APPENDIX A:

SAN RAFAEL SANITATION DISTRICT
TECHNICAL SPECIFICATIONS

SECTION 01010 PROJECT SCOPE AND TIME OF COMPLETION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. WORK INCLUDED IN THIS CONTRACT

Work covered in these contract documents consists of the following:

1. Construction and connection of the new sewer mains as indicated in the plans
2. Construction of new sewer laterals, rodding inlets, cleanouts, manholes, and connections
3. Removal and disposal of existing facilities as necessary for sewer improvements
4. Pavement restoration as necessary for sewer improvements

B. PIPELINE CONNECTIONS

The Contractor shall make all necessary connections to the existing pipelines. No connections to the existing system shall be made unless authorized in writing by the Engineer.

C. COORDINATION

1. The Contractor shall coordinate his/her operations with the District and others working in the immediate area.
2. The Contractor shall conduct his/her operations so as to assure that the existing pumping stations, as well as all other utilities, are kept in continuous operation throughout the execution of this contract. The Contractor, therefore shall schedule and conduct his work so as to minimize interference with operation and maintenance of these facilities. Methods, schedules and sequences of construction which prevent or jeopardize the District's compliance with Clean Water Standards or the NPDES Permit are not acceptable.
3. When modification, addition or connection to existing pipelines, structures, systems, circuits or equipment is required, the Contractor shall schedule such activities with the Engineer. The Contractor shall notify the Engineer, in writing, one (1) week in advance of the time when construction operations will require connection to, or modification of, in-service portions of the existing facility. No pipeline system, structure, circuit or individual unit shall be cut, modified, dewatered or removed from the facility unless authorized by the Engineer.
4. In the event that the Contractor accidentally damages operating pipes, pump stations or treatment facilities, he/she shall immediately effect the necessary repairs. The Contractor shall maintain an inventory of repair clamps and materials for small pipelines, including temporary pumps, bypass pipelines, electrical conductors or other facilities necessary to

maintain operation of sewerage facilities while the repairs are being made. The Contractor shall provide telephone numbers of standby personnel who will respond during non-working hours to repair facilities which interrupt normal operations.

5. If the Contractor fails to respond to a request by the Engineer, the District reserves the right to effect the repair with its own forces or by another contractor. The cost for repairs performed by others will be deducted from the payment due the Contractor.

D. ORDER OF WORK

The Contractor shall sufficiently obligate himself/herself to complete the First and Second specified above within the following specific timeframes.

First Order of Work: The first order of work shall be to prepare and submit a construction phasing plan, traffic control plan, and progress schedule for all items of work in a form acceptable by the Engineer. The schedule shall be updated weekly to reflect all items of work performed at the site and shall clearly indicate the proposed completion date. No work may begin under contract until the construction phasing plan, traffic control plan, and progress schedule have been approved by the Engineer. Time required for review and approval of these items shall not constitute a basis for time extension. Contractor shall complete the First Order of Work within 15 working days in succession from the date of the Notice to Proceed.

Second Order of Work: The second order of work shall be to prepare and submit a Water Pollution Control Plan per Section 17-3 which includes a dewatering plan. No work may begin under contract until the plan has been approved by the Engineer. Contractor shall complete the Second Order of Work within 15 working days in succession from the date of the Notice to Proceed.

Third Order of Work: The third order of work shall be to pothole existing sewer laterals and for underground utilities which may be in conflict with the proposed sewer facilities. The Contractor shall be aware of all PG&E requirements for potholing within five feet of a gas main. The Contractor shall provide a log of all utilities potholed and depths encountered.

Fourth Order of Work: The fourth order of work shall be to install the respective advance notice construction signs, and detour signs where applicable

Fifth Order of Work: The fifth order of work shall be to construct the new sanitary sewer facilities as indicated by the plans and specifications.

1.02 OPERATION OF EXISTING SEWER MAIN

A. GENERAL

The Contractor shall provide access for District personnel for the continuous operation of the existing sewer main while work is being performed on the new facilities. The District personnel will operate and maintain the existing sewer main until such time as the new sewer main is under

construction. At that time the contractor will be responsible for operation of the *entire* sewer main*, including all laterals within the scope of work* until the project is accepted by the District.

B. STORAGE IN UPSTREAM SEWER SYSTEM

Storage in the sewer system shall not be used routinely but rather for making necessary pipeline tie-ins. The expected daily sewage flow is unknown.

C. TANK TRUCKS

If necessary, tank trucks shall be operated in an expeditious and timely manner between sewer main shut down for tie-ins. There shall not be unreasonable delays in filling or dumping. When notified by the District, the Contractor shall immediately place the order for the necessary additional tank trucks so they can be on the job at the time required.

All sewage pumped out by tank truck shall be discharged to a location designated by the District. Discharge of raw sewage to water courses is strictly prohibited.

1.03 PAYMENT

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals as specified above, including temporary pumps and tank trucks, shall be considered as included in the contract prices for the various items of work in Schedule B and no additional compensation will be made therefor.

PART 2 – PRODUCTS
(NOT USED)

PART 3 – EXECUTION
(NOT USED)

END OF SECTION

SECTION 01030 SPECIAL PROVISIONS

PART 1 - GENERAL

1.01 ENCROACHMENT PERMIT

The following will be conditions of the City Encroachment Permits:

- PERMIT TO BE KEPT AT WORK SITE. This permit shall be kept at the site of the work and must be shown to any representative of the Public Works Department (DPW) or any law enforcement officer on demand.
- NOTICE PRIOR TO STARTING WORK. Before starting work, on which an inspector is required or whenever stated on the face of this permit, the permittee shall notify DPW. Such notice shall be given at least 24 hours in advance of the date work is begun.
- STORAGE OF MATERIAL. No material shall be stored within eight (8) feet of the edge of pavement or traveled way or within the shoulder line where the shoulders are wider than eight (8) feet.
- MAKING REPAIRS. If DPW shall so elect, repairs to paving or other improvements of facilities, which have been disturbed, shall be made by employees of DPW and the expenses therefore shall be borne by the permittee. All payment to laborers, inspectors, etc. employed by DPW for or on account of the work herein contemplated shall be made by said permittee forthwith on receipt of written orders, payrolls or vouchers approved by DPW. Alternatively, DPW may elect to require a deposit before starting repairs in an amount sufficient to cover the estimated cost thereof.
- DPW will give reasonable notice of its election to make such repairs. If DPW does not so elect, the permittee shall make such repairs promptly. In every case the permittee shall be responsible for restoring any portion of the roadway which has been excavated or otherwise disturbed to its former condition as nearly as may be possible except where DPW elects to make repairs to paving as above provided in this paragraph and except where provisions to the contrary are made elsewhere in the permit.
- STORM DRAINS. A minimum 12-inch vertical separation shall be kept between any new facilities and existing storm drain facilities unless otherwise directed by District. Cutting into existing culverts is not permitted. Damaged storm drain culvert repairs require City inspection prior to backfill. All damaged City storm drains shall be camera inspected after completion of the sewer line work to verify integrity. Videotape shall be provided to DPW prior to final inspection.
- CARE OF DRAINAGE. If the work herein contemplated shall interfere with the established drainage, ample provision shall be made by the permittee to provide for it as may be directed by DPW.
- AC REPLACEMENT WITH OVERCUTTING. Where the remaining existing pavement between the edge of the paved area and the edge of the trench after over-cutting is less than 4 feet, the remaining section of existing pavement shall be removed and the entire area shall be repaved and rebuilt as specified.

1.02 MOBILIZATION

Mobilization shall conform to the provisions in Section 9-1.16(D), “Mobilization,” of the State Standard Specifications, and shall consists of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies incidental to the project site, for the establishment of all staging areas and other facilities necessary for work on the project and for all other work and operations which must be performed or for project costs incurred prior to beginning work on the various Contract items. Mobilization shall include obtaining insurance and bonds, obtaining and paying for all permits by other agencies if applicable, furnishing temporary construction utilities, installing construction and other construction facilities all as required for the proper performance and completion of the work.

The work of this bid item also includes demobilization. Demobilization shall include final cleaning and restoration of the job site, removal of all temporary facilities and equipment from the work area, disconnection of the temporary construction utilities and turnover of project to the City.

1.03 UTILITIES, POTHOLING AND RELOCATIONS

A. GENERAL

It is not the intent of the Plans to show the exact location of existing or relocated utilities and the Engineer assumes no responsibility therefor. The position of the utilities shown on the Plans is derived from records of utility owners. No excavations were made to verify the locations shown for underground utilities. The service connections to these utilities may be, but are not necessarily, shown on the drawings. Overhead utilities including wires, poles and guys are not necessarily shown on the plans and shall be determined from the Contractor's visit to the site. It shall be the responsibility of the Contractor to determine the exact location of all utilities and service connections thereto ahead of any excavations through "potholing." The Contractor shall make his/her own investigations, including exploratory excavations, referenced herein as potholing, to determine the locations and type of existing utilities, including service connections, prior to commencing work which could result in damage to such utilities. The Contractor shall immediately notify the Engineer as to any utility discovered by him/her in a different position than shown on the drawings or which is not shown on the drawings.

B. UTILITY LOCATIONS

Prior to fabrication of engineered pipe and prior to setting grades or commencing any trenching or excavation work, the Contractor shall contact all affected utility owners and request them to locate and mark the location of their respective utilities on the ground. The Contractor shall then undertake "potholing" procedures as described hereinbelow. If a utility owner is not equipped to provide the locating service, the Contractor shall provide for it. The location of said underground pipes and conduits shall be clearly marked on the pavement or with suitable markers if not on pavement. In addition to the location of metallic pipes and conduits,

non-metallic pipe, ducts and conduits shall also be similarly located using surface indicators and shall then be similarly marked.

C. POTHOLING

As soon as the utility survey is completed, and prior to setting grades or commencing fabrication of engineered pipe, the Contractor shall commence "potholing" to determine the actual location of the pipe, duct or conduit. The Contractor shall uncover all underground utilities, including sewers and storm drains, exercising extreme care so as to avoid drainage. It will be the Contractor's responsibility to have repairs made to existing facilities at his/her expense in the event of damage. Underground utilities shall be uncovered to a point one (1) foot below the pipe, where crossing, interferences or connections are shown on the drawings, prior to the preparation of shop drawings, trenching or excavating for any pipe or structure, in order to determine actual elevations. Once uncovered, the Contractor shall record the depth of the utility at the pothole and clearly mark the depth on the pavement. Any variation in the actual elevations and the indicated elevations shall be brought to the Engineer's attention. If the Contractor does not expose all required utilities prior to shop drawing preparation and trenching, he/she shall not be entitled to additional compensation for work necessary to avoid interferences, nor for repair to damaged utilities. Excavations around underground electrical ducts and conduits shall be performed using extreme caution to prevent injury or damage to workers and the electrical ducts or conduits. Similar precautions shall be exercised around gas line, telephone, and television cables.

D. UTILITIES AT VARIANCE WITH THE PLANS

Where a underground utility is at variance with the plans the contractor shall proceed as follows:

1. Marked utility not shown on the plans: If a utility is not shown on the plans but marked in the field by the utility owner the Contractor shall pothole the utility and proceed with the work providing the utility is not in conflict with the line or grade of the pipeline to be laid and report the discrepancy to the District.
2. Utility shown on the plans but not marked: If a utility is shown on the plans but not marked by the utility company or marked in a different location the Contractor shall consult with the utility company, pothole the utility and then proceed with the work providing the utility is not in conflict with the line or grade of the pipeline to be laid.
3. Unmarked utility: If a utility is not marked by the utility company and the contractor encounters it, the contractor shall immediately notify the District and the utility company. The Contractor shall proceed with the work if the utility is not in conflict with the line or grade of the pipeline to be installed.

Utility services and service corrections may not be shown on the plans or may not all be shown on the plans.

E. UTILITY RELOCATION PROCEDURES

Any utility relocations shall be coordinated with and/or performed by the owner of the respective utility. The right is reserved to governmental agencies and to owners of utilities to

enter at any time upon any street, alley, right-of-way or easement for the purpose of making changes in their property made necessary by the work and for the purpose of maintaining and making repairs to their property. In case it should be necessary to remove, relocate or temporarily maintain a utility because of interference with the work, the work on the utility shall be performed and paid for as follows:

1. When it is necessary to remove, relocate or temporarily maintain a service connection, the Contractor shall bear all expenses incidental to the work on the service connection. The work on the service connection shall be done in a manner satisfactory to the owner thereof; it being understood that the owner of the service connection has the option of doing such work with his/her own forces, or permitting the work to be done by the Contractor.
2. When it is necessary to remove, relocate or temporarily maintain a utility main which is reasonably close to the position shown on the drawings, the cost of which is not required to be borne by the owner thereof, the Contractor shall bear all expenses incidental to the work on the utility. The work on the utility shall be done in a manner satisfactory to the owner thereof; it being understood that the owner of the utility has the option of doing such work with his/her own forces, or permitting the work to be done by the Contractor.
3. When a utility is found to be in conflict with the grade of the sewer and when it is necessary to remove, relocate or temporarily maintain a utility which is not shown on the drawings or is in a position materially different from that shown on the drawings and were it in the position shown on the drawings would not need to be removed, relocated or temporarily maintained, the District will make arrangements with the owner of the utility for such work to be done at no cost to the Contractor, or will require the Contractor to do such work in accordance with the article on changes in the work or will make changes in the alignment and grade of the work to obviate the necessity to remove, relocate or temporarily maintain the utility. Changes in alignment and grade will be ordered in accordance with the article on changes in the work.

F. UTILITY RELOCATIONS

In the event that any of the conflicting utility facilities have not been relocated out of conflict prior to the commencement of the work, the Contractor shall coordinate his/her operations with those of the utility companies to relocate their facilities to avoid or at least minimize conflicting operations or delays. The Contractor shall not be entitled to Right-of-Way delay per Section 8-1.10 of the State Standard Specifications due to the progress or operations of the utilities.

Full compensation for complying with the above provisions shall be considered as included in the contract price for the various bid items and no separate payment will be made.

G. UTILITY LOCATIONS

All utilities have reviewed the plans and may be aware of specific problems in respect to their own utilities which may require work on their part to clear the proposed pipeline construction. Prior to starting work, the Contractor shall contact the following people regarding their utilities and any protection work:

Water Mains and Services
Marin Municipal Water District
Construction Projects:
Jake Miller 415/945-1580

Telephone Utilities
AT&T
Chad Shultz 707/575-2121
Emergency: 800/310-2355

Electrical Utilities
Pacific Gas and Electric Company
Service Planning Dept. 415/257-3431
Emergency: 800/743-5000

Television Utilities
Comcast
Paul Alabona 707/759-4070 x 219
Emergency: 800/310-2355

Gas Mains and Services
Pacific Gas and Electric Company
Emergency: 800/743-5000

H. RESPONSIBILITY

The Contractor shall be responsible for all damage to underground utilities whether they are shown on the plans or not, or whether they have been potholed or not. The Contractor shall determine the location of all underground utilities and services through conferring with the utility companies and through potholing as described hereinabove.

1.04 CONTRACTOR'S OPERATIONS

The Contractor shall conduct the operations in a manner which will protect adjacent property from annoyance or damage from dust caused by the operations. When necessary, he/she shall take steps to control dust by the application of water, dust palliative, salt or other suitable means. The Contractor shall be responsible for dust control during both working and non-working hours.

During working hours, any open trenches or excavations left unattended shall be covered or properly barricaded with lighted barricades with guardrails. The Contractor shall, at all times, make provision for adequate pedestrian and local vehicle access to residences. The Contractor shall conduct the operations in a manner which will assure the maintenance of public safety at all times.

1.05 TRAFFIC CONTROL

A. GENERAL

The Contractor shall provide and maintain safe and adequate passage for vehicular and pedestrian traffic over, around, and adjacent to trenches and other excavations. Contractor shall provide construction phasing and traffic control plans per Section 17-2.

B. SIGNS AND LIGHTS

Temporary signs, lights, and devices shall be in accordance with the California State Division of Highways "Manual of Warning Signs, Lights and Devices for Use in Performance of Work upon Highways,@ current edition. During the hours of darkness, approved lights or flares shall be maintained in sufficient numbers, in proper working order, and in proper locations to adequately illuminate the area and alert approaching traffic.

C. NOTICE TO AGENCIES

At least forty-eight (48) hours prior to instituting any detours and/or roadway closures, the Contractor shall notify, in writing, of the proposed detour or closure, City of San Rafael Department of Public Works, San Rafael Sanitation District, San Rafael Fire Department and San Rafael Police Department.

D. DETOUR USE AND ACCESS

During all detours and/or street closures, the Contractor shall provide for movement of emergency vehicles through the work area. Local access to driveways and houses shall be provided within the work area during working hours to the extent feasible. During non-working hours, no driveway or house shall be denied access to a public roadway.

E. BARRIERS AND CROSS-OVERS

The Contractor shall provide temporary cross-overs at all driveways and streets where it is necessary to maintain traffic. The Contractor shall provide flaggers where necessary to direct traffic. Trenches shall be adequately barricaded and lighted for the protection and safety of the public.

1.06 PROTECTION AND RESTORATION OF IMPROVEMENTS

A. GENERAL

The Contractor shall protect, shore, brace, support, and maintain all existing surface and subsurface improvements uncovered or otherwise affected by his construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod, plantings, and shrubs, shall be restored to match their original condition or better. All replacements shall be made with new materials.

Contractor will be held responsible for any damage to existing structures, work, materials, or equipment because of his operations and shall repair or replace any damaged structures, work materials, or equipment to the satisfaction of, and at no additional cost to, the District. Contractor shall refer to Article 7 Section 7.5 Project Site and Nearby Property Protections.

B. DOCUMENT PRECONSTRUCTION CONDITION

Contractor shall be responsible for preconstruction surveys to document the condition of existing improvements. The Contractor shall be responsible to adequately document the condition for size, kind, quantity and the extent of existing improvements. Photographs shall

be for the purpose of documenting the pre-existing condition at the site of work. All surveys shall be delivered to the City prior to commencing work. In the absence of adequate pre-construction documentation, the Engineer's judgment shall be final.

C. TREE AND PLANT PROTECTION

No trees or cultured plants shall be removed or damaged, unless the Contractor obtains the written permission of the property owner and Engineer. Whenever practicable, Contractor shall tunnel beneath trees when on or near the line of trench. Hand excavation shall be employed as necessary to prevent injury to trees and other plants.

All trees and other vegetation that are removed shall be disposed of by the Contractor as approved by the Engineer. All trees and plants not removed shall be protected against injury from construction operations.

Each tree injured beyond repair or removed shall be replaced with a similar tree of the nearest size possible. All trimming, repair, and replacement of trees and plants shall be performed by qualified nurserymen or horticulturists.

The Contractor shall take the following measures when working in the vicinity of trees and shrubs:

1. All pruning and treating of trees shall be done by a professional arborist or established tree service whose operators are skilled in the care of trees, at the expense of the Contractor. The arborist or tree service selected shall be subject to approval by the Engineer.
2. Where a tree to be left standing is so close to the work area that it could not be adequately protected during a conventional trenching operation, the Contractor shall employ an alternative method of excavation for the pipeline such as tunneling or boring.
3. No tree roots shall be unnecessarily cut in excavating or trenching operations. Major roots, defined as roots 2" or larger, which are encountered in the course of excavation shall be exposed but not severed, and they shall be wrapped in plastic as a protective measure while exposed. All other roots that are cut shall be pruned cleanly so that jagged or torn ends do not exist. Where a root has been shattered or jaggedly cut, the Contractor shall dig back to a sound point, but as close as possible to the point of tearing, shattering or splitting and prune the root cleanly.
4. The Contractor shall be responsible for the recovery of any trees damaged or disturbed during construction for a period of one year following the completion of the project.

D. LAWN RESTORATION

All lawn areas that have been disturbed by the contractor's construction activities or by parking of equipment, shall be restored using methods approved by the Engineer. The top surface elevation of the new sod shall match the preconstruction elevation.

The soil used in the repair work shall be commercially available processed topsoil. Sod shall be cut in strips or rectangular sections which may vary in length, but shall be of equal width

and of a size that will permit the sections to be lifted and rolled without breaking. All sod shall be cut to a thickness of three (3) inches.

Fertilizer shall be pelleted or granulated and shall have an analysis of equal parts of available nitrogen, phosphorus, and potassium in percent by weight in order to supply the number of pounds of the pure chemicals per square foot recommended by the manufacturer. Water shall be free from any substances harmful to the growth of grass and shall be from a source approved by the Engineer prior to use.

Sod shall be placed after the soil has been adequately prepared and after the fertilizer has been applied as recommended by the manufacturer. Sod shall be laid smoothly, edge to edge, and with staggered joints.

All sodded areas shall be maintained in accordance with Section 20 of the "Technical Provisions." Maintenance shall include watering, re-sodding, repair of erosion damage, and all other operations necessary to obtain an acceptable grass cover. Watering shall be required if natural rainfall is not sufficient to maintain the sod bed in a thoroughly moist condition. Contractor shall provide water for watering. Sodded areas that have turned brown prior to final acceptance of the project shall be re-sodded. Original grades of the grass-covered areas shall be maintained after commencement of sodding operations and during the maintenance period.

E. FENCES

All existing fences affected by the work shall be maintained by the Contractor until completion of the work and such time when the new fence is installed.

Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the Engineer and owner of the fence and the period the fence may be left relocated or dismantled has been agreed upon. Where fences must be maintained, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

F. RESTORATION OF DRIVEWAYS, SIDEWALKS, RETAINING WALLS, CURBS AND GUTTERS

The Contractor shall observe the following requirements listed in Section 17-11 and 17-12 and as noted:

To the extent possible, construction shall be conducted without disturbing concrete driveways. All concrete curbs, gutters, aprons, patios, walls, driveways, and sidewalks which are broken, crushed, or damaged by the installation of the improvements shall be reconstructed by and at the expense of the Contractor. All restoration shall be of the same kind of material, quality, and of the same dimensions as the original work. The minimum thickness for concrete slabs, etc. shall be no less than adjoining pavement in thickness, or as indicated on the Drawings, or as specified, whichever is the greater.

The repairs shall be made by removing the damaged portions between cold joints, or to nearest weakened plane joint cut by a concrete saw and by replacing the entire portions. Reinforcing

dowels shall be placed in existing concrete as approved by the Engineer. Patching the damaged part is not allowed. All work shall match the appearance of the existing improvements as nearly as practicable.

A power-driven pavement saw shall be used to cut existing Portland cement concrete sidewalk, driveway, curb, and gutter where it is necessary to remove the concrete. Sidewalk shall be saw-cut at existing score marks. Driveway aprons shall be removed and replaced as a whole without saw-cutting. The kerf shall be a minimum of 1-1/2 inches and straight; and, if two cuts are made they shall be parallel. The kerf shall be deep enough to permit complete breakage of the concrete without ragged edges.

All edges of concrete shall be edged with a cement edger of the size 2-3/4 inches in width with a 3/16 inch radius. All joints or grooves that are indicated on the Plans or are required by the Engineer shall be marked with cement groovers or jointers 4 inches in width and having a groove 3/8 inch wide at the top and a depth of 1/4 inch to 2 inches.

All new or previously existing concrete surfaces shall be left neat, clean, and free from concrete droppings. The Contractor shall be responsible for preventing vandals or others from disfiguring or defacing the finished surfaces. Any new concrete surfaces disfigured, shall be replaced at the Contractor's expense.

1.07 ALIGNMENT CHANGES

In the event the Contractor requests a change in alignment to gain the advantage of reduced interference with utilities or other physical hazards and said change is agreed to by the District, the Contractor thereafter shall assume all responsibility for any physical hazards encountered along the realigned route at no additional cost to the District.

The costs of engineering, including surveys and administrative work, incurred by the District in connection with said requested change shall be deducted from payments due the Contractor.

1.08 SOILS TESTING DURING CONSTRUCTION

The District will retain a Soils Engineer who will conduct soils tests, such as on the trench backfill material, to determine compliance with the provisions of these specifications. When requested by the Engineer, the Contractor shall provide personnel to dig and properly shore holes in locations and at depths requested by the Soils Engineer so that the necessary soils tests can be performed.

Soil compaction tests will be performed at intervals and at depths necessary for determining compliance with the compaction requirements for pipe bedding, intermediate backfill and surface restoration materials. If the material as placed does not meet the compaction requirements, the Contractor shall recompact the material or remove, replace and recompact. New soils tests will be taken on the recompacted material until compaction requirements are met. All such repeated soils compaction tests will be performed at the Contractor's cost.

The Contractor shall provide samples of material for testing by the District's Soils Engineer.

1.09 OTHER TESTS

The Contractor shall provide for other tests as required in the specifications.

1.10 DISPOSAL OF EXCAVATED MATERIAL

Surplus Material - Unless otherwise specified, surplus excavated material shall be disposed in accordance with Section 11 “Disposal” of the Special Conditions.

1.11 CONTRACTOR STORAGE YARD

All areas used for storage shall be restored so that it is acceptable to the property owner. The contractor will be responsible for security of the site and construction zones. The City of San Rafael will require a permit for the use of temporary storage areas.

1.12 CONSTRUCTION LAYOUT

See Section 17-4

1.13 PAYMENT

Full compensation for completing the requirements of this section shall be considered as included in the lump sum price paid for “Mobilization / Demobilization” (Bid Item B101). Partial payments for Mobilization / Demobilization shall not exceed the following:

(1) When 5 percent of the original contract amount is earned, 50 percent of the amount bid for Mobilization, or 5 percent of the original contract amount, whichever is lesser, may be paid.

(2) When 10 percent of the original contract amount is earned, 75 percent of the amount bid for Mobilization or 7.5 percent of the original contract amount, whichever is lesser, may be paid.

(3) When 20 percent of the original contract amount is earned, 95 percent of the amount bid for Mobilization, or 9.5 percent of the original contract amount, whichever is lesser, may be paid.

(4) When 50 percent of the original contract amount is earned, 100 percent of the amount bid for mobilization, or 10 percent of the original contract amount, whichever is lesser, may be paid.

(5) Upon completion of all work on the project, (including: punch list items, cleaning up and removal of all temporary facilities and equipment from the project site) payment of any amount bid for Mobilization in excess of 10 percent of the original contract amount will be paid.

The contract lump sum price paid for “Traffic Management” (Bid Items B102) shall include full compensation for furnishing all labor (including preparation of the Traffic Control Plans and flaggers), materials (including barricades, changeable message signs, construction information signs, banners, door hangers and temporary traffic delineation), tools, equipment, and incidentals and for doing all the work complete in place for each phase of

construction, including all work necessary to provide for the convenience & safety of the public and to facilitate the performance of the contract work as shown on the Plans, as specified in the Standard Specifications and these Specifications, and as directed by the Engineer.

The contract lump sum price paid for prepare "Water Pollution Control" (Bid Item B103) shall include full compensation for furnishing all labor, materials, tools, equipment, dewatering, and incidentals and for doing all the work involved in preparing, obtaining approval of, and amending the WPCP and inspecting water pollution control practices as specified in the Standard Specifications and these Specifications, and as directed by the Engineer. Full compensation for implementation and maintenance of the water pollution control program shall be considered as included in the contract lump sum price paid for Water Pollution Control and no additional compensation will be allowed therefor.

The contract lump sum price paid for "Construction Layout" (Bid Item B104) shall include full compensation for furnishing all labor, materials, tools, equipment, supervision, and incidentals and for doing all the work involved as specified in the Standard Specifications and these Specifications, and as directed by the Engineer as may be required to complete the work.

The contract lump sum price paid for "Utility Potholing) (Bid Item B105) shall include full compensation for furnishing all labor, materials, coordination with the utility agency, and equipment necessary to complete the work as shown on the Plans, specified herein, and as directed by the Engineer, and no additional payment will be allowed therefore.. No right of way delay compensation will be allowed in the event conflicting utilities have not been relocated out of conflict prior to the commencement of work.

All surface and subsurface features shall be restored to their original construction, function and appearance to the satisfaction of the District.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals as specified above, including temporary pumps and tank trucks and AC pavement restoration, shall be considered as included in the contract prices for the various items of work in Schedule B and no additional compensation will be made therefor.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals for restoration of all other surface features within the public right of way and on private property including retaining walls, patios, fences, gravel, lawn, dirt, driveways, sidewalk, and underground service utilities such as water, phone, power, gas, cable TV, landscaping sprinklers and drain pipes shall be included in the various bid items of work in Schedule B and no additional compensation will be made therefor

PART 2 – PRODUCTS
(NOT USED)

PART 3 – EXECUTION
(NOT USED)

END OF SECTION

SECTION 01600 MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL

A. The Contractor shall qualify all items proposed to be furnished, furnish operating and maintenance data, and protect, install, test and commission all materials and equipment as specified hereinbelow.

1.02 EQUIPMENT, MATERIALS AND/OR PRODUCTS TO BE FURNISHED

B. The work, unless otherwise permitted or approved by the District, shall be completed with the incorporated use of equipment, materials and/or products where such are specified. Substitutions and equal alternatives will be permitted as provided in this article; however, neither the request for substitution nor the offer of alternatives shall in any way by their submittal obligate the District to assent to any request or offer. Failure of the Contractor awarded the work to either submit requests for substitutions or to offer alternatives within the required times provided in this General Condition will be considered as evidence that the work shall be accomplished with trade-named equipment, materials and/or products as identified in the Technical Provisions and/or the Project Drawings.

C. Unless otherwise provided elsewhere in the Contract, all equipment, materials and/or products incorporated into the work shall be new and, where not specified, shall be of the highest quality of the respective kinds for the intended use, and all installation shall meet or exceed applicable construction industry standards and practices. If equipment, materials and/or products are designated by listing named manufacturers of particular equipment, materials and/or products followed by the words or equal, then the Contractor may furnish the named equipment, materials and/or products or any equal equipment, materials and/or products. The first named manufacturer of particular equipment, materials and/or products is the basis for the design shown on the Project Drawings. A subsequently named manufacturer or particular equipment, materials and/or products has been determined to be an acceptable substitution but may require modifications in the Projects design and its ultimate construction to accommodate its use. If such subsequently named items are selected by the Contractor for incorporation into the work, the Contractor shall assume all costs required for modifications to the equipment, materials and/or products, and the Project design and construction as may be required for said item's use. Substitutions for an unnamed equal item of material shall be permitted upon compliance with the procedures set forth herein. If a Contractor makes use of an unnamed equal product as a substitute for a specifically named material or product, the Contractor shall assume all costs required to make the necessary revisions or modifications to accommodate the use of said unnamed product.

D. Before beginning the work and as soon as possible after award of the Contract, the Contractor shall submit a List of Materials to the District for review. The List shall include all items of equipment, materials and/or products to be incorporated into the work and the names of suppliers with whom purchase orders have been placed. The names on the List shall be arranged in the same order as in the specifications, and shall contain sufficient data to identify precisely the

items of equipment, materials and/or products the Contractor proposes to furnish. The List shall include specification or Project Drawing references. Once the submission is determined to be acceptable to the District, it shall be returned to the Contractor.

E. If required by the District, the Contractor shall furnish sample specimens of materials proposed to be furnished.

1.03 SUBSTITUTIONS

A. Substitution for those equipment, materials and/or products specified shall only be permitted when the proposed unnamed equal product or material to be furnished is both equal in quality and utility and after the Contractor has complied with the following provisions: (1) All substitutions shall be reviewed by the District. (2) The District must approve such substitution in writing prior to its incorporation into the work. (3) Unless otherwise authorized in writing by the District, the Contractor shall, prior to award and placing any purchase orders, and at least thirty (30) calendar days before it requires approval of any such alternative item, submit to the District sufficient data, drawings, samples, literature, or other detailed information as will demonstrate to the District that the proposed substitute is equal in quality and utility to the equipment, materials and/or products specified.

B. Within thirty (30) calendar days following receipt of all requested information from the Contractor, the District will determine whether the proposed alternative is equal in quality and utility and meets the requirements of the Contract and will inform the Contractor in writing of such determination. The burden of substantiating the quality and utility of alternatives shall be upon the Contractor, and the Contractor shall furnish all necessary information requested and required by the District. The District will be the sole judge as to the quality and utility of alternative equipment, materials and/or products, and the District's decision shall be final. An acceptance by the District of a substitution shall not relieve the Contractor from complying with the requirements of the Project Drawings and Specifications. Acceptance by the District shall not relieve the Contractor from full responsibility for the efficiency, sufficiency and quality and performance of the substitute equipment, materials and/or products, in the same manner and degree as the equipment, materials and/or products specified by name.

C. Failure of the Contractor to submit proposed substitutions for review in the manner described above and within the time prescribed shall be sufficient cause for rejection by the District of any other proposed substitutions.

D. In determining whether a proposed product is equal in quality and utility, the District is not restricted to such basic issues as performance and durability, but may consider any other issues that the District, in the discretion of the District, deems appropriate. Said issues may, but are not required to include, nor are they limited to, such additional factors as comparable performance, reliability, efficiency of operation, ease of operation, adaptability, ease of maintenance, capital costs, life-cycle costs, operational characteristics, costs of training personnel, maintenance history, warranties, problems created by the resulting overall warranty system, availability of qualified service, availability of parts, the history of any supplier, and compatibility with existing facilities.

E. No one factor or group of factors, including such issues as savings on capital costs, shall be determinative of whether the proposed product or material is equal in quality and utility. The decision of the District shall be based on those factors deemed by the District to be relevant and any data, drawings, samples, literature or other detailed information furnished by the Contractor with respect to the proposed substitution.

F. Each decision as to whether a product or material is equal in quality and utility shall be made by the District on a case-by-case basis.

G. The Contractor shall be responsible for any and all costs, including consultant costs, incurred by the District with respect to the proposed substitution that exceed the costs inherent in the normal and reasonable review of drawings and other standard data, information and documents concerning any proposed substitution. The Contractor shall be responsible for this cost, regardless of whether or not the substitution is approved by the District.

1.04 OPERATING AND MAINTENANCE DATA

A. INSTRUCTION MANUALS

The Contractor shall provide four (4) sets of manuals bound in three (3) ring binders giving operating and maintenance instructions for all equipment and devices furnished under this contract. Operating and maintenance instructions for each item of equipment and each equipment assembly shall be assembled in three-ring binders and shall consist of:

1. Names and addresses of manufacturer, nearest representative of manufacturer, and nearest supplier of manufacturer's equipment and parts.

2. For equipment requiring lubrication, the manufacturer's recommended lubricants and lubrication schedule.

3. For equipment containing integral electrical controls, diagrams showing internal and connection wiring.

4. Specified operating and maintenance information. This special information may include, but not necessarily be limited to, one or more of the following items:

   a. Equipment data: Information shall be listed on an Equipment Data Form to be furnished by the District.

   b. Start-up procedures: These instructions shall include equipment manufacturer's recommendations regarding installation, adjustment, calibration and troubleshooting.

   c. Operating procedures: These instructions shall include the equipment manufacturer's recommended step-by-step procedures for starting, operating and stopping the equipment under modes of operation.

   d. Preventive maintenance procedures: These instructions include the equipment manufacturer's recommendations regarding the steps and schedules to be followed in maintaining the equipment.

e. Parts list: This list shall include generic title and identification number of each component part of the equipment.

f. Exploded views: These shall be provided where appropriate.

g. Spare parts list: This list shall include the manufacturer's recommendations of the number of parts which should be stored by the District.

h. Overhaul instructions: These instructions shall consist of the manufacturer's directions for the disassembly, repair and reassembly of the equipment.

B. TRANSMITTAL PROCEDURE

Operating and maintenance instructions shall be transmitted to the District accompanied by a transmittal form. If manufacturer's standard brochures and manuals are used to describe operating and maintenance procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project; all extraneous material shall be crossed out or otherwise eliminated.

Required operating and maintenance instructions for each equipment item must be delivered to and be accepted by the District before the Contractor can be paid for more than eighty (80) percent of the purchase value of that equipment. Required operating and maintenance instructions for the project must be delivered to and approved by the District prior to the project being seventy-five (75) percent complete. Progress payments for work in excess of seventy-five (75) percent completion will not be made until the required operating and maintenance instructions have been delivered to and have been accepted by the District.

When transmitting operation and maintenance instructions, the Contractor shall provide an appropriately labeled, three-ring binder to contain three (3) sets of instructions. A complete table of contents listing the items and their location in the set shall be included in the binder.

1.05 PROTECTION OF MATERIALS AND EQUIPMENT

A. GENERAL

The Contractor shall be responsible for the equipment included in this contract until it has been finally inspected, tested and accepted in accordance with the requirements of these specifications. The Contractor shall make his/her own provisions for properly storing and protecting all material and equipment against theft, injury or damage from any and all causes. Materials and equipment shall be shipped, handled, stored and installed by methods which will prevent damage to the items. Damaged items will not be permitted as part of the work except in cases of minor damage that have been satisfactorily repaired and are acceptable to the District.

B. PIPE

Pipe and appurtenances shall be handled, stored and installed as recommended by the manufacturer. Pipes with soft coatings such as coal tar enamel, paint or the like shall be stored to protect the coating from physical damage or other deterioration and shall only be handled

with padded, wide slings. Pipes shipped with interior bracing shall have the bracing removed only when recommended by the pipe manufacturer.

C. EQUIPMENT

1. Definition: For the purpose of this section, equipment means any mechanical, electrical or instrumentation devices, and other items with one or more moving parts requiring an electrical, pneumatic, electronic or hydraulic connection.

2. Packing and Marking: All equipment shall be adequately and effectively protected against damage from moisture, dust, handling or other cause during transport from manufacturer's premises to site. Each item or package shall be clearly marked with the equipment number unique to the specification reference covering the item. Each separate portion of plant shall receive, as far as practicable, a fitting or distinguishing mark which shall be shown on the packing lists.

3. Manufacturer's Nameplates: All equipment shall be furnished with a corrosion-resistant metallic nameplate fastened to the equipment in an accessible position. This nameplate shall be stamped or embossed with letters not less than 1/8" high, stating the manufacturer's name, equipment rating, capacity, size, model, serial number and speed. Nameplates shall be fastened to the equipment with brass or stainless steel rivets or screws in tapped holes in the equipment or base. Nameplates fastened with adhesive and paper or plastic nameplates will not be accepted. Separate nameplates are not required on valves and fittings.

4. Identification of Equipment: All equipment items and valves with an assigned equipment number in this project manual shall have affixed to them in a prominent location a label or tag displaying the assigned equipment number. Equipment item and valves lacking a number shall have a similar tag providing a unique description of the item. Markers shall be of stainless steel fasteners or as otherwise approved by the District. Plastic tape labels will not be acceptable.

5. Storage of Equipment: During the interval between delivery and installation, all equipment to be incorporated into the project shall be stored in enclosed, weathertight, licensed commercial warehouses equipped with fire detection and sprinkler systems. Environmental controls such as heaters or protective encapsulation shall be provided to ensure against condensation and moisture damage. In the event prolonged (more than ninety (90) days) storage is required for any item of rotative equipment, the Contractor shall institute a protective maintenance program which shall include grease protection of bare metal surfaces, periodic indexing of rotating parts, renewal of grease in bearings, and any procedures recommended by the manufacturer. The Contractor shall maintain adequate records to demonstrate full compliance with these requirements. All equipment shall be available for inspection by the District.

6. Protection of Equipment after Installation: After all installation, all equipment shall be protected from damage, including but not limited to, dust, abrasive particles, debris and dirt generated by the placement, chipping, sandblasting, cutting, finishing and grinding of new or existing concrete, terrazzo and metal; and the fumes, particulate matter, and splatter from welding, brazing and painting of new or existing piping and equipment. The Contractor is advised that as minimum, vacuum cleaning, blower with filters, protective shieldings, and other dust suppression methods will be required at all times to adequately protect all

equipment. During concreting, including finishing, all equipment that may be affected by cement dust must be completely covered. During painting operations, all grease fittings and similar openings shall be covered to prevent the entry of paint. Electrical switchgear, unit substation, and motor load centers shall not be installed until after all concrete work and sandblasting in those areas have been completed and accepted.

D. DELIVERY OF MATERIAL OR EQUIPMENT

The District's personnel or representatives of the District will not accept materials or equipment deliveries for the Contractor.

1.06 INSTALLATION

All materials and equipment shall be installed in accordance with the manufacturer's recommendations and requirements.

All materials and equipment shall be installed by specialists properly skilled in the trades and professions required to assure first-class installation. Where required by detailed specifications, the Contractor shall cause the installation of specific equipment items to be accomplished under the supervision of factory-trained installation specialists furnished by equipment manufacturers. The Contractor shall be prepared to document the skills and training of all workers engaged in the installation of all equipment furnished by the Contractor or the District.

1.07 TESTING

A. GENERAL

All materials, equipment and work included in this contract shall be tested and inspected to prove compliance with the contract requirements. Unless otherwise specified, all costs of testing, including temporary facilities and connections, shall be borne by the Contractor. No tests specified herein shall be applied until the item to be tested has been inspected and approval given for the application of such test.

Tests and inspections shall include:

1. Factory tests
2. The delivery acceptance test and inspections
3. The installed tests and inspections of items as installed

Tests and inspections, unless otherwise specified or accepted, shall be in accordance with the recognized standards of the industry.

The Contractor shall supply all necessary for construction and testing.

The form of evidence of satisfactory fulfillment of delivery acceptance test and of installed test and inspection requirements shall be, at the discretion of the District, either by tests and inspections carried out in the District's presence or by certificates or reports of tests and inspections carried out by approved persons or organizations. The Contractor shall provide and

use forms which include all test information, including specified operational parameters, and shall be acceptable in content to the District.

B. DELIVERY ACCEPTANCE TESTS AND INSPECTIONS

The delivery acceptance tests and inspections shall be at the Contractor's expense for any materials or equipment specified herein and shall include the following:

1. Test of items at the place of manufacture during and/or on completion of manufacture, comprising material tests, hydraulic pressure tests, electric and instrumentation subsystem tests, electric and operating tests, and inspections in accordance with the relevant standards of the industry and more particularly as detailed in individual clauses of these specifications to satisfy the District that the items tested and inspected comply with the requirements of this contract.
2. Inspection of all items delivered at the site or to any authorized place of storage in order that the District may be satisfied that such items are of the specified quality and are in good order and condition at the time of delivery. To that end, the Contractor shall be prepared to remove all coverings, containers or crates to permit the District to conduct the inspection. Should the District find, in his/her opinion, indication of damage or deficient quality, the Contractor shall provide the necessary documentation or conduct tests deemed necessary by the District to demonstrate compliance.

C. TESTS AND INSPECTION

All materials and equipment shall be tested by the Contractor to the satisfaction of the District before any facility is put into operation. Tests shall be as specified in these specifications and shall be made to determine whether the materials and equipment have been properly assembled, aligned, adjusted and connected. Any changes, adjustments or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work. All costs are the responsibility of the Contractor.

1.08 DEFECTIVE MATERIALS TO BE REMOVED

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.

1.09 INTERIM MAINTENANCE

After the completion of the testing under this contract as specified above, the Contractor, under this contract, shall be responsible for all maintenance of the equipment and materials furnished under this contract until the beginning of the commissioning period. The Contractor shall repair to new condition or replace at no cost to the District, materials or equipment furnished which is lacking in any mechanical or aesthetic respect due to improper maintenance during the interim period.

1.10 COMMISSIONING

After all tests have been performed to the satisfaction of the District and upon written notification from the District, the Contractor shall proceed to make the tie-ins as necessary to commission the facilities. The Contractor shall provide personnel to perform the uncompleted or remedial work detected during this period. The cost of such work shall be borne by the Contractor.

1.11 VERIFICATION PERIOD AND BENEFICIAL OCCUPANCY

Prior to completion of all items on the Punch List, the Contractor may request the start of the verification period. The verification period will start only after the Contractor has put the mechanical/electrical system into operation and after the District has checked that these systems are operating satisfactorily. The verification period will run for 30 calendar days, during which time the Contractor shall be responsible for operation and maintenance of the fuel tanks. If, at the end of the 30 day verification period, the District determines that the mechanical/electrical systems which are being verified are operating satisfactorily, the District will take over operation of these systems.

All warranties for materials and equipment shall commence only upon formal acceptance by the District of the entire job or of a portion of the project containing the specific equipment item.

1.12 RECORD DRAWINGS

The Contractor shall maintain at the site a set of drawings on which shall be accurately shown the actual installation of all work under this section, indicating thereon any variations from contract drawings, including any changes in sizes, locations and dimensions. For this purpose, the District will furnish two (2) sets of blue or black line on white prints.

The District may periodically inspect the record drawings at the site. The proper and current maintenance of the information required on these drawings shall be a condition precedent to approval of requisitions for periodic payment.

At the completion of the work, the Contractor shall submit a complete set of record drawings to the District.

1.13 WARRANTIES

The Contractor shall provide warranties on all equipment effective for one (1) year after the date of the project acceptance unless otherwise specified herein. Warranties shall be in favor of the Sanitary District.

1.14 PAYMENT

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals as specified above, including temporary pumps and tank trucks and AC pavement restoration, shall be considered as included in the contract prices for the various items of work in Schedule B and no additional compensation will be made therefor.

PART 2 – PRODUCTS
(NOT USED)

PART 3 – EXECUTION
(NOT USED)

END OF SECTION

SECTION 02050 DEMOLITION/ABANDONMENT/SALVAGE OF EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

The Contractor shall remove pavement sections, rodding inlets, cleanouts, manholes, existing facilities conflicting with installation of these sewer improvements, and abandoned certain pipelines as specified as necessary for the construction of work as shown on the plans and as specified.

All clearing and grubbing work shall be done in accordance with Section 16, "Clearing and Grubbing", of the State Standard Specifications, these Technical Provisions, and as directed by the City's Representative.

Dust Control shall conform to the provisions of Section 10, "Dust Control" of the State Standard Specifications.

1.02 SAFETY

The Contractor shall take all necessary precautions with regard to safety in carrying out the demolition work. Suitable barriers shall be erected around the demolition area to protect workmen and the public, and the Contractor shall rigorously comply with applicable safety requirements.

1.03 PAYMENT

Full Compensation for "Clearing and Grubbing" of the various types shall include the removal and disposal of the resulting material, removal and disposal of organic materials as specified in the Standard Specifications and these Technical Provisions and directed by the Engineer and shall be considered as included in the contract prices for the various items of work listed in Schedule B and no additional compensation will be made therefor.

Full Compensation for "Dust Control" shall include furnishing all labor, materials, and equipment nececessary to complete the work as shown in the plans, as specified in the Standard Specifications and as directed by the Engineer, and shall be considered as included in the contract prices for the various items of work listed in Schedule B and no additional compensation will be made therefor.

Full compensation for "Demolition, Abandonment, and Salvaging Equipment, sawcutting, removal and disposal of pavement (including baserock), curbs, gutters, existing sewer facilities (including pipe, manholes, rodding inlets, cleanouts), testing and disposal of hazardous materials, and relocating existing irrigation system, landscape rocks and structures for completion of project improvements shall be considered as included in the contract prices for the various items of work listed in Schedule B and no additional compensation will be made therefor.

PART 2 - PRODUCTS

2.01 GROUT

A. The grout materials shall consist of Portland cement (Portland cement and fly ash) and/or additives. The grout shall have a minimum penetration resistance of 100 psi in 24 hours when tested in accordance with ASTM C403 and a minimum compressive strength of 200 psi in 7 days when tested in accordance with ASTM C495 and a compressive strength of 300 psi in 28 days when tested in accordance with ASTM C495.

B. The Contractor shall design a grout mix with a density to meet the requirements of ASTM C939. The apparent viscosity shall not exceed 18 seconds in accordance with ASTM C939. The grout shall not bleed or segregate.

C. The initial set time shall not be less than 3 hours. The grout shall have a minimum density of 55 pcf and a maximum density of 61 pcf. The grout shall have less than 1 percent shrinkage by volume.

PART 3 - EXECUTION

3.01 SALVAGE OF EQUIPMENT AND MATERIALS

Unless requested by the Engineer, all materials and debris resulting from the demolition work shall become the sole property of the Contractor and shall be disposed of by the Contractor at a legal disposal site.

The Contractor shall deliver salvaged items to the District yard at a location to be defined by the District.

3.02 METHODS AND EQUIPMENT

Before starting work, the Contractor shall inform the District fully as to the method of demolition he proposes to follow, and the amount and character of equipment he proposes to use, which shall be subject to the approval of the District. The approval of the District shall not be considered as relieving the Contractor of the responsibility for the safety of his method or equipment or from carrying out the work in full accordance with the plans and specifications.

3.03 REMOVAL OF OLD STRUCTURES

The Contractor shall carefully dismantle old structures so as to minimize damage to nearby landscaping or improvements to remain.

3.04 DISPOSAL OF MATERIALS AND DEBRIS

All materials and debris resulting from the demolition work shall become the sole property of the Contractor and shall be disposed of by the Contractor at a legal disposal site.

3.03 ABANDONMENT OF PIPELINES

Pipelines to be abandoned shall be dewatered and cleared of all obstructions and then filled with grout and securely closed at all pipe openings by a watertight plug of concrete not less than three (3) feet thick.

3.04 ABANDONMENT OF MANHOLES

Where approved by the Engineering, the existing manholes may be abandoned. All pipes entering the manholes shall be securely plugged with a three (3) foot concrete plug. The manhole shall be demolished to an elevation three (3) feet below finished grade and backfilled with intermediate backfill compacted to the requirements of the typical trench section shown on the plans. The surface shall be restored as shown on the typical trench section shown on the plans.

Where manholes to be abandoned are in landscaped areas, an approved top soil mix shall be placed in the top 12" and the landscaping shall be restored.

The manhole frame and cover from existing manholes to be removed or abandoned shall not be re-used.

3.05 GROUTING

A. GROUTING EQUIPMENT

1. The materials shall be mixed in equipment of sufficient size and capacity to provide the desired amount of grout material for each reach, bulkhead to bulkhead, in a single operation. The equipment shall be capable of mixing the grout at densities required for the approved procedure and shall also be capable of changing density as dictated by field conditions any time during the grouting operation.
2. Pumping equipment shall be of a size sufficient to inject grout at a velocity and pressure appropriate to the size of the pipe being filled. Gages to monitor grout pressure shall be attached immediately adjacent to each injection port. The gage shall conform to an accuracy of no more than one-half percent (0.5%) error over the full range of the gage. The range of the gage should not be more than 100 percent greater than the design grout pressure. Pressure gages shall be instrument oil filled and attached to a saddle-type diaphragm seal (gage saver) to prevent clogging with grout. All gages shall be certified and calibrated in accordance with ANSI B40, Grade 2A.

B. INJECTION PROCEDURE AND PRESSURE

1. Construct bulkheads per pipe manufacturer's recommendations at the grouting supply and vent ends.
2. Maximum grout pressure shall be no less than 5 psig and no greater than 10 psig.
3. At a minimum two grouting tubes and one venting tube shall be furnished per grout stage. Grout shall be applied until it flows out of the vent tube. Then the vent tube shall be capped. Additional grout shall be applied to one grout tube until the grout flows out of the second grout tube. Then the grout tubes shall be capped.
4. The bulkhead shall be sealed flush to the manhole walls with non-shrink grout.

5. Grout and vent tubes shall be cut off and ground flush with manhole walls after the non-shrink grout bulkhead seal has cured.

C. ON-SITE TEST EQUIPMENT

Density for each batch shall be verified by ASTM C138 or by other methods as approved by the Engineer. Viscosities shall be checked with a flow cone provided by the Contractor. The apparent viscosity should not exceed 18 seconds in accordance with ASTM C939.

D. GROUT TESTING

One set of three standard cylinders shall be cast for each batch. Testing of the specimens for compressive strength shall be in accordance with ASTM C39. One test shall be made one day from the time of casting, and two tests shall be made 28 days from the time of casting. The average of the 28 day strength tests shall be equal to or greater than 300 psi. All testing shall be done by an independent testing laboratory at the expense of the Contractor. The grout shall have a minimum penetration resistance of 100 psi in 24 hours when tested in accordance with ASTM C403 and a minimum compressive strength of 300 psi in 28 days when tested in accordance with ASTM C495 or C109.

E. MONITORING

During the grout injection procedure the Contractor shall monitor sewers and storm drains along the length of pipeline to be filled to make sure grout does not escape the pipeline being grouted and enter pipes or storm drains

END OF SECTION

SECTION 02200 EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.01 DESCRIPTION

A. SCOPE OF WORK

The Contractor shall perform all operations necessary to excavate whatever substance encountered, including earth, sand, gravel, rock, buried structures, pipes or debris, to the depth shown on the plans and required for the installation, to remove unsuitable material and replace with suitable material for bedding and backfill, and to restore the ground surface or pavement to conditions satisfactory to the Engineer.

B. RELATED WORK SPECIFIED IN OTHER TECHNICAL SECTIONS

1. Pipeline Construction: Section 02600
2. Cast in Place Concrete: Section 03310

1.02 DEFINITIONS

A. PIPE BEDDING

Pipe bedding shall be composed of that portion of the backfill material placed in the bottom of the trench for the pipe barrel to rest on.

B. PIPE ZONE BACKFILL

Pipe zone backfill shall comprise that portion of the backfill surrounding the installed pipe, extending after compaction from the foundation to a level twelve (12) inches above the top of the pipe.

C. INTERMEDIATE BACKFILL

Intermediate backfill shall comprise the portion of the backfill from twelve (12) inches above the top of the pipe to the surface.

D. SOUND EARTH

Sound earth shall mean most native soils, with the exception of highly organic spongy soils and fat, highly plastic expansive clays.

E. SOUND GRANULAR SOIL

Sand with a maximum particle size of 3-inch, or gravel with a minimum grain size of 3-inch, or pea gravel, or crushed rock mixed with sand shall comprise sound granular soil.

F. RELATIVE COMPACTION

Relative compaction shall be taken to mean field density values expressed as a percentage of the laboratory standard maximum density, as determined by the methods of ASTM D-1557-91 and D-1556-90 or ASTM D-2292-91 and D-3017-88 (Nuclear Method).

1.03 QUALITY ASSURANCE

The District will retain a Soils Engineer who will conduct compaction tests to determine compliance with soil compaction requirements as described herein above.

1.04 SUBMITTALS

A. The Contractor shall submit to the Engineer copies of his/her proposed methods of sheeting, shoring and bracing as approved by the Division of Industrial Safety, per these specifications.

B. The Contractor shall submit to the Engineer samples of all materials proposed for use as pipe bedding and backfill. When requested by the Engineer, the Contractor shall submit a sieve analysis of the materials proposed to be used at no cost to the District.

1.05 BRACING AND SHEATHING

A. The Contractor shall do and be solely responsible for all bracing, sheathing and shoring necessary to perform and protect all excavations as required for reasons of safety and to conform to governing laws. Where required by the Division of Industrial Safety, shoring shall be designed by a registered Civil Engineer. Excavations shall be supported so that the ground alongside the excavations will not slide, and all existing improvements, either on public or private property, will be fully protected from damage. Additional supports requested by the Engineer shall in no way relieve the Contractor of his/her responsibility for the sufficiency of his/her precautions.

B. All shoring, bracing and sheathing above the top of the pipe shall be removed from the trench or excavation. Sheathing which has been driven below the invert of the pipe must not be removed. Under wet soil conditions, sheathing shall be left in the trench up to the top of the pipe.

C. The cost of such bracing, shoring and sheathing shall be included in the unit price per lineal foot of pipeline and no additional allowance will be made therefor.

1.06 CONTROL OF WATER

A. The Contractor shall remove all water which may accumulate in the excavation during the progress of the work by pumping or other suitable methods so that all work can be done in the dry. Trenches and other excavations shall be kept free of water while the pipe or structures are being installed, while concrete is setting, and until backfill has progressed to a sufficient height to anchor the work against possible flotation or leakage. Water shall be disposed of in such a manner as to cause no injury to public or private property or be a menace to the public health.

B. Where water is encountered, the trench excavation shall be carried twelve (12) inches below the pipe invert in which case the pipe bedding material shall be one and one half inch (1½") crushed rock.

C. The cost of such removal of water and additional excavation and pipe bedding material shall be included in the unit bid price per lineal foot of pipeline and no additional allowance will be made therefor.

1.07 REMOVAL OF UNSTABLE MATERIAL

A. Where unstable soil is encountered or where the bearing capacity is unsatisfactory to the Engineer, the soil shall be removed to a depth of twelve (12) inches below the pipe barrel and replaced with one and one half inch (1½") crushed rock.

B. The Contractor shall not be relieved thereby of his/her responsibility otherwise to employ procedures necessary to keep the trench bottom in a workable condition and provide a firm and adequate bedding for the pipe.

C. The cost of trench stabilization shall be included in the price per lineal foot of pipeline and no additional payment will be allowed.

1.08 PAYMENT

The cost of excavation, removal of unstable material, excavation of rock, backfilling, dewatering, compacting, imported material, backfill and compaction shall be included in the various bid prices in Schedule B for construction and no additional allowance will be made therefor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. GENERAL

The Contractor shall provide and install all materials as shown on the drawings and/or as specified herein.

B. CRUSHED ROCK

1. Crushed rock shall be hard, sound and durable and shall not slake or disintegrate in water.
2. One and one half inch (1½") crushed rock shall be uniformly graded with one hundred percent (100%) passing a one and one half inch (1½") sieve and not more than five percent (5%) passing a 3/8" sieve.
3. Three-quarter inch (3/4") crushed rock shall be uniformly graded with one hundred percent (100%) passing a three-quarter inch (3/4") sieve and not more than five percent (5%) passing a ¼" sieve.

C. CLASS 2 AGGREGATE BASE

Class 2 aggregate base shall be free from organic matter and other deleterious substances and shall be of such nature that it can be compacted readily with water and rolling to form a firm stable base. All class 2 aggregate base shall be virgin material with a sand equivalent of 25 and shall have the following gradation:

Sieve Size	Percentage passing
1”	100%
¾”	87-100
No. 4	30-65
No 30	5-35
No. 200	0-12

D. CONTROLLED DENSITY (ALSO INDICATED ON PLANS AS CDF)

Controlled Density Fill (CDF) shall be used where shown on the plans for backfill around new drainage pipes and structures.

CDF shall be flowable to fill the voids and self-leveling within the area to be backfilled. CDF shall have a cement content of 94 lbs per cubic yard and a total cementitious (cement and flyash) content of 200 to 250 lbs per cubic yard with a maximum aggregate size of 3/8-inch not to exceed 40% of the total aggregate content. Materials used for CDF shall have the following quantities:

1. Cement shall conform to ASTM C-150, Type II. The maximum percent alkalis shall not exceed 0.6%.
2. Aggregates shall comply with ASTM C-33 and shall be free from any substances that will react with the cement alkalis. The 3/8-inch aggregates shall be pea gravel.
3. Flyash shall conform to ASTM C 618 for Class F Pozzolans as modified herewith, and a loss on ignition (LOI) not to exceed 4%.
4. Water to be used in concrete shall be clean and free from objectionable quantities of organic matter, alkali, salts and other impurities which might reduce the strength, durability or otherwise adversely affect the quality of the CDF.
5. Air entraining agent shall conform ASTM C-260. Entrained air content shall be a minimum of 8.0%. The actual entrained air content shall be established for each particular job with the materials and aggregates to be used to meet the placing and unit weight requirements. Entrained air content may be as high as 20% for fluidity requirements.

E. TOPSOIL

Topsoil shall be imported, fertile, friable, natural, productive soil containing a normal amount of humus and capable of sustaining healthy plant life. Topsoil shall be free of subsoil, heavy of stiff clay, rocks, gravel, brush, roots, weeds, noxious seeds, sticks, trash and other deleterious substances. Soil shall not be infested with nematodes or with other noxious animal life or toxic substances. Soil shall be obtained from well-drained, arable land and shall be of an even texture. Soil shall not be taken from areas on which are growing any noxious weeds, such as Morning Glory, Sorrel, or Bermuda Grass.

F. WATER

Water used for dust control and moisture conditions for compaction shall be reasonably free of objectionable quantities of silt, oil, organic matter, alkali, salts and other impurities as determined by the Engineer. Bay water or water from drainage ditches on the project site shall not be used. Treated and disinfected effluent from the District treatment plant may be used for these purposes providing all water trucks or pipelines are clearly marked with signs stating, "WASTEWATER - DO NOT DRINK." All use of reclaimed wastewater must conform to Health Department Requirements.

PART 3 - EXECUTION

3.01 EXCAVATION

A. The excavation shall be made to enable the pipe to be laid to the grades and alignment shown on the plans. Excavated materials not required for fill or backfill shall be removed from the site of the work.

B. Trenches shall be excavated either by hand or by machine beginning at the outlet structure and proceeding upgrade, except as may otherwise be permitted by the Engineer. Hand excavation, tunneling, jacking or boring will be required when use of a machine will cause unnecessary destruction of trees, shrubs, lawns and existing structures above or below ground.

C. The narrowest practicable trench width which will allow proper densification of pipe zone backfill materials shall be maintained with vertical sidewalls from the foundation to at least the top of the pipe. Trench width at the top of the pipe shall not exceed the maximum trench width shown in the County Specifications. Where general conditions make this impractical, means must be provided, with the approval of the Engineer, for adequately supporting the increased load on the pipe which such widening will cause.

D. Where sheathing is required, the width of trench shall be increased sufficiently to accommodate the sheathing and timbers.

E. Excavation for manholes and other structures shall have twelve (12) inch minimum and twenty four (24) inch maximum clearance on all sides. Bell holes shall be excavated accurately to size by hand.

F. Excavation shall not be carried below the required level. Excess excavation below the required level shall be backfilled at the Contractor's expense with gravel, crushed rock or concrete, as directed by the Engineer, and thoroughly tamped.

G. In rock, excavation shall be carried six (6) inches below the bottom of the pipe and replaced with an approved material thoroughly tamped to provide a uniform support for the pipe. Permits for blasting shall be secured by the Contractor from the proper authorities. The cost of drilling and blasting shall be included in the unit bid price for lineal foot of pipeline and no additional allowance will be made therefor.

H. The bottom of all trenches shall be excavated accurately to the required grade with a firm bed to fit the barrel of the pipe. Minor adjustments in elevation required to produce the required invert slope shall be made by adequately bedding the pipe with sound granular pipe bedding materials, as hereinbefore defined, thoroughly compacted along the length of the pipe, underneath, and on both sides. It is essential that a uniform solid bearing be provided under the entire section of pipe.

I. For flexible pipe (PVC and polyethylene pipe), the pipe bedding (bottom of trench) shall be firm, but not hard, and shall consist of pipe zone backfill, free from stones or lumps exceeding one (1) inch in greatest dimension which might bear against the pipe. Suitable foundations shall be prepared by providing a one (1) inch minimum leveling course with loose bedding material graded uniformly in one plane for the full length of the pipe. Foundations shall provide uniform support under the haunches of the pipe up to the spring line along the full length of each pipe section.

3.02 BACKFILL

A. GENERAL

1. After the pipelines and their appurtenances have been properly constructed and inspected and after joints, plaster and concrete have set sufficiently to prevent damage, backfilling shall be done with approved material free from large clods or stones. Unless otherwise specified all backfill shall be compacted to 90 percent relative compaction per ASTM 1557.
2. The Contractor's attention is called to the fact that it will be his/her responsibility to obtain an encroachment permit for all work to be done in streets, roads, highways or railroad rights-of-way from the proper agency having jurisdiction and that the method of backfilling of trenches must conform to the requirements of such agency. Where imported materials will be required, the cost of furnishing and placing such materials shall be included in his/her bid price for sewer construction and no additional allowance will be made therefor.

B. PIPE ZONE BACKFILL

1. Backfill materials shall be so placed that the pipe will not be displaced, excessively deflected, or damaged. Materials placed as pipe zone backfill shall be free of stones or lumps exceeding one (1) inch in greatest dimension and shall be so placed as to prevent the formation of voids.
2. Pipe zone backfill preparation shall be placed and compacted determined on the basis of local native soil conditions and such that vertical ring deflection of flexible pipe will be limited to five percent (5%) of the nominal pipe diameter.
3. In general, pipe zone backfill shall be placed immediately after laying the pipe, provided the pipe is true to line and grade.

C. INTERMEDIATE BACKFILL

1. The backfill shall be blended sufficiently to secure the best practicable degree of compaction and stability.

2. Compaction may be performed by mechanical or hand tamping methods or by hydraulic methods as is necessary to achieve the required relative compaction.
3. Care shall be taken during compaction to prevent displacement of the pipe due to floating or shifting and to prevent hydrostatic or impact damage to the pipe and foundation. Heavy mechanical tamping or rolling equipment directly over the top of the pipe, such as might result in excessive reduction of the vertical diameter of the installed pipe, shall be avoided.
4. Intermediate backfill above the pipe zone backfill shall not be placed until conformance with specified relative compaction of pipe zone backfill material has been confirmed.

3.03 PRECAUTION AGAINST FLOTATION

The Contractor shall take every precaution against the flotation of the pipe due to water entering the trench or while pouring concrete encasement. In case of flotation, the Contractor shall replace the pipeline or portions thereof at his/her own expense and make good any injury or damage that may have resulted.

3.04 BACKFILL DEFECTS

Within one (1) year after acceptance of the project, the Contractor shall promptly refill and repair all trenches which settle or otherwise show defects. All shrubs, trees, lawns, patios, structures and other property disturbed during the course of the work shall be restored to their original condition to the satisfaction of the Engineer.

END OF SECTION

SECTION 02500 SURFACE RESTORATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. SCOPE OF WORK

Work included in this section shall consist of furnishing all labor, material, equipment, tools and services required for the performance of paving and surfacing operations, including repair of curbs, gutters, etc., as specified herein and/or as shown on the Drawings, or as necessary to complete the project. Any concrete curbs or gutters damaged by the work shall be repaired or replaced in kind.

B. RELATED WORK SPECIFIED IN OTHER TECHNICAL SECTIONS

1. Excavation and Backfill: Section 02200
2. Hot Mix Asphalt: Section 17-15

1.02 SUBMITTALS

The Contractor shall submit to the Engineer data describing the proposed surface restoration materials.

1.03 PAYMENT

A. Restoration of all surfaces and surface improvements damaged as a part of the work, including asphalt pavement, concrete pavement, paths, sidewalks, curbs, gutters, irrigation, landscaping, fencing, etc., shall be included in the various bid prices and no additional compensation will be allowed.

B. The Contractor shall be responsible for any off-site improvements which are damaged as a result of the Contractor's operation or by the travel of trucks on roads to and from the work area. Any such off-site damage shall be replaced at the Contractor's expense.

PART 2 - PRODUCTS

2.01 GENERAL

A. Materials for paving and surfacing shall conform to the applicable provisions of the State Standard Specifications and the County Specifications.

B. Pavement restoration for public roads shall conform to the requirements of the agency having jurisdiction over the roadway right-of-way.

2.02 PAVING AND SURFACING MATERIALS

A. AGGREGATE BASE

Aggregate base shall be Class 2, conforming to Section 26 of the State Standard Specifications. Minimum relative compaction shall be 95%. If pavement having a structural section greater than 15" is cut, additional base material may be required by the Engineer. Base shall be placed and compacted prior to placing of temporary paving.

B. ASPHALT CONCRETE

1. Asphalt concrete shall conform to Section 17-15 Hot Mix Asphalt.
2. Liquid asphalt prime coat shall be slow curing.

C. CONCRETE

Concrete for replacement of curbs, gutters, etc. shall be six (6) sack mix. Add 2 pounds of lamp black per cubic yard of concrete.

PART 3 - EXECUTION

3.01 PLACEMENT OF ASPHALT CONCRETE

A. DELIVERY AND SPREADING

Bituminous mixtures shall be delivered to the roadbed at temperatures specified in Section 39 of the State Standard Specifications. Spreading of the mixture shall be in accordance with Section 39 of the State Standard Specifications. All loads shall be covered with tarpaulin or other material during transportation.

B. COMPACTION

Initial or breakdown rolling and the final rolling of the uppermost layer of the asphalt concrete shall be compacted in accordance with Section 39 of the State Standard Specifications. Compaction by vehicular traffic shall not be permitted.

C. PAVEMENT THICKNESS

Pavement shall match the existing adjoining pavement in thickness, or as indicated on the Drawings, or as specified, whichever is greater.

D. JOINING PAVEMENT

The joints between old and new pavements or between successive days' work shall be carefully made in such manner as to insure a continuous bond between old and new sections of the course. Edges of existing pavement shall be exposed and cleaned and edges cut to straight, vertical surfaces. All joints shall be painted with a uniform coat of tack coat before the fresh mixture is placed.

E. PAVEMENT CUTTING

Trenches and other excavations in asphalt paved areas shall be cut by means of a saw cut to the full depth of the pavement. Pavement cuts shall be laid out by a chalk line and care shall be taken to ensure neat, straight edges.

After the Engineer has approved a section of trench for final paving, the Contractor shall strip out all temporary pavement to the full depth of the new pavement section as specified. Spalled or cracked sections of pavement beyond the excavation limits which, in the opinion of the Engineer, show signs of having separated from the adjoining pavement or are moveable, shall be removed and replaced with new pavement. Broken edges of pavement shall be trimmed along lines parallel to the trench edges. Exposed subgrade materials shall be compacted to the same standards as the adjoining trench backfill.

F. CONFORMANCE TO EXISTING IMPROVEMENTS

Asphalt concrete overlays shall be tapered to conform to existing paving, gutters, catch basins, and other surface features as directed by the Engineer.

G. SAND SEAL

Provide a sand seal over all new asphalt.

3.02 RESTORING OTHER AREAS

A. Other surfaced areas other than pavement shall be restored by replacement of identical surface and base when practicable. In no case shall the thickness and method of placement of curbs, sidewalks, etc., be less than that specified in the County Specifications.

B. All concrete curbs, gutters, aprons, patios, and driveways which are broken, crushed or damaged by the installation of the improvements shall be reconstructed by and at the expense of the Contractor, of the same kind of material and of the same dimensions as the original work, with the minimum requirement that concrete shall be Class A (6-sack), and the minimum thickness for concrete slabs, etc., shall be four (4) inches. The repairs shall be made by removing or replacing the entire portions between joints or score lines by removing the damage portions by concrete saw and not by merely refinishing the damaged part. All work shall match the appearance of the existing improvements as nearly as practicable.

C. All trenches in landscaped or cultivated areas shall have the top twelve (12) inches backfilled with topsoil. After installation, the topsoil and any adjacent unimproved land which has been compacted by the operation of the Contractor shall be thoroughly scarified and the surface cleaned of all large clods, stones or debris.

D. In lawn areas, the Contractor shall replace any grass removed for excavations, or which is damaged by his operations, with sod. Ground cover materials other than lawn shall be replaced in kind to the satisfaction of the District.

E. All landscape irrigation piping and control wires which are damaged by the work shall be replaced in kind.

F. The Contractor shall maintain all restored lawn and landscaped areas for a minimum of thirty (30) days after acceptance of the project by the District.

END OF SECTION

SECTION 02600 PIPELINE CONSTRUCTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. WORK INCLUDED IN THIS SECTION

This section includes gravity pipe installed through open trench or pipe bursting construction methods as determined by the Contractor and approved by the Engineer. Contractor shall utilize horizontal directional drilling for new sewer main alignment on 116 Miramar Ave.to minimize disturbance of existing site features on the subject property. No further horizontal directional drilling for new sewer main and laterals may be utilized unless approved by the Engineer on a case-by-case to minimize site disturbance to existing utilities and/or structures.

The Contractor shall furnish, install and test all pipework, including fittings, and appurtenances as shown on the drawings and described in these specifications as required to completely interconnect all equipment with piping for complete and operable systems.

B. RELATED WORK SPECIFIED IN OTHER TECHNICAL SECTIONS

1. Excavation and Backfill: Section 02200
2. Surface Restoration: Section 02500
3. Cleaning and Video Inspection: Section 02659

1.02 QUALITY ASSURANCE

A. MANUFACTURE

All materials and equipment furnished under this section shall: (1) be of a manufacturer who has been regularly engaged in the design and manufacture of the materials and equipment; and (2) be demonstrated to the satisfaction of the Engineer that the quality is equal to the materials and equipment made by those manufacturers specifically named herein, if an alternate product manufacturer is proposed.

B. CODES

Pipe materials and fittings shall meet specific ASTM, ASA, AWWA, commercial or Federal Specification Standards, as designated herein.

C. INSPECTION

All piping materials delivered to the job site shall be new, free from defects and shall be marked to identify the material, class and thickness.

D. ACCEPTANCE

Acceptance of piping materials shall be subject to strengths and quality testing in addition to inspection of the completed product. Acceptance of installed piping shall be based on inspection and leakage tests as specified herein.

1.03 SUBMITTALS

A. GENERAL

Per these specifications, the Contractor shall submit technical literature relating to the materials and equipment to be furnished under this section as will enable the Engineer to determine compliance with the design and arrangement of parts shown on the plans and specified herein or called for by character of this work.

1.04 PAYMENT

B. The contract price per linear foot of "Sewer Lateral" (Bid Items B109-B110) and "Sewer Main" (Bid Items B111-B116) utilizing open trench, horizontal directional drilling, and/or pipe bursting construction methods as determined by the contractor and approved by the Engineer shall include furnishing and installation of all necessary materials, storage of materials, equipment, labor, potholing laterals, determining active laterals, bracing, shoring and sheeting for all excavation as necessary to protect workers, control of sewage flow, trenching, dewatering, all pipe and fittings, locator wire and tape, pipe bedding, backfilling, compaction, sawcutting, restoration of pavement sections, landscape restoration, CCTV testing, all connections, as shown on the plans complete and in-place.

PART 2 - PRODUCTS

2.01 GENERAL

All materials shall be new, shall conform to these specifications and to the sizes and details shown on the plans. All materials shall be subject to test by the Contractor at the point of manufacture or at the site of the work. All materials which may fail to meet the requirements of the specifications herein referred to shall be rejected and shall be removed from the site of the work.

2.02 PIPELINE MATERIALS

A. POLYVINYL CHLORIDE PVC C-900 (RUBBER RING JOINTS) - GRAVITY SEWER MAIN (OPEN TRENCH CONSTRUCTION)

1. SCOPE. This specification designates general requirements for unplasticized polyvinyl chloride (PVC) Plastic Pipe with integral wall bell-and-spigot joints. All PVC pipe shall be white.
2. MATERIALS. PVC Pipe and Fittings shall conform to all the requirements of AWWA C-900 for pipe diameters 4" through 12" with a SDR = 21.
3. TYPE AND MANUFACTURE. All pipe, fittings, and accessories shall be of the same manufacture in order that bell-and-spigot configurations will be identical. Pipe shall be

made up with rubber ring joints to provide for expansion and contraction. The bell shall consist of an integral wall section stiffened with two PVC retainer rings which securely lock the solid cross section rubber ring into position. Methods of installation shall be in strict conformance with the recommendations of the manufacturer.

4. RUBBER RINGS. The rubber ring gaskets shall consist of synthetic rubber compounds meeting the requirements of ASTM F-477.

5. FITTINGS. All fittings for C-900 pipe shall be one piece and shall meet the requirements of ASTM D-1784. Fittings shall conform to requirements of DR 25. Fittings shall be designed to withstand a minimum of 755 psi quick burst pressure @ 76º F tested in accordance with ASTM D-1599. Bells shall be gasketed joint conforming to ASTM D-3139 with gaskets conforming to ASTM F-477.

B. POLYETHYLENE PIPE AND FITTINGS (HDPE PIPE) - PIPE BURSTING OR HORIZONTAL DIRECTIONAL DRILLING CONSTRUCTION

1. GENERAL. Where polyethylene pipe and fittings are shown on the Plans and/or specified, the Contractor shall furnish and install polyethylene pipe manufactured to conform to the following specifications.
2. TYPE AND MANUFACTURE. Polyethylene pipe and fittings shall be Type III Category 5, Grade P34, with a DR=17, having the following properties:

Property		Value	ASTM Test
Density, min.		0.955-0.957 gms/cc	D-1505
Melt Flow - Condition E		0.20 gms/10 min	D-1238
or Condition F		1.5 gms/10 min	D-1238
Environmental Stress Cracking Resistance w/no failures or stress crack initiation (Condition C)		1,000 hrs	D-1693
Tensile Strength, Yield 2 in/min		3,100 psi	D-638
Brittleness Temperature		180º F	D-746
Long-Term Strength	@ 73ºF	1,600 psi	D-2837
	@ 140ºF	800 psi	D-2837
Cell Classification		355434C or 335434C	D-3350

Polyethylene pipe shall be Driscoplex 4000 (DIPS)/4100 (IPS), or equal.

3. The polyethylene resin shall contain 2% carbon black antioxidant, well dispersed, and be stabilized against ultraviolet degradation to provide protection during processing and subsequent weather exposure. The interior of the pipe shall be gray.

4. Pipe shall be made to diameter and tolerances as shown in manufacturer's literature.

5. All pipe shall be made from virgin material. All resin in all the pipe and fittings must be produced by a single resin manufacturer and shall be fully traceable. No rework compound, except that obtained from the manufacturer's own production of the same formulation, shall be used.

   All pipe fittings and specials shall be furnished by the same pipe manufacturer.

6. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
7. The Contractor shall furnish and install the proper connecting pieces and/or transition sleeves in every case where it is necessary to join pipes of different diameters, materials, or types of joint.
8. Fusion joining and other procedures necessary for correct assembly of the polyethylene pipe and fittings will be done only by personnel trained in those skills to the satisfaction of the Engineer and the pipe supplier. Fused welds must be de-beaded and accepted by the District Inspector prior to pipe installation.
9. Only those tools designed for joining procedures and approved by the pipe supplier and Engineer shall be used for assembly of pipe and fittings to insure proper installation.
10. Where shown on the plans, polyethylene pipe shall be connected to systems or fitting of other materials by means of an assembly consisting of a polyethylene flange adapter butt-fused to the pipe, a backup ring of stainless steel made to ASA B-16 dimensional standards (with modified pressure rating, bolts of stainless steel and compound gasket).
11. The supplier shall provide polyethylene pipe with a permanently imprinted manufacturer's brand name, pipe size, and other identification for tracing pipe quality to raw material source. The HDPE pipe shall also be identified with a green stripe.
12. The pipe supplier shall furnish the system components, fusion machine of type specified and pipe support stands. The Contractor shall supply the power source for operation of the fusion machine.

C. PLASTIC METALLIC TAPE

Directly above the pipeline as shown on the plans, the Contractor shall install a continuous twelve (12) inch wide green plastic/metallic tape. Plastic tape to assist in easy location of the pipeline shall be Detectable tape as manufactured by Allen Systems, Inc, 108 East Wesley, Wheaton, IL, 60187, or Terra Tape as manufactured by Griffolyer Company, Div of Reef Industries, Inc, P O Box 33248, Houston, TX 77033, or approved equal. Legend printed on the tape shall be "Buried Pipe Below."

D. LOCATOR WIRE

The locator wire shall be Copperhead No. 12 AWG-Solid HS-CCS tracer wire, 30 mil HDPE, 30 volt as manufactured by Copperhead Industries, LLC or equal. Locator wire shall be terminated in manholes or in a precast concrete traffic box with a cast iron traffic lid. The continuity of the locater wire shall be tested prior to final paving.

PART 3 - EXECUTION

3.01 HANDLING PIPE AND FITTINGS

A. Proper tools, implements and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the work. During loading,

transportation and unloading, Contractors shall take every precaution to prevent injury to any and all pipe.

B. No pipe shall be dropped from cars or trucks nor allowed to roll down skids without proper restraining ropes. Each section of pipe shall be delivered in the field as near as practicable to the place where it is to be installed, and all bells shall be faced in the proper direction for laying. Pipe shall be distributed along the trench opposite the spoil bank within easy reach of the workers installing the pipe in the trench.

C. Pipe shall not be rolled nor dragged on the ground. Where pipe is placed in stockpiles, it shall be neatly piled and blocked with strips between tiers and with all bells facing in the same direction. Any pipe which may have been damaged in transportation or handling shall either be repaired by the Contractor before installation to the satisfaction of the Engineer or shall be permanently removed from the job site.

D. The site where the pipe is heat fused into longer length shall be graded level or with a uniform slope and shall be free of sharp rocks and other debris that could cut or gouge the pipe. Rollers shall be provided where the pipe must be dragged over rough ground to eliminate abrasion. For fusion welding during wet or stormy weather, shelters shall be provided by the Contractor.

3.02 PIPELINE ALIGNMENT AND GRADE

All pipelines shall be laid true to line and grade. Pipe alignment shall reasonably conform to that shown on the plans, and in no event shall joint deflections exceed the pipe manufacturer's recommendations.

3.03 INSTALLATION OF PIPELINES (OPEN TRENCH CONSTRUCTION)

A. GENERAL

1. The Contractor shall install all pipelines and appurtenances in the position and to the lines, elevations and grades shown on the plans. All pipe work shall be installed in a competent manner with all pipe runs truly parallel with vertical and horizontal axes.

2. Wherever a pipeline of any material terminates or extends at or through a structural wall or sump, the Contractor shall install, in advance of pouring concrete, the fitting or special casting required for the particular installation. Particular care shall be taken to secure full support of the pipe within the earth beyond the joint. A flexible type coupling or fitting shall be installed on all pipelines connecting to concrete structures to prevent shearing of the pipe due to settlement of earth surrounding the structure.

3. In the case of pipelines lying generally within structures, or extending from structure to structure, the Contractor shall, insofar as practicable, assemble such lines in advance of pouring concrete so that those sections passing through concrete walls may be cast monolithically in place.

4. Wherever any run of pipe is installed subsequent to pouring of concrete, the Contractor shall accurately position cored openings in the concrete for such pipelines. Openings shall be of sufficient additional diameter or size to permit a perfect final alignment of pipelines and fittings without any deflection of any part, and to allow adequate space for satisfactory

caulking, where the pipe passes through the wall, to insure water tightness around openings so formed. The boxes or cores shall be provided with continuous keyways, subsequently to hold the caulking in place against any movement of the pipe due to expansion or contraction. Cored openings shall be sealed with quick setting non-metallic hydraulic cement. The cement shall be "Waterplug," as manufactured by Standard Dry Wall Products, Inc, or equivalent. The cored opening shall be completely watertight.

B. CUTTING PIPE

The Contractor shall perform all work of cutting pipe and special castings necessary to the assembly, erection and completion of the work. All pipe shall be cut to fit accurately with smooth ends and faces. The Contractor shall be responsible for the correctness of cutting and shall stand the loss for any materials, which are damaged or incorrectly cut.

3.04 HORIZONTAL DIRECTIONAL DRILLING

A. The Engineer must be notified 48 hours in advance of starting work. The Directional Bore shall not begin until the Engineer is present at the job site and agrees that proper preparations for the operation have been made.

B. All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety.

C. Site Preparation

1. Prior to any alterations to work-site, Contractor shall photograph or video tape entire work area, including entry and exit points. One copy of which shall be given to Engineer.
2. No alterations beyond what is required for operations are to be made. Contractor shall confine all activities to designated work areas.

D. Drill Path Survey: Entire drill path shall be accurately surveyed with entry and exit stakes placed in the appropriate locations within the areas indicated on drawings. If Contractor is using a magnetic guidance system, drill path will be surveyed for any surface geomagnetic variations or anomalies.

E. High Density Polyethylene Pipe

1. Install HDPE pipe and fittings in accordance with manufacturer’s installation instructions and as shown on the drawings.
2. Joint Welding

a. Sections of HDPE pipe shall be joined into continuous lengths by the thermal butt fusion method and shall be performed in strict accordance with the pipe manufacturer’s printed recommendations. Threaded or solvent-cement joints and connections are not permitted.
b. Butt fusion shall conform to ASTM D-2657 and pipe manufacturer’s criteria for the type of joining. Joints shall indicate a ductile rather than brittle fracture when tested.

c. Fusion equipment used in the joining procedure shall be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, fusion temperature, alignment, and fusion pressure. Fusion equipment shall have a temperature gauge to record temperature during pipe installation.
d. The butt-fused joint shall be true alignment and shall have uniform rollback beads resulting from the use of proper temperature and pressure. Joints shall have internal bead projections of not more than ¼-inch. The joint shall be allowed adequate cooling time, per the pipe manufacturer's printed recommendations before removal of pressure. The individuals fusing the pipe shall allow further cooling prior to the application of stresses due to bending or movement of the pipe. The fused joint shall be watertight and shall have strength equal to that of the pipe.
e. All joints shall be subject to acceptance by the Owner's Representative. All defective joints shall be cut out and replaced. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of wall thickness, shall not be used and must be removed from the site. A defective area of the pipe may be cut out and the joint fused in accordance with the procedures specified above. Discard and do not use any section of the pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by Owner's Representative.
f. Sections of the HDPE pipe shall be assembled and joined on the job site.
g. Where the HDPE pipe is connected to fittings or valves of other materials, an HDPE flange adapter shall be fused to the end of the pipe and the connection made with bolted flange components, or a commercially manufactured adapter shall be fused to the pipe where shown on the drawings.

3. Testing and Inspection During Assembly:

On each day that fusion butt joints are made, a trial fusion shall be assembled, and fusion data for the trial fusion shall be recorded using fusion machine data recording equipment. A bent strap test shall be preformed and approved by the Owner's Representative before production begins. During assembly of the HDPE pipeline all joints shall be visually inspected and data for each field fusion shall be compared to the successful trial fusion. All joints failing the visual inspection or that do not favorably compare to trial fusion data shall be removed and redone.

a. Butt Fusion bent strap test: The bent strap test specimen shall be prepared by making a trial butt fusion and allowing it to cool to ambient temperature. A test strap shall be cut out of the trial fusion pipe and shall be of a minimum size required per ASTM D-2657. The test shall consist of bending the strap so that the ends of the strap touch. Any disbondment at the fusion shall be considered unacceptable and indicative of poor fusion quality. If failure occurs, fusion procedures and/or machine set-up shall be changed, and a new trial fusion and bent strap test specimen prepared and tested. Field fusion shall not proceed until a test joint has passed the bent strap test.
b. Visual Inspection: Butt fusion joints are visually inspected to ensure joint quality. The size and shape of the fusion beads shall be used to visually inspect if a proper joint has been made. Specifically, a) the double bead width shall be 2 to 2-1/2 times the height

from the pipe surface, b) both beads shall be uniform in size and shape all around the joint, and c) the depth of the v-groove between the beads shall not be more than half the bead height.

4. Connections and Existing Pipelines

Upon completion of HDPE pipe installation, a minimum period of 24 hours shall be provided before joining HDPE pipe to existing pipe materials, to allow the HDPE pipe sufficient time to contract/regain its original size

Pipe shall be fused together in one length, if space permits. Pipe will be placed on pipe rollers before pulling into bore hole with rollers spaced close enough to prevent excessive sagging of pipe.

F. Pilot Hole

Pilot hole shall be drilled on bore path with no deviations greater than five percent of depth over a length of 100 feet. In the event that pilot does deviate from bore path more than five percent of depth in 100 feet, Contractor will notify Engineer and Engineer may require Contractor to pullback and re-drill from the location along bore path before the deviation.

G. Reaming

Upon successful completion of pilot hole, Contractor will ream bore hole to a minimum of 25 percent greater than outside diameter of pipe using the appropriate tools. Contractor will not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.

H. Pullback

1. After successfully reaming bore hole to the required diameter, Contractor will pull the pipe through the bore hole. In front of the pipe will be a swivel. Once pullback operations have commenced, operations must continue without interruption until pipe is completely pulled into bore hole. During pullback operations Contractor will not apply more than the maximum safe pipe pull pressure at any time.
2. In the event that pipe becomes stuck, Contractor will cease pulling operations to allow any potential hydro-lock to subside and will commence pulling operations. If pipe remains stuck, Contractor will notify Engineer. Engineer and Contractor will discuss options and then work will proceed accordingly.

I. Following drilling operations, Contractor will de-mobilize equipment and restore the work site to original condition. All excavations will be backfilled and compacted to 95 percent of original density. Landscaping will be restored to original. All mud shall be disposed of by the Contractor.

J. Contractor shall maintain a daily project log of drilling operations and a guidance system log with a copy given to Engineer at completion of project. As-built drawings shall be certified as to accuracy by Contractor.

3.05 PIPEBURSTING

A. The trenchless pipe replacement process shall utilize High Density Polyethylene Pipe as the carrier pipe.

B. When shown on the plans sewer mains shall be pipeburst using a method that will not cause undue vibration or impact in the ground around the pipe or damage adjacent utilities.

C. The size-for size or upsizing installation of new pipe shall be accomplished by the following procedures:

1. The polyethylene pipe shall be attached to the rear of the pipe bursting machine with the hose lines and cables passing through the annulus of the replacement pipe.
2. A cable or chain shall be inserted from the launching trench through the existing pipe to the reception manhole where it shall be attached to the winch and the pipe bursting head.
3. The pipe bursting system with the replacement polyethylene pipe attached shall be lowered into the launching trench while the directional winch chain is simultaneously being tensioned, locating the pipe bursting head in the existing sewer line.
4. The pipe bursting action shall be initiated following the continuously tension winch chain toward the receiving manhole.
5. When the system reaches the reception manhole or the point of connection to an existing pipeline the polyethylene pipe shall be disconnected from the rear of the machine and the unit prepared for the next run.
6. New HDPE laterals shall be reconnected to the new pipe by means of a thermal weld saddle. The polyethylene pipe shall be drilled out, deburred and smooth to the touch.

D. After the polyethylene pipe has been inserted in the existing manhole, the Contractor shall trim the polyethylene pipe and anchor the pipe to the manhole base. Care must be exercised to prevent the new pipe from slipping out of position prior to final sealing of the manhole. The polyethylene replacement pipe shall protrude far enough into the manhole to allow the sealing and trimming operations to be performed.

E. A minimum of twelve hours after pipe insertion, a rubber seal shall be placed in the annular space between the polyethylene pipe outside diameter and the inside diameter of the existing hole in the manhole at each manhole location, together with caulking and non shrink grout.

F. All rehabilitated sewer mains shall be tested, cleaned and TV-inspected as specified herein.

G. Lateral connections to HDPE pipe shall be made by electrofusion HDPE saddles, Central, Friatec or approved equal. The connection between the existing lateral and new polyethylene lateral shall be by a banded rubber coupling with stainless steel shear bands, Fernco, Caulder, or equal.

H. Low Pressure Air Test Procedure of Sewer Pipe

1. After a manhole-to-manhole section of sanitary sewer main has been rehabilitated or replaced and prior to any service lines being connected to the replacement pipe, the pipe shall be plugged at each manhole with pneumatic plugs. The design of the plugs shall be such that they will hold against the test pressure without requiring external blocking or bracing. One of the plugs shall have three air hose connections: one for inflation of the plug, one for reading the air pressure in the sealed line, and one for introducing air into the sealed line.
2. Low pressure air shall then be introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure resulting from any ground water that may be over the pipe. At least two minutes shall elapse to allow the pressure to stabilize. The pressure shall be at least 4 psig at the beginning of the test.
3. The air pressure must not drop over a ten (10) minute period.

3.06 CLEANING

Prior to testing, the inside of each completed piping system shall be thoroughly cleaned of all dirt, loose scale, sand and other foreign material. Cleaning shall be by sweeping, flushing with water or blowing with compressed air, as appropriate for the size and type of pipe. The Contractor shall install temporary strainers, temporarily disconnect equipment, or take other appropriate measures to protect equipment while cleaning piping.

3.07 TESTING PIPE SYSTEMS

A. GENERAL

1. Gravity sewer lines, laterals and appurtenances shall be substantially watertight. All precautions shall be taken by the Contractor to secure watertightness throughout the component parts of the system. All jointing of pipe shall be subject to rigorous inspection by the Engineer or his representative. In addition, before the acceptance of the work and prior to the admission of any sewage into the system, the Contractor shall perform the tests herein specified and otherwise demonstrate to the satisfaction of the Engineer the watertightness of the sewer lines, including laterals and manholes and appurtenances. All leakage in excess of the maximum allowable amount hereinafter stipulated shall be corrected.

2. Testing shall be performed after backfilling and after manholes are finished. The Contractor shall make whatever preliminary tests he deems necessary prior to backfilling to satisfy himself that the completed and backfilled line will meet the hydrostatic tests herein required.

3. The test shall be conducted to include the new sewer mains and all new house connecting sewers and laterals. The test shall meet the requirements as herein specified. Any visible infiltration into sewers or manholes, no matter how slight, shall be repaired.

4. The Contractor shall furnish all facilities, including labor, materials, equipment, and tools necessary to conduct the tests and cleaning operations, and he shall repair all leaks. The

cost of testing and cleaning sewers shall be included in the unit bid price per lineal foot of sewer, and no additional allowance will be made therefor.

B. ISOLATION FROM EXISTING SYSTEM: The Contractor shall flush all sewer lines after backfilling and prior to testing. Accumulated material shall be removed at each manhole, and no material shall be allowed to enter the existing sewer system.

C. SIDE SEWER TESTING: All newly rehabilitated side sewers (laterals) shall be plugged at the cleanout and tested together with the sewer main.

D. AIR TESTING: Air testing of the sewer pipe will be permitted. The air test pressure shall be four (4) psi at the beginning of the test. For all pipe diameters there shall be no pressure drop over a ten (10) minute test period. Any leaks discovered shall be repaired by the Contractor at his expense.

E. SEWER CLEANING: After all grading and paving operations in the vicinity of the sewer lines are completed, the Contractor shall clean all lines of dirt and debris as specified in Section 02659.

F. TELEVISION INSPECTION: Prior to the start of pipeline construction, the Contractor shall arrange and pay for closed circuit television inspection of the sewer mains as specified in Section 02659.

After the sewers have been backfilled, completed, tested and cleaned, but before acceptance of the job, the Contractor shall arrange and pay for closed circuit television inspection of the sewer mains and each new lateral as specified in Section 02659.

3.08 PRESERVATION AND CLEANING UP

The Contractor shall properly preserve and clean the work as it progresses. At regular intervals, or as directed, rubbish and debris shall be collected and removed by the Contractor.

Upon the completion of the work, the Contractor shall clean up the whole work, and all false work, equipment, tools, rubbish and other temporary material shall be removed from the site, which shall be left in a clean condition acceptable to the Engineer.

END OF SECTION

SECTION 02605 MANHOLES

PART 1 - GENERAL

1.01 DESCRIPTION

A. SCOPE OF WORK

Work included in this section shall consist of furnishing all materials, labor, equipment, tools, and services required for the fabrication and construction of manholes, including laying of pipelines and appurtenances as specified herein, and/or as shown on the drawings, or as necessary to complete the project.

B. RELATED WORK SPECIFIED IN OTHER TECHNICAL SECTIONS

1. Section 02200: Excavation and Backfill
2. Section 02500: Surface Restoration

1.02 SUBMITTALS

Prior to manufacture, the Contractor shall furnish shop drawings to the Engineer showing details of fabrication of the manholes proposed to be used.

1.03 QUALITY CONTROL

All manhole and casting materials shall be inspected and approved prior to installation. The acceptance of any material or finished members by the Inspector shall not be a bar to their subsequent rejection, if found defective. Rejected material shall be immediately removed from the site and replaced promptly by the Contractor.

1.04 PAYMENT

The contract price paid for each "Shallow Sanitary Sewer Manhole" (Bid Item B117) and "Standard Sanitary Sewer Manhole" (Bid Item B118) shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for construction including all excavation, manhole base, forming of channels, cast iron frame and cover, backfilling, compaction and steel plates, and temporary resurfacing as specified herein and directed by the Engineer and no additional allowance will be made therefor.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE MANHOLES

All precast manhole sections shall conform to ASTM C-478, except that Type II modified Portland cement shall be used. The design, the specifications and the name of

the manufacturer of any precast manhole units shall be submitted to the District for approval prior to purchase.

Precast manhole bases are not allowed.

2.02 CASTINGS

Castings shall conform to the requirements of ASTM A-48, Class 30.

Castings shall conform to the shape and dimensions shown on the Standard Drawings. All castings shall be clean and free from blow or sand holes or defects of any kind.

The cover and its seat in the frame shall be machined so that the cover will sit evenly and firmly in the frame.

Cast iron frames and covers shall be dipped or painted with asphalt which will form a tough, tenacious, non-scaling coating which does not have a tendency to become brittle when cold or sticky when hot. Covers shall be easily removable.

Salvaged manhole ring and covers shall not be reused on the new manholes.

PART 3 - EXECUTION

3.01 PRECAST MANHOLE CONSTRUCTION

An approved form ring conforming to the dimensions of the precast barrel section joint shall be used to form a joint groove in the manhole base prior to setting the first barrel section. The concrete base shall be sufficiently cured to the satisfaction of the District before the first barrel section is set. All joint surfaces of precast sections and the manhole base shall be thoroughly cleaned prior to setting precast sections. These various sections shall be set in a Ram-Nek sealing gasket, or equal, and installed in accordance with the manufacturer's recommendations. The eccentric cone shall be center over the downstream channel

Handling of barrel sections after the sealing gasket has been affixed shall be carefully controlled to avoid bumping the gasket and thus displacing it or covering it with dirt or other foreign materials. Any gaskets so disturbed shall be removed and replaced if damaged and repositioned if displaced. Care shall be taken to properly align the manhole section with the previously set section before it is lowered into position.

3.02 MANHOLE CHANNELS

Pipe shall be used as a form for the channel if the proper positions of the flexible joints can be maintained. Whether pipe or channel forms are used, after the manhole base concrete has taken a set, the channel shall be checked with the proper template. All channels shall be finished smooth with a steel trowel.

3.03 ADJUSTING OR REPAIRING MANHOLES

All workmanship and materials shall conform to these Specifications and to the details shown on the Plans. In the case of existing brick or cast-in-place concrete manholes, repair or adjustment in kind or with precast elements may be permitted upon approval of the District.

Undamaged frames and covers shall not be reinstalled unless otherwise directed by the District. Where the completed manhole throat will exceed twelve (12) inches, adjustment shall be made by removing the upper portion of the manhole down to the first barrel section. Precast concrete barrel and cone sections shall be used to reconstruct the upper portion of the manhole in accordance with the Standard Drawings.

Before any work is started on adjusting or repairing a manhole, the channel inside the manhole base shall be covered with a temporary debris cover, consisting of plywood and canvas. This temporary debris cover shall be kept in place during all work, and upon completion, the canvas and the plywood shall be carefully removed from the manhole interior allowing no debris to fall or to remain in the manhole.

3.04 TEMPORARY COVERS AND PLUGS FOR MANHOLES

The District must have accessibility to manholes on all live sewers to allow maintenance of the system at all times. In streets, avenues, intersections, lanes, any public thoroughfares involving automobile traffic, buses, trucks, etc., the permanent manhole casting and cover shall be installed on all actively used sewers and sewer mains, including manholes, where live laterals are being used. The permanent manhole, casting and cover shall be brought up to the grade of the temporary asphalt. The manhole, frame and cover shall at a later date be raised to grade when the final permanent paving is done.

Temporary steel plate covers of approved design shall only be used on inactive sewer lines during the construction in subdivisions or other areas not subject to active vehicular traffic where final grades for unfinished roadbeds have not been determined, or where approved or ordered by the District. If the sewer being constructed is actively used, the Contractor shall install the permanent manhole frame and cover so the District can have access to the sewer for maintenance.

A temporary debris cover shall be placed over the base of any existing manhole prior to beginning any adjustment or repair work.

3.05 MANHOLE TESTING

A. GENERAL

All sanitary sewer manholes shall be watertight. All manholes shall be successfully tested either with clean water or by vacuum testing.

B. VACUUM TESTING OF MANHOLES

1. Sanitary sewer manholes may be vacuum tested in lieu of water testing. Vacuum testing of manholes shall be performed twice, first prior to backfilling and then again after backfilling.
2. Vacuum testing of manholes shall conform to the standard set for in ASTM C1244-93 Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.
3. The District representative shall be notified a minimum of two working days prior to the testing of the manholes.

4. The Contractor shall be responsible to perform the tests. The District's representative shall be present during all tests.
5. The Contractor shall document the tests and submit this documentation to the District.
6. Manholes shall be prepared for vacuum testing as follows:

   a. All lift holes shall be plugged.
   b. All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.

7. Vacuum testing of manholes shall be conducted as follows:

   a. The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.
   b. A vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 inches of mercury.
   c. The manhole shall pass if the time for the vacuum readings to drop from 10 inches of mercury to 9 inches of mercury meets or exceeds the values indicted in Table 1.
   d. If the manhole fails the initial test the leaks shall be located and the necessary repairs made by an approved method. The manhole shall then be retested until a satisfactory test is obtained.

TABLE 1 - VACUUM TEST TIMETABLE

MANHOLE DEPTH-FEET	MANHOLE DIAMETER-INCHES 48"	60"	72 "
4'	10 sec.	13 sec.	16 sec.
8'	20 sec.	26 sec.	32 sec.
12'	30 sec.	39 sec.	48 sec.
16'	40 sec.	52 sec.	64 sec.
20'	50 sec.	65 sec.	80 sec.
24'	60 sec.	78 sec.	96 sec.
*	5.0 sec.	6.5 sec.	8.0 sec.

*Add "T" times for each additional 2' depth.
(The values listed above have been extrapolated from ASTM designation C924-85.)

8. If the vacuum test fails, or 10" Hg vacuum cannot be obtained the following procedure shall be followed to locate the leaks.

   Shut off vacuum pump
   - Remove vacuum test plate from manhole
   - Then, using a 2 gallon hand pump sprayer (like a garden sprayer), spray the interior surface of the manhole with a soap and water mixture
   - Begin testing
   - After 30 second, stop vacuum and remove vacuum test plate once again
   - Check the inside of manhole for soapy bubbles, indicating the areas that leak

END OF SECTION

SECTION 02610 SANITARY SEWER RELIEF VALVES AND RODDING INLETS

PART 1 - GENERAL

1.01 DESCRIPTION

A. SCOPE OF WORK

Work included in this section shall consist of furnishing all materials, labor, equipment, tools, and services required for the fabrication and construction of sanitary sewer relief valves and rodding inlets per District Standard Plans and as indicated in the plans, including laying of pipelines and appurtenances as specified herein, and/or as shown on the drawings, or as necessary to complete the project.

B. RELATED WORK SPECIFIED IN OTHER TECHNICAL SECTIONS

1. Section 02200: Excavation and Backfill
2. Section 02500: Surface Restoration

1.02 SUBMITTALS

Prior to manufacture, the Contractor shall furnish shop drawings to the Engineer showing details of fabrication of the sewer relief valves, boxes with lids, rodding inlet frame and cover, and appurtenances proposed to be used.

1.03 QUALITY CONTROL

All materials shall be inspected and approved prior to installation. The acceptance of any material or finished members by the Inspector shall not be a bar to their subsequent rejection, if found defective. Rejected material shall be immediately removed from the site and replaced promptly by the Contractor.

1.04 PAYMENT

The contract price paid for each "Sanitary Sewer Cleanout" (Bid Item B119) and "Standard Sanitary Rodding Inlet" (Bid Item B120) shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for construction including all excavation, backfilling, compaction, and pavement restoration as specified herein and directed by the Engineer and no additional allowance will be made therefor.

PART 2 - PRODUCTS

2.01 PRECAST BOXES

Oldcastle precast B1017 box and lid marked "SEWER", or Engineer approved equal

2.02 CASTINGS

Cast Iron Rodding Inlet Frame and Cover stamped “SANITARY SEWER” by South Bay Foundry #SBF 1257 or Engineer approved equal.

2.03 PIPELINE MATERIALS

See Section 02600 Pipeline Construction

PART 3 - EXECUTION

3.01 TEMPORARY COVERS AND PLUGS

The District must have accessibility to cleanouts and rodding inlets on all live sewers to allow maintenance of the system at all times. In streets, avenues, intersections, lanes, any public thoroughfares involving automobile traffic, buses, trucks, etc., the permanent casting and cover shall be installed on all actively used sewers and sewer mains. The permanent casting and cover shall be brought up to the grade of the temporary asphalt. The frame and cover shall at a later date be raised to grade when the final permanent paving is done.

Temporary steel plate covers of approved design shall only be used on inactive sewer lines during the construction in subdivisions or other areas not subject to active vehicular traffic where final grades for unfinished roadbeds have not been determined, or where approved or ordered by the District. If the sewer being constructed is actively used, the Contractor shall install the permanent frame and cover so the District can have access to the sewer for maintenance.

END OF SECTION

SECTION 02615 ADJUST FRAME AND COVER TO GRADE

PART 1 - GENERAL

1.01 DESCRIPTION

A. SCOPE OF WORK

Work included in this section shall consist of furnishing all materials, labor, equipment, tools, and incidentals to adjust sanitary sewer manhole and rodding inlet frame and covers to grade in accordance with Section 15 Existing Facilities of the Standard Specifications and indicated in the plans.

1.02 SUBMITTALS

Prior to manufacture, the Contractor shall furnish shop drawings to the Engineer showing details of fabrication of the manholes proposed to be used.

1.03 QUALITY CONTROL

All manhole and rodding inlet casting materials shall be inspected and approved prior to installation. The acceptance of any material or finished members by the Inspector shall not be a bar to their subsequent rejection, if found defective. Rejected material shall be immediately removed from the site and replaced promptly by the Contractor.

1.04 PAYMENT

The contract price paid for each "Adjust Sanitary Sewer Manhole to Grade" (Bid Item B121) and "Adjust Sanitary Sewer Rodding Inlet to Grade" (Bid Item B122) shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for construction including all excavation, manhole base, forming of channels, cast iron frame and cover, backfilling, compaction and steel plates, and temporary resurfacing as specified herein and directed by the Engineer and no additional allowance will be made therefor.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.01 ADJUSTING OR REPAIRING MANHOLES

All workmanship and materials shall conform to these Specifications and to the details shown on the Plans. In the case of existing brick or cast-in-place concrete manholes, repair or adjustment in kind or with precast elements may be permitted upon approval of the District. Undamaged frames and covers shall not be reinstalled unless otherwise

directed by the District. Where the completed manhole throat will exceed twelve (12) inches, adjustment shall be made by removing the upper portion of the manhole down to the first barrel section. Precast concrete barrel and cone sections shall be used to reconstruct the upper portion of the manhole in accordance with the Standard Drawings.

Before any work is started on adjusting or repairing a manhole, the channel inside the manhole base shall be covered with a temporary debris cover, consisting of plywood and canvas. This temporary debris cover shall be kept in place during all work, and upon completion, the canvas and the plywood shall be carefully removed from the manhole interior allowing no debris to fall or to remain in the manhole.

END OF SECTION

SECTION 02659 CLEANING AND VIDEO INSPECTION

PART 1 - GENERAL

1.01 DESCRIPTION

The work to be done under this Section consists of furnishing all labor, equipment, materials, plant and supervision necessary to clean and TV inspect the sewer main lines and laterals designated on the Plans attached hereto and made a part hereof and as specified herein.

Additional required work includes performing the sewer condition assessment, data input to a Pipeline Assessment Certification Program (PACP) database and capturing and storing digital images for each event, i.e. lateral connections and all defects, which are recorded on a DVD and written inspection report as the work proceeds.

1.02 RELATED WORK SPECIFIED IN OTHER TECHNICAL SECTIONS

Section 02600: Pipeline Construction
Section 02605: Manholes

1.03 DELIVERABLES

A. CLEANING RECORDS

The Contractor shall make a record of each sewer that is cleaned using the street name, address and structure number of the upstream manhole and the location and type of any problem found.

B. TELEVISED Inspection RECORDS

The Contractor shall furnish the District with two (2) copies of the following records:

1. Televised records of each sewer line TV inspected on a DVD properly labeled as to date and address or location.
2. Written reports of inspected sewer lines which include rating and classification of each defect found.
3. PACP database of inspected sewer lines.
4. Digital images of all defects.

C. Project status report

The Contractor shall provide a monthly status report describing the level of completion of various tasks of the work. This request will be used to determine payment as the work proceeds.

1.04 QUALITY REQUIREMENTS

A. Company Experience

As a minimum the company shall have at least three (3) years experience and the supervisor two (2) years experience in this type of work. The Contractor shall demonstrate that he/she owns or has access to backup equipment so that the work does not have to be suspended in the event of equipment breaking down.

B. Qualification of Workers

The Contractor shall provide sufficient skilled workers and supervisor, who shall be present at all times during execution of the work described above, who shall be thoroughly familiar with the type of work involved and the materials and techniques specified. As a minimum the company shall have at least three (3) years' experience and the supervisor two (2) years' experience in this type of work.

C. PACP operator certification

Prior to initiating CCTV inspection work associated with condition assessment assignments, the Contractor shall present the Owner with copies of PACP certifications of operators that will be performing the work.

D. WORKER ATTIRE AND VEHICLES

All workers on the CCTV crew shall wear a photo identification badge, and lime green or orange safety vests. Vehicles shall be identified with the firm's name.

1.05 SUBMITTALS

The Contractor shall submit six (6) copies of the following for approval.

- Schedule of cleaning and televising.
- Brand name, model, specifications of television equipment to be used and sample DVD as specified in Section 1.16, Equipment, to establish picture quality.
- Traffic Control Plan.
- Formal procedures demonstrating that current regulatory requirements are conformed to regarding safe manhole entry and verification that all employees are trained on manhole entry procedures.

1.06 NOTIFICATION TO RESIDENTS, BUSINESSES, SCHOOLS AND AGENCIES

The Contractor shall provide the following notifications to the residents, businesses, schools and agencies in the work area:

- Post Notices of the cleaning and televising on power poles within the work area.
- Deliver a second notification to the affected properties in the form of a door knob hanger forty-eight (48) hours prior to the actual work or as required by the District. Affected properties shall be defined as all the properties in the vicinity of the work including the properties through which and/or over which the Contractor must traverse and work.

The wording of the public notifications will be developed by the District in cooperation with the Contractor and furnished to the Contractor. The notices will have a blank line for the Contractor to write in the date work will be done on the specified property being notified. The District will make the appropriate number of copies and forward them to the Contractor. The Contractor shall remove the posted notices immediately after the work is done.

1.07 SEWER CLEANING

A. GENERAL

All new sewers and laterals shall be cleaned prior to TV inspection. Cleaning shall consist of the use of a hydroflusher, rodder, root cutters including use of hand rodding equipment in easement areas where necessary as well as any other cleaning equipment necessary to remove foreign materials including adhered grease and dirt from the pipe walls together with all roots, rocks and debris from the sewer, manhole inverts and structures to obtain a clear picture of the internal condition of the line. Use of chemicals or herbicides is not permitted.

B. CLEANING PRECAUTIONS

During sewer cleaning operations, satisfactory precautions shall be taken in the use of cleaning equipment. When hydraulically propelled cleaning tools are to be used (which depend upon water pressure to provide their cleaning force), precautions shall be taken to insure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. The Contractor shall take particular care in cleaning plastic pipe so as not to damage it with the cleaning equipment. No fire hydrant shall be obstructed in case of a fire in the area served by the hydrant. The Contractor shall make his/her own arrangements for a water meter and any other utility service necessary to complete the work.

C. MANHOLE CLEANING

When necessary, all manhole structures, within the alignment of the sewer main to be televised, shall be cleaned using high-velocity District jet equipment. The cleaning process shall remove accumulated debris from all interior surfaces without damaging the structural integrity of the manhole.

If a manhole structure exhibits excessive damage during the cleaning operations, such as concrete spalling, exposed reinforcing, etc., cleaning operations shall immediately cease and the condition shall be immediately brought to the attention of the Engineer.

D. MATERIAL REMOVAL

All grease, sludge, dirt, sand, roots, rocks and other solid or semisolid material resulting from the cleaning operation shall be removed at the downstream manhole or pump station of the section being cleaned. Passing material from manhole section to manhole section, which could cause line stoppages, accumulations of sand, rocks and debris in pump stations, or damage to pumping equipment, shall not be permitted.

E. ROOT REMOVAL

All roots shall be mechanically removed wherever root intrusion is significant enough to restrict the passage of the camera and/or obtaining a clear picture. Procedure may include the use of rodding machines. Tree roots found shall be routinely reported on the Televised Inspection Report and peripheral work, as required as part of the Project.

1.08 CONTROL OF SEWAGE FLOW

A. PLUGGING OR BLOCKING

When necessary to plug or block the sewage flow, sewer line plug shall be inserted into the line upstream of the section being worked. The plug shall be so designated that all or any portion of the sewage can be released. During TV inspection, flow shall be reduced to levels that will allow full inspection of the pipe interior. After the work has been completed, flow shall be restored to normal.

The Contractor shall control the flow in the sewer being televised as necessary to allow the flow to be below the lens of the camera being used in order to get a clear picture. The Contractor shall notify the District prior to plugging any sewer line. Bypass pumping shall be provided at all times the line is being plugged. The Contractor at his/her option may perform the work on a sewer which has a high flow during the night when flows are low.

B. BYPASS PUMPING

When bypass pumping is required, the Contractor shall supply the pumps, conduits, and other equipment to divert the flow of sewage around the manhole section in which work is to be performed. The bypass system shall be of sufficient capacity to handle existing flow plus any additional flow that may occur during a rainstorm. The Contractor shall be responsible for furnishing the necessary labor and supervision to set up and operate the bypass pumping system. Engines shall be equipped in a manner to keep noise to a minimum.

C. FLOW CONTROL PRECAUTIONS

When flow in a sewer line is plugged, blocked, or bypassed, sufficient precautions must be taken to protect the sewer lines and connected homes from damage that might result from sewer surcharging. The discharge of any sewage from the sewer system to other than a downstream or adjacent sanitary sewer system is prohibited.

D. REMOVAL OF WATER IN SAGS

When the sewer has a sag where the TV camera goes under water the Contractor shall use jet or other equipment to remove the water in the sag(s) just prior to televising.

The beginning, end and depth of the sag and standing water shall be noted on the TV report.

1.09 TELEVISED INSPECTION OF SEWER MAINS

A. GENERAL

After cleaning, the manhole sections shall be inspected by means of closed-circuit color television. The inspection will be done one manhole section at a time under a condition of flow control.

B. EQUIPMENT

Pipe Inspection Camera – Produce a DVD using a pan-and-tilt, radial viewing, pipe inspection camera that pans ± 275 degrees and rotates 360 degrees. The television camera used for the inspection shall be specifically designed and constructed for such inspection. The camera shall be operative in 100% humidity conditions. Use a camera with an accurate footage counter that displays on the monitor the exact distance of the camera (to the nearest tenth of a foot) from the centerline of the starting manhole. Use a camera with camera height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe being televised. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. A reflector in front of the camera may be required to enhance lighting in dark or large diameter pipe. The camera shall be capable of showing on the digital inspection the Owner's name, Project name, Contractor name, date, line size and material, line identification (Owner's manhole numbers at both ends) and ongoing footage counter. The camera, television monitor, and other components of the system shall be capable of producing picture quality to the satisfaction of the Owner; and if unsatisfactory, equipment shall be removed and replaced with adequate equipment. No payment will be made for an unsatisfactory inspection.

C. TELEVISED RECORDINGS

The purpose of televised recordings shall be to supply a visual and audio record, of problem areas of the lines, that may be replayed. Televised recordings shall include an audio track recorded by the inspection technician during the actual inspection work describing the parameters of the line being inspected (i.e., location, depth, diameter, pipe material), as well as describing connections, defects and unusual conditions observed during the inspection. Televised recording playback shall be at the same speed that it was recorded. Slow motion or stop-motion playback features may be supplied at the option of the Contractor. Once inspected, the CDs/DVDs shall be labeled and become the property of the Owner. The Contractor shall have all necessary playback equipment readily accessible for review by the Owner during the project.

D. TELEVISED INSPECTION REPORTS

Each DVD must be accompanied by a written inspection report approved by the Engineer. This report shall identify televised inspection date, time, project number, company, operator, tape number, location, notes, upstream manhole number, downstream manhole number, pipe type, pipe diameter, gauge dimensions, flow and camera direction and any other information required by the Engineer. The report shall contain a listing of all pipe events, defects, sags, service connection locations including quadrant location, infiltration points and conditions, etc., observed on a footage basis.

Each pipe event shall include a rating according to the Pipeline Assessment Certification Program (PACP) schedule - defect classification table for the following: cracks, breaks, collapsed sections, misaligned joints, broken joints, sags, debris, root intrusion, and infiltration. The severity of the defect should also be reported. The beginning of all sags of 1/4 pipe, 1/2 pipe and underwater as well as where the camera pulls out of sag should be reported. For each service connection, the quadrant position, its condition and type must be recorded. All other information required for analysis such as degree of deterioration and deformed or collapsed pipe should be reported. All pipe event codes and locations entered on the inspection report must correspond to the event codes, pipe footage and counter displayed on the DVD. All televising shall be in color.

E. OPERATION

The camera shall be moved through the line in either direction at a moderate rate, allowing complete visibility of the pipe condition at all times. The camera shall be stopped when necessary to permit proper documentation of the sewer's condition. In no case will the camera be pulled at a speed greater than 30 feet per minute. Power winches that do not obstruct the camera view or interfere with proper documentation of the sewer conditions may be used to move the camera through the sewer line. If, during the inspection operation, the camera will not pass through the entire section of sewer due to an obstruction (i.e. offset, break, protruding lateral), the Contractor shall set up his/her equipment so that the inspection can be performed from the opposite manhole, a reverse set-up.

The importance of accurate distance measurements is emphasized. Measurements recorded on the DVD should start at the beginning of the pipe in the manhole and shall not include the depth of the manhole. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device. The accuracy shall be to two tenths (0.2) of a foot.

F. LOCATION OF OBSTRUCTIONS

The Contractor shall locate on the ground any obstruction which necessitates a reverse set up as the District can hire a contractor to repair it. The obstruction shall be located on the ground surface by means of a radio wave transmitter and receiver and marked with green paint and/or a stake. Do not paint patios, walls or private property improvements.

1.10 FINAL ACCEPTANCE

Acceptance of sewer line cleaning and televising shall be made upon delivery, evaluation and approval of the work products required by these specifications and as measured by the footage successfully televised, verified and approved by the Engineer.

1.11 PAYMENT

The cost for all labor, equipment and materials for sewer cleaning and televised inspection shall be included in the respective bid items of Schedule B therefor and no additional compensation will be allowed.

END OF SECTION

SECTION 02740 HOT MIX ASPHALT

PART 1 - GENERAL

See Section 17-15 Hot Mix Asphalt

1.01 PAYMENT

Measurement and payment for "HMA – Pavement Overlay" (Bid Item B107), as determined by Weighmaster's Certificates, shall be per Ton and shall include full compensation for furnishing all the labor, materials, tools, equipment, and for doing all the work involved in installation of HMA complete in place, including tack coat, cleaning surface, and all incidental work, all as specified in the State Standard Specifications, these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefore

PART 2 - PRODUCTS

See Section 17-15

PART 3 - EXECUTION

See Section 17-15.

END OF SECTION

SECTION 02760 ASPHALTIC CONCRETE GRINDING

PART 1 - GENERAL

See Section 17-18

1.01 PAYMENT

The respective contract prices paid per square foot for "Asphaltic Concrete Grinding" (Bid Item B106) shall include full compensation for furnishing labor, materials and equipment necessary to complete the work (including removing and disposing of pavement grindings and for "hand" clearing of pavement from gutter pans as shown on the plans and specified herein).

The quantities to be paid for shall be to the specified dimensions of grinding regardless of the number of passes required to conform to the depth requirement shown on the plans.

PART 2 – PRODUCTS

See Section 17-18

PART 3 - EXECUTION

See Section 17-18

END OF SECTION

SECTION 03310 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

See Section 17-11

1.01 PAYMENT

The linear foot cost paid for "Concrete Curb and Gutter (24-inch)" (Bid Items B108) shall include full compensation for furnishing all labor, materials, tools, formwork, equipment, testing, and incidentals, and for doing all the work involved in constructing the curb and gutter complete in place including excavation and subgrade preparation as shown on the Plans, as specified in the Standard Specifications and these Specifications, and as directed by the Engineer

PART 2 - PRODUCTS

See Section 17-11

PART 3 - EXECUTION

See Section 17-11

END OF SECTION