected by the Contractor as directed by the Engineer and the line shall be retested until the line is able to pass the test. All remedial corrections ordered by the Engineer or required to correct failures or imperfect construction and any retesting shall be made by the Contractor at his expense and no additional payment will be made therefore.

Payment for hydrostatic pressure and leakage tests shall be considered as included in price bid for the various items of work requiring the test and shall include full compensation for furnishing all labor, tools, materials, gauges, water, and incidentals, and doing all work involved in performing the required test as herein specified, as specified in the Special Provisions and as directed by the Engineer.

20.08 WATER/SEWER SEPARATION

a. **Description:** Separation of sewer and water mains shall be maintained as stated herein and as shown in the Standard Plans. The following material is an excerpt from Section 7081(b) of Title 17, California Administrative Code regarding "Required Separation Between Water Mains and Sanitary Sewer (10 feet horizontal and 1 foot vertical)":

PUBLIC HEALTH REASONS

Sanitary sewers frequently leak and saturate the surrounding soil with sewage. Water mains cannot always be relied upon to have continuous positive pressure therein and can be contaminated by a nearby leaking sewer. To install new water mains or to repair breaks in existing mains in sewage contaminated areas is a serious public health hazard. Hazards also can result if a nearby existing sewer is broken in the course of installing or repairing a water main; this can allow sewage to enter the water main trench or the water main. Water main failures will likely result in failure of any sewer located above or too near the water main.

A community with its buried water mains and sanitary sewers in close proximity is extremely vulnerable to waterborne disease outbreaks in the event of earthquake or man-made disasters that would cause simultaneous fractures to these conduits.

Any case in which both a water main and sewer fall in close proximity is extremely hazardous to the water consumers. There can be no dollar value set on the reduction of such hazards. All practical steps must be taken to avoid them.

BASIC SEPARATION

Water mains and sewers should be separated as far as is reasonable in both the horizontal and vertical directions with sewers always lower than water mains.

PARALLEL CONSTRUCTION

The horizontal distance between pressure water mains and sewers shall be a minimum of 10 feet.

PERPENDICULAR CONSTRUCTION (CROSSING)

Pressure water mains shall be at least one foot above sanitary sewers where these lines must cross. The basic separation distance specified shall be measured from the nearest edges of the facilities.

EXCEPTIONS TO BASIC SEPARATION REQUIREMENTS

Certain local conditions of topography, available space, etc., may create a situation where there is no alternative but to install water mains or sewer lines at less than the required separation. In such cases, more rigid construction requirements must be met as specified in the section below subject to the special provision and restrictions given in the following section. The basic separation requirements apply to sewers of twenty-four (24") inch diameter or less. Larger sewers may create special hazards because of flow volumes and type of joints used. Each installation of sewer larger than twenty-four (24") inch diameter must be reviewed in advance to determine if the separation and protection provided to nearby water mains is adequate.

SPECIAL CONSTRUCTION REQUIREMENTS

The special construction requirements necessary for sewers or water mains where the minimum required separation cannot be maintained are given in City of Reedley Standard Drawing W-6. These are two situations encountered in the field:

Case 1 - New Sewer - New or Existing Water Main
Case 2 - New Water Main - Existing Sewer

For Case 1 the special construction requirements apply to the sewer. For Case 2 the special construction requirements may apply to either or both the water main and sewer.

The special construction requirements shall apply to house laterals that cross above a pressure water main but not to those house laterals that cross below a pressure water main. The special construction requirements given are for the normal conditions found with sewage collection lines and water distribution mains. More stringent requirements may be

necessary for special circumstances such as water mains buried deeper than normal, unstable soil conditions, high ground water, etc. These situations must be reviewed with the Health Department in advance.

The special provisions and restrictions given below must be followed.

SPECIAL PROVISIONS AND RESTRICTIONS

Sewer force mains are not permitted to be constructed over water mains. Force mains constructed parallel to water mains must have the required separation as given in Basic Separation Requirements regardless of construction. When sewer force mains must cross under water mains, special approval of the Health Department is required in advance.

Construction of any sanitary sewers within twenty-five (25') feet horizontal distance of low head water mains shall be reviewed and approved by the Health Department in advance. (Low head water mains are defined in the State Health Department Policy as any water main which has less than five (5) psi at any time at any point in the main.)

Where a sewer must cross over a water main, it should cross at a 90° angle if possible and the length of sewer pipe shall be centered on the water main so the sewer joints are the maximum distance from the water main.

In pressure testing new water mains and/or sewers, special attention should be given to those areas where the lines are in close proximity. End Excerpt from State Health Department.

20.09 CROSS-CONNECTION CONTROL

a. **General:** In conformance with the requirements of the Fresno County Department of Health, cross-connection control (backflow prevention) shall be provided to protect service connections for new construction, and modification or change-of-use of existing construction.

b. **Definition:** A cross-connection is an unprotected connection between a potable water system and any other liquid system not approved as safe for human consumption. During times of flow reversal (backflow), contaminated water or other unsafe fluids can flow through a cross-connection and produce a health hazard.

Types of Cross-Connection (Backflow) Devices and When They are Required. The kind of backflow protection required depends on the degree of hazard and the kind of installation. There are five means of backflow protection:

1) Air gap separation
2) Reduced pressure principle backflow prevention device

3) Double check valve assembly
4) Pressure vacuum breaker
5) Atmospheric vacuum breaker

Air gap separation should be used to protect against backflow where feasible. Where it is not feasible, one of the four other methods should be used:

An approved, properly installed reduced pressure principle backflow prevention device should be used to protect the service of any installation where any material hazardous to health is brought into contact with the water system. This includes hoses or pipes immersed in hazardous materials.

An approved, properly installed double check valve assembly should be used to protect the service of any installation where any objectionable (but not necessarily hazardous) material is brought into contact with the water system.

An approved, properly installed pressure vacuum breaker (PVB) may be used where all use and piping downstream of the PVB is at least twelve (12") inches below the bottom of the PVB. No pressurizing device (e.g., a pump) or any other source of pressure may be connected downstream of a PVB; however, shut-off valves may be installed downstream of a PVB. A PVB may be used for continuous service for an indefinite period.

An approved, properly installed atmospheric vacuum breaker (AVB) may be used where all use and piping downstream of the AVB is at least six (6") inches below the bottom of the AVB. No source of pressure or shut-off valves may be installed downstream of an AVB. Continuous service through an AVB is restricted to twelve (12) hours.

SECTION 21 – LANDSCAPE AND LANDSCAPE IRRIGATION

This Section will apply to and regulate all walls and landscaping to be placed in the public rights-of-way and/or to be maintained by the City of Reedley. It is intended to provide and promote adequate, coordinated, and modern development to enhance the esthetics of the City.

Exceptions to this section will be processed in the same manner as required by the subdivision ordinance.

21.01 GENERAL POLICIES

Landscaping shall be provided on major arterial streets, major collector streets on which is placed a requirement for construction of masonry block walls, median islands, or on other such areas as required by the City Planning Commission.

Major arterial streets will require a landscaped area with a minimum width of twenty-one (21') feet, including the width of the wall behind the City standard sidewalk.

Major collector streets will require a landscaped area with a minimum width of seventeen (17') feet, including the width of the wall behind the City standard sidewalk.

With prior approval of the City Engineer, meandering sidewalk may be constructed.

21.02 DESIGN CRITERIA

(to be added later)

21.03 FINAL MAP REQUIREMENTS

Prior to recordation of the Final Map, the following requirements must be satisfied:

1. Conceptual approval of walls and landscaping adjacent to public street must be obtained from the City Planning Commission.

2. The subdivider/developer shall provide detailed wall plans, signed by a registered civil engineer, and landscaping and irrigation plans.

3. Three (3) sets of check prints for the wall design, landscape and irrigation plans shall be submitted to the engineering Division of the Public Works Department.
4. A complete materials list with cost estimate shall be submitted with the check prints.

5. Plan check and inspection fees, using the current fee rate and based on preliminary estimates, shall be submitted with the check prints.

6. Upon approval of the plans, the subdivider/developer shall provide two (2) sets of construction prints on mylar (film). One set will be returned to the subdivider/developer. The other set will be kept on file in the Public Works Department.

7. The subdivider/developer shall either install the landscaping and irrigation system, or enter into a separate improvement agreement and post approved security to guarantee installation of the landscaping and irrigation system.

21. 04 INSTALLATION AND MAINTENANCE

A. CONSTRUCTION

All improvements shall be installed in accordance with the approved plans, standards and policies of the City.

The Subdivier/developer shall notify the City Engineer prior to the installation of the irrigation system and landscaping.

B. MAINTENANCE

Prior to the Subdivider/Developer receiving written acceptance of the improvements by the City Engineer, the Subdivider/Developer shall, if required by the City, enter into a Landscape Maintenance Agreement with the City.

The Subdivider/Developer shall maintain all irrigation and landscaping for a period of ninety days after receiving written acceptance by the City Engineer.

The Subdivider/Developer shall pay all cost for water and electricity until the end of the ninety day maintenance period.

At the end of the ninety day period and after receiving the final written acceptance by the City, the Subdivider/Developer shall be responsible for notifying the utility companies by letter to arrange for the utility meters to be transferred to the City. Copies of the notification shall be sent to the Public Works Director/City Engineer.

21.05 LANDSCAPE AND IRRIGATION PLANS

Landscape and irrigation construction plans conforming to the approved concept or master plan, with a maximum sheet size of 24" x 36", shall contain notes, details, and specifications necessary to complete the proposed work. Said information shall include, but not be limited to, the following:

1. Title
2. Vicinity Map
3. Key Map (Scale of 1" = 200') used as Sheet Index
4. Signature Block on the Cover Sheet
5. Signed by the Landscape Designer
6. Approved by – Public Works Director/City Engineer
7. Approved by – Community Development Director
8. Drawn on Engineer's Scale on maximum 24" x 36 " sheet
9. Notes Peculiar to this Project
10. Bench Mark (Same one used on the Street Improvement Plans)
11. Legend (City Standard L-1)
12. Water Line, with Point of Connection(s) for the Project
13. Relation to existing pipes, utilities, etc. (show by cross-section)
14. Stationing – from south to north and from west to east (to coincide with the Street Stationing on Improvement Plans)
15. Construction Phasing Limits (if applicable)
16. Note on Title Sheet – 24 HOUR NOTICE IS REQUIRED PRIOR TO START OF CONSTRUCTION. CALL CITY OF REEDLEY PUBLIC WORKS DEPARTMENT AT (559)637-4200 EXT. 214.

SECTION 21.06 - GUIDELINES FOR CONTAINER-GROWN LANDSCAPE TREES

These guidelines were developed to assist landscape professionals in specifying high quality, container-grown, landscape trees. They were developed by arboricultural and horticultural professionals in California (Quality Tree Committee) comprised of municipal arborists, urban foresters, nurseryman, landscape architects and other landscape specialists. Depending on species, intended use, and availability of the trees, some elements of these guidelines may need to be modified.

21.061 PROPER IDENTIFICATION

All trees shall be true to name as ordered or shown on the planting plans and shall be labeled individually or in groups by species and cultivar (where appropriate).

21.062 COMPLIANCE

All trees shall comply with federal and state laws and regulations requiring inspection for plant disease, pests and weeds. Inspection certificates required by law shall accompany each shipment of plants. Clearance from the County Agricultural Commissioner, if required, shall be obtained before planting trees originating outside the county in which they are to be planted. Even though trees may conform to county, state, and federal laws, the buyer may impose additional requirements.

21.063 TREE CHARACTERISTICS AT THE TIME OF SALE OR DELIVERY

A. TREE HEALTH

As typical for the species/cultivar, trees shall be healthy and vigorous, as indicated by an inspection for the following:

1. foliar crown density
2. length of shoot growth (throughout crown)
3. size, color and appearance of leaves
4. uniform distribution of roots in the container media
5. appearance of roots
6. absence of twig and/or branch dieback
7. relative freedom from insects and diseases

Note: some of these characteristics can not be used to determine the health of deciduous trees during the dormant season.

B. CROWN

1. **Form**: Trees shall have a symmetrical form as typical for the species/cultivar and growth form.

a) **Central Leader**: Trees shall have a single, relatively straight central leader and tapered trunk, free of codominant stems and vigorous, upright branches that compete with the central leader. Ordinarily, the central leader should not have been headed. However, in cases where the original leader has been headed, an upright branch at least ½ (one-half) the diameter of the original leader just below the pruning point shall be present. Note: This section applies to single trunk trees, as typically used for street or landscape planting. These specifications do not apply to plants that have been specifically trained in the nursery, e.g., topiary, espalier, multi-stem, clump, etc., or unique selections such as contorted varieties.

b) **Main Branches (Scaffolds)**: Branches should be distributed radially around and vertically along the trunk, forming a generally symmetrical crown typical for the species. Minimum vertical spacing may be specified.

1. Main branches, for the most part, shall be well spaced.

2. Branch diameter shall be no longer than ⅔ (two thirds) the diameter of the trunk, measured 1" (one inch) above the branch.

3. The attachment of scaffold branches shall be free of included bark.

c) **Temporary branches**: Unless otherwise specified, small "temporary" branches should be present along the lower trunk below the lowest main (scaffold) branch, particularly for trees less than 1-½" (one and one-half inches) in trunk diameter. Temporary branches should be distributed radially around and vertically along the lower trunk. They should be no greater than ⅜" (three-eighths inch) in diameter and no greater than ½ (one-half) the diameter of the trunk at the point of attachment. Heading of temporary branches is usually necessary to limit their growth.

C. TRUNK

1. Trunk diameter and taper shall be sufficient so that the tree will remain vertical without the support of a nursery stake.

2. The trunk shall be free of wounds (except properly-made pruning cuts), sunburned areas, conks (fungal fruiting-bodies), wood cracks, bleeding areas, signs of boring insects, galls cankers and/or lesions.

3. Trunk diameter at 6" (six inches) above the soil surface shall be within the diameter range shown for each container size below:

Container	Trunk Diameter (in)	Soil level from Container Top (in)
#5	0.5" to 0.75"	1.25" to 2"
#15	0.75" to 1.5"	1.75" to 2.75"
24 inch box	1.5" to 2.5"	2.25" to 3"

D. ROOTS

1. The trunk, root collar (root crown) and large roots shall be free of circling and/or kinked roots. Soil removal near the root collar may be necessary to inspect for circling and/or kinked roots.

2. The tree shall be well rooted in the soil mix. When the trunk is carefully lifted both the trunk and root system shall move as one.

3. The upper-most roots or root collar shall be within 1" (one inch) above or below the soil surface. The soil level within the container below the rim should be within the distance ranges shown in the table above.

4. When the container is removed, the rootball shall remain intact.

5. The rootball periphery should be free of large circling and bottom-matted roots. The acceptable diameter of circling peripheral roots depends on species and size or rootball. The maximum acceptable size should be indicated for the species (if necessary).

E. MOISTURE STATUS

At time of inspection and delivery, the rootball shall be moist throughout, and the tree crown shall show no signs of moisture stress, as indicated by wilt, shriveled,

dead leaves, or branch dieback. Roots shall show no signs of being subjected to excess soil moisture conditions, as indicated by root discoloration, distortion, death, or foul odor.

21.064 INSPECTION

The buyer reserves the right to reject trees that do not meet specifications as set forth in these guidelines or as adopted by the buyer. If a particular defect or sub-standard element or characteristic can be easily corrected, appropriate remedies shall be required. If destructive inspection of rootballs is to be done, the buyer and seller should have a prior agreement as to the time and place of inspection; minimum number of trees to be inspected, or percentage of a species or cultivar, and financially responsibility for the inspected trees.

21.065 DELIVERY

The buyer should stipulate how many days prior to delivery that notification is needed.

21.066 TERMS AND DEFINITIONS

Codominant - Stems: two or more vigorous and upright branches of relatively equal size that originate from a common point, usually where the leader has been lost or removed.

Crown - The portion of a tree above the lowest main (scaffold) branch, including the trunk, branches and foliage.

Cultivar - A named plant selection from which identical or nearly identical plants can be produced, usually by vegetative propagation or cloning.

Girdling root - A root that partially or entirely encircles the trunk and/or large buttress roots, which could restrict growth and downward movement of photosynthate.

Included bark - Bark embedded within the crotch between a branch and the trunk or between two or more stems that prevents the formation of a normal branch bark ridge. This often occurs in branches with narrow-angled attachments or branches resulting from the loss of the leader. Such attachments are weakly attached and subject to splitting out.

Kinked root - A primary root (s), which is sharply bent, causing a restriction to water, nutrient, and photosynthate movement. Kinked roots may compromise the structural stability of roots systems.

Leader - The dominant stem which usually develops into the main trunk.

Photosynthate - pertains to sugar and other carbohydrates that are produced by the foilage during photosynthesis, an energy trapping process.

Root collar - The flared area at the base of a tree where the roots and trunk merge. Also referred to as the "root crown" or "root flare."

Shall - used to denote a practice that is mandatory.

Should - used to denote a practice that is mandatory.

Scaffold branches - large, main branches that form the main structure of the crown.

Temporary branch - A small branch that is retained temporarily along the lower trunk of young trees. Temporary branches provide photosynthate to increase trunk caliper and taper help protect it from sunburn damage and mechanical injury. Such branches should be kept small and gradually removed as the trunk develops.

Trunk - The main stem or axis of a tree that is supported and nourished by the roots and to which branches are attached.

SEWER PUMP STATION

Appendix A

March, 2007

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SECTION 1
GENERAL

All work involved in constructing sewer pump stations shall conform to the applicable provisions of the California Department of Transportation Standard Specifications, current edition, hereinafter referred to as Standard Specifications, City Standards, the improvement plans and these specifications.

The following specifications represent the minimum specifications allowable for a duplex sewer pump station. Additional features or specifications may be required as needed.

SECTION 2
REINFORCED CONCRETE

Scope of Work:

The work included herein shall conform to Section 51 "Concrete Structures" and Section 90 "Portland Cement Concrete" of the Standard Specifications. This work shall consist of furnishing all labor, tools, equipment and materials necessary for the installation of all structural concrete, minor concrete and mortar as shown on the plans and specified herein.

Structural Concrete:

Strength:
The minimum ultimate (28 days) compressive strength of all structural concrete shall be 3250 psi.

Concrete Mix:
All structural concrete shall be Class "A" (564 pounds of cement/cubic yards of concrete) with Type II Portland Cement. The maximum size of aggregate shall be 1½ inches.

Slump:
The amount of water used for mixing (including free moisture carried by the aggregate) shall not exceed the maximum necessary to produce a 4-inch slump as determined by ASTM test method C-143.

Placing:
Concrete shall be placed in accordance with Section 51-1.09 "Placing Concrete" of the Standard Specifications.

Forms:
All formwork shall conform to Section 51-1.05 "Forms" of the Standard Specifications.

Defective Concrete:
Concrete not meeting the minimum strength requirement, not formed as indicated, not true to intended alignment, which has large voids or rock pockets, which has wood or other debris embedded which has a surface deviation greater than ⅛ inch in 10'-0", or does not fully conform to the specifications shall be deemed defective, and if so directed by the Engineer, shall be removed and replaced with concrete complying with the drawings and specifications.

Minor Concrete:

Concrete Mix:
All minor concrete shall be Class "A" (564 pounds of cement/cubic yards of concrete) with Type II Portland Cement. The maximum size of aggregate shall be 1 inch.

Formwork:
Earthen forms for exterior concrete surfaces shall be allowed only upon approval by the Engineer. The acceptability of the earthen forms shall be solely decided upon by the Engineer.

Mortar:

All mortar shall conform for Section 51-1.135 "Mortar" of the Standard Specifications.

Non-Shrink Grout and Drypack:
Non-Shrink grout shall conform to Section 50-1.09, "Bonding and Grouting" of the Standard Specifications with a required admixture using the following proportions:

Portland Cement	1 part by Wt.
Sand (100% Passing #8 Sieve	1 part by Wt.
Water	4 ½ - 5 ½ gal./sack cement
Sika "Intraplast" N Admixture	1 % by Wt. of cement

Drypack shall be composed as for grout except that only enough water shall be added to wet the mixture (no free water and no slump). Drypack shall be tamped into place and cured as specified for concrete in this section.

Contractor shall not use non-shrink grout or drypack that has been mixed longer than 30 minutes. No retemping shall be allowed.

Finishes on Walking Surfaces:

The contractor shall give a monolithic finish to the walking surfaces at all concrete floors and slabs within and adjacent to the structures which are to be constructed under this contract. All concrete surfaces to be so finished shall be thoroughly worked, brought to a uniform smooth finish and given a final brush finish.

Curing:

All newly placed concrete shall be kept moist for the first seven (7) days after the concrete has been placed. This shall be achieved by one of the following methods:

1. Ponding

2. Cotton mats, rugs or carpets kept continuously wet.

3. Kraft paper or plastic film with joints dealing or tapered. The perimeter of the paper shall be sprinkled once daily.

4. Curing compound method: All exposed cast in place concrete shall be cured with white pigmented curing compound (State Spec. 8030-71D-05, Type 1) in accordance with Section 90-7 "Curing Concrete", of the Standard Specifications.

Forms may be used to cure formed portions in accordance with Section 90-701D "Forms-In-Place Methods" of the Standard Specifications. If the forms are removed prior to seven (7) days after the pour, the newly exposed areas shall be cured for the remainder of the seven (7) days by one of the above methods.

SECTION 2
METAL WORK

Scope of Work:

The work included herein shall conform to Sections 52-"Reinforcement", 55 - "Steel Structures" and 75 - "Miscellaneous Metal" of the Standard Specifications. This work shall consist of furnishing all labor, tools, equipment and materials necessary for the installation of all reinforcing steel, structural steel and miscellaneous metal as shown on the plans and specified herein and as directed by the Engineer.

Reinforcing Steel:

Materials:

1. Bars shall be deformed bars conforming to ASTM A-615, as follows:

Bar Size	Grade
#4 and smaller	Grade 40
#5 and larger	Grade 60

2. All reinforcing steel shall be new, clean, free from oil, dirt, loose mill scale, excessive rust, mortar, or other coatings that would destroy or reduce the bond.

Placing Reinforcement:

The bending and placing of all reinforcement shall conform to the "Manual of Standard Practice" of the American Concrete Institute. Bends shall be made around a pin having a diameter of not less than four (4) times the bar diameter for stirrups and ties, six (6) times the bars except for bars larger than 1" which shall be eight (8) times the bar diameter. Bars shall be bent cold.

Reinforcing shall be accurately placed in accordance with the drawings and shall be securely tied in position with at least No. 16 gauge annealed wire at all bar intersections. Metal chairs and bolsters shall be used to hold all steel above the form bottoms at the proper distance. Metal spacers shall be used to secure the proper spacing of the steel. Precast concrete blocks shall be used to support reinforcing steel off the ground in footings and off the soffit of concrete exposed to weather. The clear distance between parallel bars shall not be less than 1 ½ times the bar diameter, but in no case less than 1 ½ inches nor less than 1 ⅓ times the maximum size of coarse aggregate.

Splices shall be made with a lap of at least 30 bar diameters unless noted otherwise. The bars shall be placed in contract and wired together in such a manner as to maintain a clearance of not less than the minium clear distance to the other bars and to the surface of the concrete. Minimum clear distance to all concrete surfaces shall be 2 inches unless otherwise noted on the plans.

Pump Access Covers:

The wet well shall be equipped with a pump access cover for each pump as shown on the plans. Access covers shall be stainless steel-fitted aluminum construction, designed for access to submersible pumps. Covers shall be equipped with a guide bar bracket, safety chain hook, electric cable support, and a hasp for a padlock. Covers shall be of a size compatible with the pumps.

Valve Box Access Cover:

Cover shall be double leaf, channel frame aluminum construction with stainless steel hardware and a hasp for a padlock. Cover shall be of a size compatible with valve box opening, minimum size shall be 5' x 6' with each leaf being 3.0' x 5'. The cover shall withstand a live-load of at least 300 pounds per square foot and be equipped with spring door operators and automatic hold open arms. The cover construction shall have a mill finish with Bituminous Coating applied to exterior of the frame.

Anchor Bolts and Concrete Anchors:

Concrete anchorage devices shall be installed in the concrete as shown on the plans so that the attached equipment will bear firmly against the concrete. The concrete anchors for the pump discharge mount shall be RED HEAD RED-CHEM STAINLESS STEEL CONCRETE ANCHORS # CHEM-2034, ¾" Diameter, or approved equal.

Bolted Connections:

All bolts, nuts and washers within the wet well shall be stainless steel.

SECTION 3
PAINTING

Scope of Work:

Under this item, the Contractor shall furnish and apply to the satisfaction of the Engineer, protective paint in colors as selected by the Engineer. All exposed interior and exterior metal surfaces, except aluminum, galvanized steel, stainless steel and chrome plated metal, shall be coated.

All paint shall be delivered in original containers and shall be applied in strict accordance with the recommendations of the manufacturer.

Preparation of Surfaces:

Concrete Surfaces:

Before painting, all concrete surfaces to be painted shall be thoroughly cleaned. Surfaces to be painted shall be completely wire brushed to remove any loose concrete or paint, and cracks shall be patched. Concrete surfaces to be painted shall have all air pockets or other imperfections filled, so that a smooth surface results. All surfaces shall be completely dry prior to painting.

Concrete surfaces which shall be coated with a protective coating for the purpose of protecting the concrete surface, shall have all air pockets or other imperfections in the concrete filled, so that a smooth concrete surface results, after the surface has been opened, it shall be accomplished soon after the removal of the forms to promote adequate adhesion. Covering over the surface with a thin layer of mortar shall not be acceptable.

Metal Surfaces:

All metal work to be painted shall be absolutely clean and free of all rust and grease.

All exposed cast iron or steel piping to be painted, which has a previously applied coal tar derivative, shall be primed, prior to finish coating, with two (2) coats of Koopers "Tarstop", or approved equal.

Completion of Surface Preparation:

After the Contractor has completed the job of preparing all surfaces to be painted, the surfaces shall be inspected and approved by the Engineer prior to the application of any protective coatings.

Materials:

Under these specifications, all paint products to be furnished for application shall be as manufactured by Koppers, or approved equal.

Coating System:

A. One (1) coat of Bitumastic #50 M. The completed surfaces shall have a dry thickness of at least 16 mil.

B. Two (2) coats of Bitumastic #300 M. First coat to be red, second coat to be black. Application of second coat to be applied within 24 hours of the first. The completed surfaces shall have a dry thickness of at least 16 mil.

C. One (1) coat of 622 Rust Penetrating Primer followed by two (2) coats of Glamortex 501 Enamel, color: OSHA Safety Blue.

The completed surfaces shall have a dry thickness of at least 3 mil.

Exterior Concrete Painting:

Coating System A shall be used to paint the wet well and valve box exterior surfaces in contact with the soil.

Interior Concrete Painting:

After surface preparation, the Contractor shall paint all submerged concrete surfaces, surfaces exposed to sewage fumes, all valve box interior, with coating System B.

Wet Well Metalwork Painting:

All exposed metalwork surfaces which are submerged or subjected to sewage fumes shall be painted with coating System B. Metal located within water containing compartments shall be considered submerged. The pumps, pump discharge, pump power cables and lifting cables are not to be coated. Also the access covers are not to be coated.

Valve Box Metalwork Painting:

All exposed metalwork surfaces in the valve box shall be painted with coating System C. The access cover in not to be coated.

SECTION 4
PIPEWORK

Scope of Work:

Under this section, the Contractor shall furnish all labor and materials for, and shall install, complete and test as specified, all pipework and appurtenances constructed under this contract.

Shop drawings are required to be submitted by the Contractor to the Engineer for all fabricated pipework, valves and special fittings.

Materials:

PVC Gravity Sewer Pipe:

PVC sewer pipe shall conform to City of Reedley standards and the requirements of ASTM D 3034, SDR 35, and shall have gasketed joints.

PVC Force Main:

PVC force main shall conform to AWWA C900 and shall be class 150.

Ductile Iron Pipe (D.I.):

Ductile iron pipe and fittings shall be cement mortar lined. Pipe joints shall be flapped or as shown on the plans. Applicable sections of the following standards apply.

Standard	Item
AWWA C151	Ductile Iron Pipe
AWWA C104	Cement Mortar Lining
AWWA C110	Fittings
AWWA C111	Rubber Gasket Joints

Cast Iron Fittings (C.I.):

Cast iron fittings shall be in accordance with the American Water Works Association Standard C110-77, "Gray Iron and Ductile Iron Fittings, 3-inch through 48-inch, for Water and other Liquids".

Couplings and Flanges:

In the locations shown on the plans, flanged coupling adaptors shall be Ford Style FFCA and flexible couplings shall be Ford Syle FCI or approved equal.

Flanges shall be of a size and pattern to fit valves and other piping to which they are to be connected.

Small Piping and Fittings:

These specifications shall apply to all metal pipe four inches (4") in diameter and smaller, other than cast iron piping, and shall also apply to all valves and cocks, unions, fittings, and connecting devices, and to pipe lines furnished as a part of the several piping and equipment items within the pump station. Small pipe shall include all nuts, bolts, gaskets, hangers, supports, the drilling of holes and flanges, and all materials and labor that may be necessary to the best installation of this class of work.

Fittings:
All screwed fittings shall be "American Standard Malleable Iron Screwed Fittings", 300 lb. W.O.G. of standard form and dimensions. Malleable iron shall conform to current standard specifications for malleable iron.

Castings, as adopted by the American Society for Testing Materials. All fittings shall be galvanized to correspond with pipe on which they are installed.

All fittings necessary for the satisfactory alignment and arrangement of piping and all necessary unions and cleanouts shall be furnished by the Contractor.

Gate Valve:

All gate valves shall have standard flanged ends. Each valve shall have a 2" square operating nut. Valves shall correspond in size with the run of pipe on which it is installed, except as otherwise noted. Gate valves shall be 4" CLOW AWWA, F-5070, or approved equal.

Swing Check Valve:

Check valves shall be flanged, iron body, bronze-mounted check valves. Hinge pins shall be stainless steel or other noncorrodible metal, and the stuffing box assembly shall be made of bronze, securely screwed to the valve body. Swing check valves shall be Mueller check valves catalog number A-2600-6.02 or approved equal.

Pipework in Concrete:

Where formed holes are left in the concrete, the Contractor shall be responsible for the accuracy of their location and for sealing around pipes to produce water tightness where necessary. He shall also provide any necessary pipeline openings through the concrete which may have been omitted.

Domestic Water Service:

The Contractor shall provide and install all items as shown on the plans and as needed to supply 2" water service per City of Reedley Standard Plan W-3B.

Reduced Pressure Backflow Preventer:

The backflow preventor shall be a reduced pressure principle type and shall be suitable for supply pressure up to 175 psi. The backflow preventor shall be designated for inline servicing. The device shall be Febco Model 825Y for a 2" service, or approved equal.

Domestic Water Spigots:

Contractor shall supply one (1) spigot as shown on the plans.

Wet Well Water Stops:

All cored openings in the wet well wall shall be sealed with water stops secured by stainless steel bands and non-shrink grout as specified in Section 2.

Water stops shall be Fernco "Large Diameter Water Stops", or approved equal.

Discharge Wash-Down Assembly:

Wash-down assembles as shown on the plans shall use 8" x 1" Tap Rockwell 323 Double Strap bronze saddles, or approved equal.

Wet Well Construction:

Wet well shall be constructed using 72-inch diameter, Class IV reinforced concrete pipe sections manufactured to meet ASTM Standards C76, C443, and C655. The wet well shall be constructed with no more than three pipe sections. The lower wet well section shall be a minimum of 6 feet in length.

Interior surfaces shall be painted prior to the installation of pumps. The discharge connection mating surface shall be kept clean and free of all paint.

Sewer Manholes:

The Contractor shall construct the sewer manholes as shown on the plans per City of Reedley Standard Plan S-2.

SECTION 6
MECHANICAL EQUIPMENT

Scope of Work:

Under this section the Contractor shall furnish and install all mechanical equipment and appurtenances for this project as shown on the plans and hereinafter specified. All such equipment shall be placed by the Contractor in satisfactory operating condition as an integral part of the construction of the project.

The Contractor shall provide and install all necessary items and appurtenances required for the proper placement and functioning of the project components as intended, whether such items and appurtenances are directly specified or not.

All equipment shall designed, manufactured and assembled in such a manner so as to perform satisfactorily within housings, enclosures and the environment into which it is to be installed and operated. All items shall be tested in place. Required supervision for installing, testing and starting shall be furnished by factory-trained personnel at no charge.

The Contractor shall verify all actual dimensions of existing and new construction equipment areas, bases and mountings; and he shall be responsible for insuring proper fit of the equipment selected for installation. The Contractor shall be fully responsible for the compatibility of furnished mechanical, electrical, pipework and structural items and appurtenances.

Pump Warranty:

The pump manufacturer shall warrant the pumps and motors being supplied to the owner against defects in workmanship and materials for a period of one (1) year under normal use, operation and service. The warranty shall be in printed form and shall apply to all similar units.

Submersible Pumps, Motor and Slide-away Coupling

The Contractor shall furnish and install a totally submersible pump, as shown on the plans and as described hereinafter. The pumping unit shall conform to the following characteristics:

Two (brand) size (size) Model _____ Torque-flow vortex submersible pumps with _____ HP, _____ phase, _____ volt, _____ hertz submersible motors and slide-away casings.

Pump casing shall be constructed of ASTM A48 Class 30 grey iron and shall be completely open from suction to discharge with now wearing rings or impeller face plates required. All internal case clearances shall be equal to the discharge diameter so that all material which will pass through the discharge can pass through the pump.

The impeller shall be of the recessed design, constructed of ASTM A48 Class 30 grey iron and shall be mounted completely out of the flow path between the pump inlet and discharge connection, so that the solids pumped are not required to flow through the impeller. The impeller shall be keyed to the motor shaft and secured by an impeller bolt.

The motor shall be provided with thrust and radial bearings to carry the entire load which may be imposed upon it under all operating conditions. Motor shall be approved by Underwriters Laboratory for operation in a Class I, Group D, Division I hazardous location.

The motor shall have two mechanical seals - the lower on outside the motor and protecting the upper on which is an oil-filled chamber. Moisture detector probes in the oil-filled seal chamber shall be connected to a customer-supplied alarm to indicate the presence of moisture in the seal chamber. Thermal over-load protectors shall be imbedded in the motor windings and connected to the starter to disconnect the motor in the event of overload.

The slide-away coupling shall consist of a foot-mounted discharge elbow and adaptor, steel baseplate, upper and lower rail supports, lifting yoke and cable. All metal to metal interfaces where movement might occur shall be non-sparking. The foot-mounted discharge elbow and adaptor shall conform to ASTM A48 Class 30 grey iron.

Lifting cable and hardware shall be stainless steel. Cable shall have an minimum working load of 2,400 lbs. and shall be supplied by the pump manufacturer.

PERFORMANCE

Each pump shall be capable of operating at the following conditions:

First design point = _____ GPM @ _____ ' TDH.

Second design point = _____ GPM @ _____ ' TDH.

(Maximum) (Maximum) shut off = _____ feet.

Impeller selected shall be capable of operating at all three design points without exceeding _____ BHP.

Minimum clearance through case = _____ Inches

Pump Test:

The pump manufacturer shall perform the following inspections and tests on each pump before shipment from factory.

1. Impeller, motor rating and electrical connections shall first be checked for compliance to the customer's purchase order.

2. A motor and cable insulation test for moisture content or insulation defects.

3. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.

4. The pump shall be run for 30 minutes submerged, a minimum of 6 feet under water.

5. After operational test No. 4, the insulation test (No. 2) is to be performed again.

A written report stating the foregoing have been done shall be supplied with each pump at the time of shipment.

The pump cable end will then be fitted with a shrink fit rubber boot to protect it prior to electrical installation.

Documentation:

Standard drawings supplied shall include pump outlines, controls, access frames and typical installation guides. Electrical control wiring diagrams shall be supplied. Instruction and maintenance manuals and pump parts lists for the pumps installed shall also be supplied.

Acceptance Tests:

After installation, each pumping unit shall be given a running test, during which it shall demonstrate its ability to operate without vibration, overheating or excessive current draw, and to pump the capacity and head specified. These tests are to be conducted by the Contractor in the presence of the Engineer. The Engineer shall be given at least 24 hours notice in advance of each test.

During the tests, observations shall be made of motor input, vibration, noise and overheating to detect any defects in the equipment. Written results of each test shall be submitted by the Contractor to the Engineer prior to approval of the tested pumps.

The Contractor shall provide at his expense the necessary water, gauges, meters, piping and labor necessary for conducting the tests. All adjustments needed to place the equipment in satisfactory working order shall be made at the time of the tests. All defects or defective equipment revealed by or noted during a test shall be corrected or replace promptly at the expense of the Contractor, and if necessary, tests shall be repeated until satisfactory results are obtained.

In case the Contractor is unable to demonstrate to the satisfaction of the Engineer that the units will satisfactory perform the service required, and that they will operate free from vibration and over heating, the units may be rejected. The Contractor shall then remove and replace the equipment at his own expense.

SECTION 7
ELECTRICAL WORK

Scope of Work:

The Contractor shall provide all the required labor, project equipment and materials, tools, construction equipment, safety equipment, transportation, test equipment, and satisfactorily complete all the electrical work shown on the drawings and included in these specifications.

The electrical work for this project includes the providing of all electrical materials and equipment required for a complete and fully operating facility. The Contractor shall provide temporary power for system testing.

Included in this work is the providing of all required conduits, conductors, and cables including those specified; shown on the drawing; and neither specified nor shown on the drawings but nonetheless required for satisfactory interconnection and operations of all electrical, mechanical and instrumentation equipment either shown on the respective drawings, specified in the respective portions of the specifications, or otherwise required.

Codes:

All the electrical equipment and materials, including their installations, shall conform to the following applicable codes:

1. National Electrical Code, Latest Edition
2. State Electrical Code, Latest Edition, Title 24 Part 3
3. Occupational Safety and Health Act Standards
4. City of Reedley Codes and Ordinances

Variances:

In instances where two codes are at variance, the more restrictive requirements shall apply.

Standards:

Equipment shall conform to the applicable EIA, IEEE, and NEMA Standards.

Drawings:

The electrical drawings shall govern the general layout of the completed construction. Except where special details are used to illustrate the method of installation of a particular piece or type of equipment or materials, the requirements or descriptions in this specifications shall take precedence in the event of conflict.

Pump Station Control System:

Contractor shall furnish and install the ultra sonic control for the two pumps to be installed in this station. System shall be the Milltronics Hydro Ranger 200 as described in manuals by Siemens Milltronics Process Instruments Inc., 1954 Technology Drive, P.O. Box 4225 Peterborough, Ontario Canada, K9J7B1. Enclosure shall be Type 4X/NEMA 4X/IP65 poly carbonate, 9.5" x 6.9"x3.5". A.C. power shall be 240V ac, 50/60 Hz, 36 VA (17W). Fuse: F3: 2G, slow blow, 0.375A, 250V. Temperature sensor fuse F2: Belling Lee, L754, 4000A HRC, ceramic type, 50mA, 250V. Mount enclosure at shoulder height in ambient temperatures between -20°C to 50°C (-5°F to 122°F) in relative humidity suitable for outdoors (Type/Nema 4X, IP65 enclosure). If mounted in secondary enclosure provide louvers and ventilation by fan to maintain ambient temperature within operating limits. Mounting to provide easy access for hand programmer and avoid exposure to direct sunlight and proximity to high voltage, current runs & variable frequency motor speed controls.

Output from the ultra sonic control system shall be to display, chart recorder, alarm, pump control, and to actuate the emergency power system for the stations operation.

Contractor shall furnish and install one ultra sonic Milltronics Hydro Ranger 200 control system and control panel (conforming to NEMA 3R and 12 standard) with a hinged inner door (dead front) fabricated from 5052-H32 0.080 thick marine alloy aluminum. The inner door shall be held closed by two hand operated ¼ turn fasteners and shall contain the control instruments and indicators. The tamper proof outer door shall be lockable using a hasp. Ventilation shall be provided by air inlet louvers on one side of the enclosure together with a temperature activated cooling fan with capacity of 16 ft^3/sec., the thermostatically controlled fan shall be manually adjustable to turn on between 32°C and 50°C with a differential of not more than 6° C between turn on and turn off. The cabinet fan circuit shall be fused at 125 percent of ampacity of the fan motor installed. The air inlet louvers and air outlet openings shall be located to direct the bulk of the air flow over the Hydro Ranger 200 Controller. Enclosure shall be a double compartment NEMA and contain space for service entrance equipment on the left side.

Control Panel:

The entire control panel shall be UNDERWRITERS LABORATORY LISTED and furnished with a UL LABEL. Each component shall be factory mounted, wired, inspected and tested. A wiring diagram and heater chart shall be enclosed in the panel. A red "High Voltage Inside" nameplate shall be fastened to door covering the high voltage compartment. All components including indicating lights, switches, buttons, relays, accessories, and permanently identified as to their function with the components. The identifications shall be in the form of photo etching, silk screening or engraving. All terminal blocks shall be identified by both number and graphic symbols which clearly indicate the purpose of each terminal block. All control wiring shall be numbered at each termination. The panel enclosure shall be free standing and mounted on a reinforced concrete pad. The lower compartment shall have a lockable access door and be flush with the concrete pad.

The enclosure shall be constructed of 14 gauge steel. The entire unit shall be degreased, cleaned and treated with a phosphatizing process, then primed and painted inside and out with corrosion-resistant, industrial-grade baked enamel. The finish coat shall be ASA-61 Gray.

Control System Operation:

The control system shall provide total automatic control for two (2) motor driven pumps operating on ____volts, ____ phase, ____ wire service. The wet well level shall be monitored and controlled as follows:

Level 5 - High Level
Level 4 - Start Lag Pump
Level 3 - Start Lead Pump
Level 2 - Stop Lag Pump
Level 1 - Stop Lead Pump

Contingent upon the wet well level, the control system shall cause the liquid level indicator/controller to energize the appropriate control contacts. Upon wet well level rise, the lead pump start contact (Level 3) shall be energized causing a relay in the pump logic controller to start the lead pump. If the level continues to rise to the lag pump start control (Level 4), the controller shall energize a relay to start the lag pump, and both pumps shall run simultaneously. The liquid level shall be lowered until the lag pump stop contact (Level 2) is reached, stopping the lag pump. The lead pump shall continue to run lowering the wet well level until the lead pump stop contact (Level 1) is reached. Upon the next wet well level rise, the lead pump selection shall be alternated. If the wet well level rises to high level contact (Level 5), it shall energize a relay in the pump logic controller to operate the alarm system and indicate a high water condition.

The control system shall be built in such a manner that the owner will have the ability to select high level alarm activation at a separate specific level or have it activated when start lag pump level is reached. The owner shall have the ability to select independent start and stop for the lead and lag pumps, or a common stop for both pumps.

Liquid Level Indicator/Controller

The liquid level indicator/controller shall be equipped with manual testing capability located on the inner door. The operator shall be able to simulate rising and falling liquid level.

Monitoring and control of the liquid level in the wet well shall be by transducers installed in the wet well above the liquid as recommended by the manufacturers. The echo from the output at the transducer is processed back through to the Hydro Ranger 200 control panel and controller which generates output to relays in the control panel turning the pumps on/off as programmed as well as controlling programmed alarms and emergency power actuation.

Logic Controls

The duplex logic control system shall consist of the logic chassis mounted on the subpanel and the logic panel mounted on the dead front door. The logic chassis shall be a pre-wired assembly constructed of anodized aluminum containing logic and alarm circuits. The logic chassis shall interface with the wet well level liquid indicator/controller. The logic chassis shall contain a three point terminal block for 120 VAC supply power, a power on-off switch for 120 vac power, a 15 amp circuit breaker to protect 120 VAC power; a 120/24 VAC control transformer, a 3 position lead pump selector switch that can operate in either "automatic alternation"; "lead pump #1 - Lag pump #2 - lag pump #1" positions. Relays shall be square base, plug-in type, 3 pole double throw rated at 10 amp, 240 VAC with epoxy encapsulated coil and clear dust cover and shall be directly interchangeable. Five LED status indicator lights shall be mounted adjacent to the relay sockets and wired in parallel with the relay coils to indicate that the power is applied to the coils. All relays shall have mechanical hold-down bales.

All terminals on the logic chassis shall be of the barrier clamp plate type rated at 15 amp at 300 VAC and accept two (2) AWG #14 wires. Terminal blocks shall be provided for interfacing output from the liquid level indicator/controller to the logic chassis via a multi-conductor cable shall be identified with yellow heat shrink tubing with black nomenclature. Labels shall read as follows: High level alarm, start lag pump, start lead pump, stop lag pump, stop lead pump, and common.

The logic panel shall be constructed of corrosion resistant anodized aluminum, and connected to the logic chassis via a multi-conductor cable. The logic panel shall be mounted on the inner door. The logic panel shall have the following components: Two "hand-off automatic" selector switches for pumps, two "pump run" green LED Indicators, one 24 VAC "power on" yellow LED indicator, one "start lag pump" yellow LED indicator, one red push button for audible alarm silence, one "high level alarm" red LED indicator and one red push button for visible alarm reset. Provide two 6-digit non-resetable, dust tight, oil tight and moisture resistant running time meters.

Back-Up System for Liquid Level Control

A backup control system shall be provided consisting of a system of float switches (SM-2 floats). The float system shall be turned on and off by one switch at the control panel. The float switches (mercury switches) shall be installed as shown on Plan Sheet No. 36., "Pump Station -Section" to be activated at the water surface elevations shown in the wet well actuating installed relays in the control panel turning the pumps on and off in the same sequence as the ultra sonic system. The float activated control system shall remain in the off mode till manually turned on at the control panel by a single switch.

Power Handling

Main lugs of the appropriate size shall be furnished for connecting the incoming supply power. The lugs shall be suitable for use with aluminum or copper conductors. Ground lugs of appropriate size shall be bolted to the sub-panel. Motor circuit protection shall be either type and shall contain self test magnetic motor circuit protectors. Either type shall contain a self test "Trip Selector" permitting

a mechanical simulation of the over current tripping device. The protector operating mechanisms shall be quick-mate, quick-break and trip-free type. Thermal magnetic breakers shall comply with Federal SPE.W-C 357a as Class Two breakers. Symmetrical amperes interrupting ratings shall be 10,000 amps minimum for 250 volt rated breakers and 15,000 amps minimum for 480 volt rated breakers. Magnetic motor circuit protectors shall provide instantaneous clearing of faults to a minimum of 10,000 amperes, RMS, symmetrical and shall have an adjustable instantaneous trip settings. Q-Frame type circuit breakers are not acceptable.

Circuit breaker toggles shall be operable through external extension handles that will interlock with the dead front door.

Each motor starter shall be NEMA rated, FVNR, with three overload relays and reset button. The contractor shall feature double break, silver cadmium oxide contacts, pressure type terminals, and barriers, free floating armature-magnet frame, molded continuous duty coils and stainless steel springs sized for the specific pumps supplied under this contract. Definite purpose contractors, horsepower rated motor starters, and fractional NEMA sizes are not acceptable. Motor starter overload reset operators shall be reset without opening the dead front door.

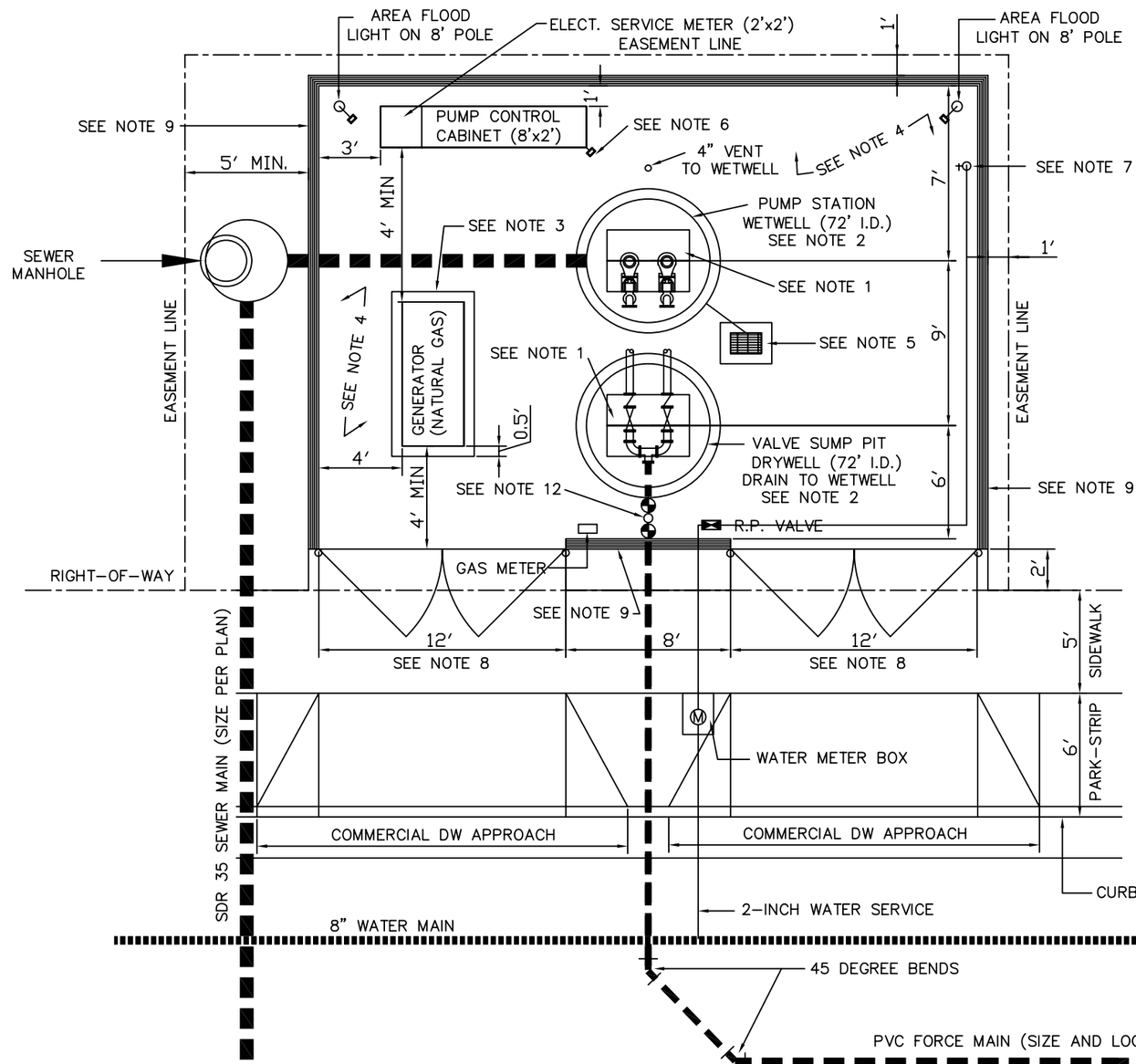
A 100 watt strip heater and separate thermostat set at the appropriate temperature to prevent corrosion-causing condensation and freezing shall be supplied.

A control transformer, adequately sized for the connected load shall be provided on 3 phase, 3 wire systems. The transformer shall be protected by fuses or circuit breaker. The control transformer may be eliminated on 4-wire and single phase systems providing that the control voltage is protected by a circuit breaker and is wiped per N.E.C. standards.

The unit shall be equipped with the capability to connect an emergency backup natural gas engine.

Optional Equipment: (As required)

1. Provide a NEMA 4X, red lexan, break resistant globe and 75 watt lamp.



PUMP STATION - SITE PLAN

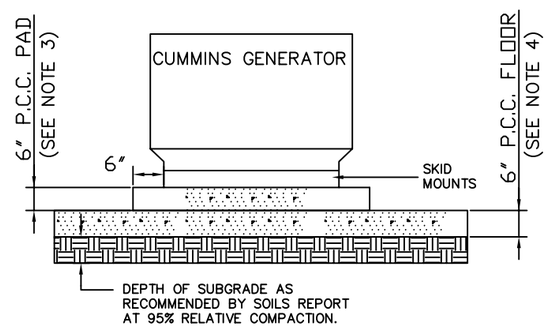
NOT TO SCALE

LEGEND:

- VALVE
- EMERGENCY CONNECTION POINT

GENERAL NOTES:

1. DOUBLE 18"x48" CHECKER PLATE DOORS (SEE DRAWINGS NO. 2 AND 3 FOR DETAILS).
2. STEEL REINFORCED CAP TO MINIMUM 2" ABOVE FINISH FLOOR (SEE DRAWING NO. 2 FOR DETAILS).
3. 6" RAISED PCC PAD, #4 REBAR AT 12" BOTH WAYS.
4. 22'x32'x6" CLASS "A" PCC FLOOR WITH #4 REBAR 18" O.C. BOTH WAYS THROUGHOUT. SUBGRADE TO BE COMPACTED TO 95% MAXIMUM DENSITY TO DEPTH PER SOILS REPORT.
5. 12"x18" FLOOR DRAIN WITH STEEL GRATE, 6" PVC TO WETWELL.
6. 70-WATT FLOOD LAMP WITH PHOTO ELECTRIC CELL (ORIENTATED TO THE NORTH).
7. 2-INCH PIPE RISER WITH 3/4-INCH HOSE BIBB.
8. DOUBLE SWING CHAIN LINK GATES @ 6'-10".
9. 7-FOOT HIGH SPLIT FACE CONCRETE BLOCK WALL WITH FOOTINGS, BUILDING PERMIT TO BE ISSUED BY CITY OF REEDLEY BUILDING OFFICIAL BY SEPARATE PERMIT.
10. INSTALL 1" SCHEDULE 40 METALLIC CONDUIT FROM CONTROL PANEL TO GENERATOR.
11. INSTALL 1" SCHEDULE 40 METALLIC CONDUIT FROM CONTROL PANEL TO WETWELL.
12. EMERGENCY CONNECT WITH VALVES FOR ISOLATION.



EMERGENCY GENERATOR

SPECIFIED NATURAL GAS FUELED CUMMINS ENGINE WITH SPECIFIED EXHAUST SILENCER,OR APPROVED EQUAL. WEATHER PROTECTIVE ENCLOSURE AND SOUND ATTENUATION MATERIAL RATED WITH A MAX. LEVEL OF 65 dBA AT 23 TO 25 FEET.
(REFER TO SPEC SECTION FOR FURTHER DETAILS)

REGISTERED PROFESSIONAL ENGINEER
BRUCE A. WEBBER
C043156
Exp. 3-31-2008
CIVIL
STATE OF CALIFORNIA

BRUCE WEBBER
CITY ENGINEER

Date

CITY OF REEDLEY

DATE	DRAWN BY	ENGINEER	SCALE
10/30/06	M.P.	B.Webber	NONE

TITLE-DESCRIPTION
SEWAGE LIFT STATION DETAILS

PROJECT

DRAWING NUMBER
1 OF 3

NO.	REVISION	DATE	APPROVED BY
1			

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ITEM	ELEVATION PUMP STA.
TOP ELEV. *	
INFLUENT PIPE (INVERT) *	
HIGH WATER ALARM *	
START LEAD PUMP *	
START LAG PUMP *	
PUMP OFF *	
BOTTOM OF WETWELL *	
BOTTOM OF STATION SLAB *	

NOTE: ALL VERTICAL WORK SHALL BE TO CITY OF REEDLEY DATUM

ITEM	VALUE PUMP STA.
DESIGN FLOW **	
DESIGN FLOW (FROM PUMP CURVE) *	
DESIGN HEAD (FROM PUMP CURVE) *	
REQUIRED FLOW ***	
REQUIRED HEAD (TDH) ***	
VOLTAGE ****	
PHASE	
HORSEPOWER *	
RPM *	

PREFERED PUMP IS FLYGT (OR EQUAL)

PREFERRED GENERATOR IS CUMMINS POWER SYSTEMS
MODEL GG–SERIES (NATURAL GAS)
WITH OPTIONAL WEATHER–PROTECTIVE AND SOUND–ATTENUATED
HOUSING (OR EQUAL), CONTACT PHONE No. (661)326–4002

* ENGINEER TO SPECIFY BASED ON LIFT STATION REQUIREMENTS

** DESIGN FLOW IS DETERMINED FROM THE CALCULATED LOADING (IE. # OF LOTS SERVED AND ZONING)

*** REQUIRED DISCHARGE FLOW & HEAD ARE CALCULATED CONDITIONS BASED UPON FIELD CONDITIONS OF DESIGN.

**** VOLTAGE REQUIREMENT (_____ VOLTS, __ PHASE)

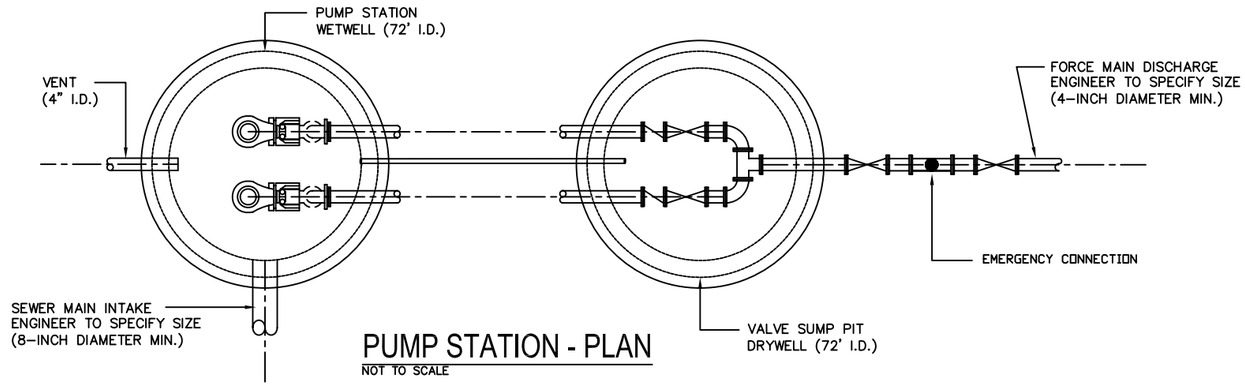
???? ENGINEER TO SIZE PUMP STATION WETWELL AND VALVE VAULT AS NEEDED (VALVE VAULT MIN. 6' I.D. x 5'–6")

NOTES:

SAFETY GRATE NET MANUFACTOR U.S.F FABRICATION INC.

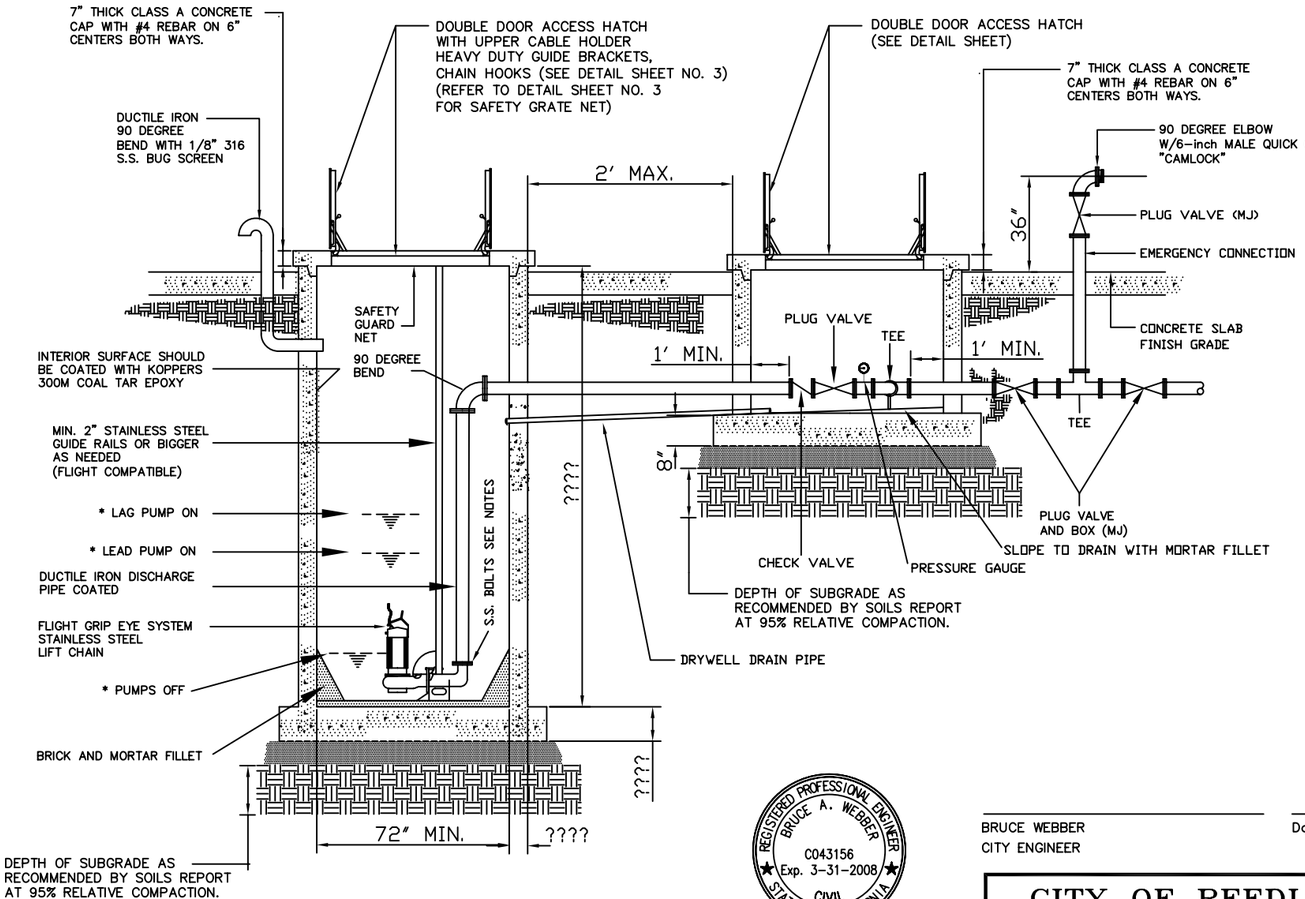
ALL FLANGE BOLTS SHALL BE 316 STAINLESS STEEL BOLTS.

PRESSURE GAUGE IN VALVE VAULT SHALL HAVE SHUT OFF VALVE.



PUMP STATION - PLAN

NOT TO SCALE



PUMP STATION - SECTION

NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
BRUCE A. WEBBER
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Exp. 3-31-2008
CIVIL
STATE OF CALIFORNIA

BRUCE WEBBER
CITY ENGINEER

Date

NO.	REVISION	DATE	APPROVED BY
1			

CITY OF REEDLEY

DATE	DRAWN BY	ENGINEER	SCALE
10/30/06	M.P.	B.Webber	NONE

TITLE-DESCRIPTION
SEWAGE LIFT STATION DETAILS

PROJECT

DRAWING NUMBER
2 OF 3

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NOTES:

STYLE "FLED–0" ACCESS HATCH, AS MANUFACTURED FOR ITT FLIGHT CORP. OR EQUAL.

MATERIAL SHALL BE 6061–T6 ALUMINUM FOR BARS ANGLES, AND EXTRUSIONS. 1/4––INCH DIAMOND PLATE SHALL BE 5086 ALUMINUM.

DESIGN OF EACH ACCESS HATCH SHALL CONFORM TO O.S.H.A. STANDARD 1910.23.

UNIT DESIGNED LIGHT DUTY, FOR A MINIMUM LIVE LOAD OF 300 LBS./SQ.FT. DEFLECTION SHALL NOT EXCEED 1/150th OF THE SPAN.

EACH DOOR SHALL BE SUPPLIED WITH A HEAVY DUTY, STAINLESS STEEL PNEUMATIC–SPRING, FOR EASE OF OPERATION WHEN OPENING COVER. COVER SHALL BE COUNTERBALANCED, SO ONE PERSON CAN EASILY OPEN THE HATCH DOOR. SPRING DESIGN SHALL ACCOMMODATE EASE OF MAINTENANCE.

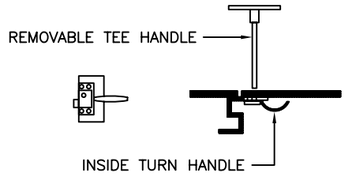
EACH DOOR SHALL BE EQUIPPED WITH AN ALUMINUM HOLD OPEN ARM. DOOR SHALL LOCK OPEN IN THE 90 DEGREE POSITION. EACH HOLD OPEN ARM SHALL HAVE A RED VINYL GRIP HANDLE. HOLD OPEN ARM SHALL BE FASTENED TO THE FRAME WITH 1–1/2 INCH GRADE 316 STAINLESS STEEL BOLTS.

ANGLE FRAME SHALL BE OF EXTRUDED ALUMINUM, WITH A CONTINUOUS 1–1/2" ANCHOR FLANGE. ANGLE FRAME SHALL BE A MINIMUM OF 1/4" THICK.

ALL HARDWARE NOT OTHERWISE SPECIFIED SHALL BE STAINLESS STEEL.

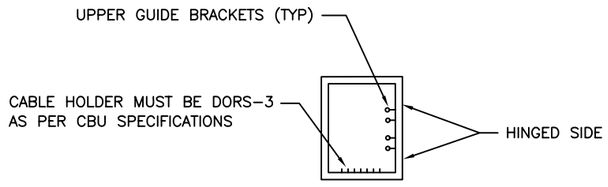
EACH HATCH SHALL BE SUPPLIED WITH A GRADE 316 STAINLESS STEEL SLAM LOCK, WITH KEY WAY PROTECTED BY A THREADED ALUMINUM PLUG. PLUG SHALL BE FLUSH WITH THE TOP OF THE 1/4'" DIAMOND PLATE. SLAM LOCK SHALL BE FASTENED WITH FOUR GRADE 316 STAINLESS STEEL BOLTS, NUTS AND WASHERS.

EACH HATCH SHALL BE EQUIPPED WITH AN ALUMINUM LIFT HANDLE. THE LIFT HANDLE SHALL BE FLUSH WITH THE TOP OF THE 1/4" DIAMOND PLATE.



STAINLESS STEEL SLAM LOCK

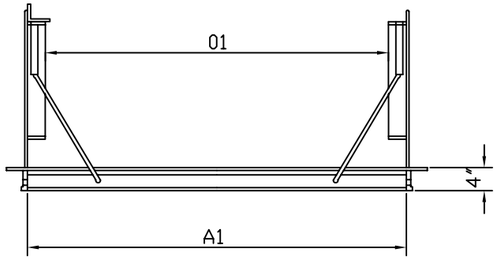
NOT TO SCALE



NOTES: FOR LOCATION OF ACCESSORIES SEE PUMP OUTLINE DIMENSIONS

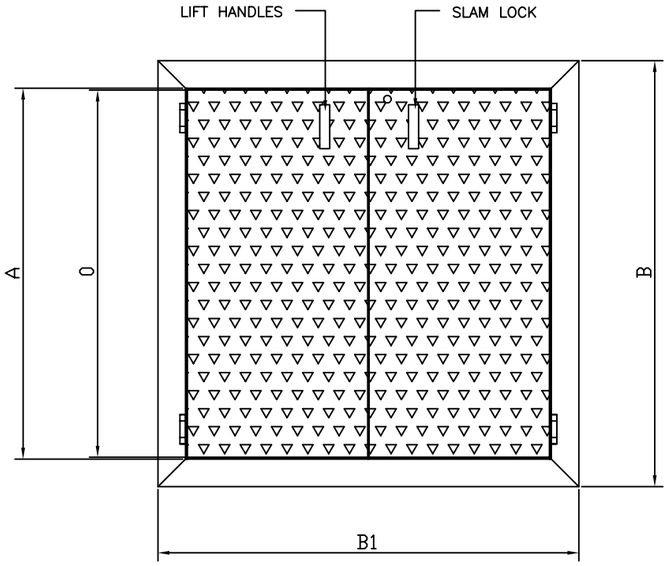
GUIDE AND CABLE BRACKET

NOT TO SCALE



SECTION B-B

(COVER SHOWN IN OPEN POSITION)

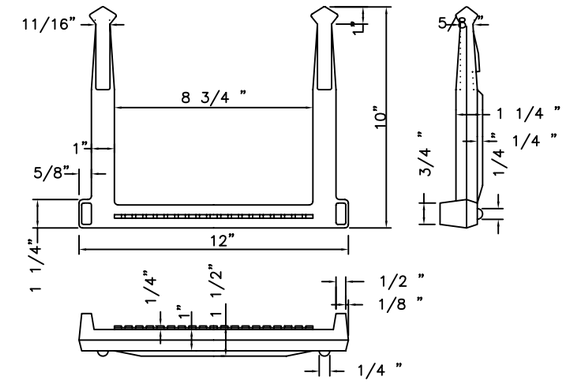


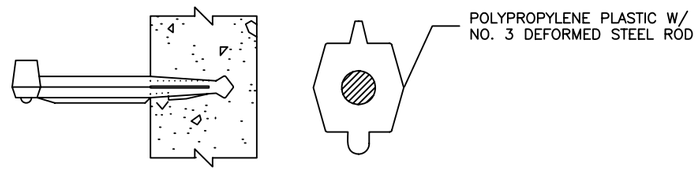
PLAN

PATTERN NO. ALUMINUM	DIMENSION IN INCHES		Unobstructed Clear Opening
	A x A1	B x B1	O x O1
FLED–O–12	36" x 48"	42–1/4" x 54–1/4"	34" x 43"

LIGHT DUTY DOUBLE ALUMINUM DOOR HATCH AND ACCESS FRAME AND COVER

NOT TO SCALE



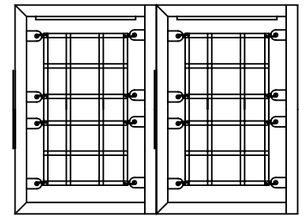


STEPS SHALL BE PLACED INTO WET CONCRETE WALL DURING MANUFACTURE, OR HAND DRIVEN INTO PRE FORMED HOLES AFTER CONCRETE HAS CURED

MANHOLE STEPS

NOT TO SCALE

MANHOLE STEPS SHALL BE M.A. IND., INC. MODEL NO. PS1 OR AN APPROVED EQUAL



DUAL SAFETY GRATE NET DETAIL

NOT TO SCALE

(MANUFACTURE BY U.S.F. FABRICATION INC. OR EQUAL)

REGISTERED PROFESSIONAL ENGINEER BRUCE A. WEBBER C043156 Exp. 3-31-2008 CIVIL STATE OF CALIFORNIA

BRUCE WEBBER
CITY ENGINEER

Date

NO.	REVISION	DATE	APPROVED BY
1			

CITY OF REEDLEY

DATE	DRAWN BY	ENGINEER	SCALE
10/30/06	M.P.	B.Webber	NONE

TITLE-DESCRIPTION: SEWAGE LIFT STATION DETAILS

PROJECT

DRAWING NUMBER: 3 OF 3

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