# TECHNICAL SPECIFICATIONS

**for**

# BEVERLY PARK ELEMENTARY

**11427 3rd Avenue Burien, Washington**


## DRS Project No. 18123

*Owner/Applicant*

Highline School District No. 401
15675 Ambaum Blvd SW
Burien, Washington 98166

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# INDEX

## DIVISION 1 – GENERAL CONSTRUCTION PROVISIONS

# SECTION 01001
# SPECIFICATION STRUCTURE

## PART 1: GENERAL

1.1 FORMAT

A. This specification is organized on the format promulgated by the Construction Specification Institute. (CSI Format)

B. This format assigns permanent numbers to all Divisions and Sections and so far as possible assigns all products, processes, activities and construction requirements permanent places in the specifications. A number is assigned which will not change from specification to specification.

C. Division, Section and Subsection numbers which are not required are omitted from the Specification.

D. Reference to an Article is a numbered clause in the General Conditions.

1.2 INDEX

A. All Sections required for a complete Contract appear in the index. Sections not required are omitted.

B. Bidders and Contractors should check Sections present against the index to assure the presence of all required Sections of the Contract.

1.3 ARRANGEMENT

A. The Project Manual is organized as follows:

1 Procedural and legal documents in the opening Sections.

2 Specifications in Divisions number 1 to 16.

B. No attempt has been made in these specifications or plans to segregate work covered by any trade or subcontractor under one specification. Such segregation and establishment of subcontract limits shall be solely a matter of specific agreement between the Contractor and his/her subcontractors and shall not be based upon an inclusion, segregation or arrangement in or of these specifications. The Contractor and subcontractor in each case is warned that work included in any subcontract may be divided between several general specifications and that each general specification or subhead of the Contract Specifications may include work covered by two or more subcontracts in excess of any one subcontract.

C. The Contractor shall be responsible for all work shown or specified, regardless of location in the Contract Documents.

1.4 LANGUAGE

A. These Specifications are written in imperative and abbreviated form.

B. This imperative language of the technical sections is directed at the Contractor, unless specifically noted otherwise.

C. Incomplete sentences shall be completed by inserting "shall", "the Contractor shall", and "shall be", and similar mandatory phrases by inference in the same manner as they are applied to notes on the drawings. The words "shall be" shall be supplied by inference where a colon (:) is used within sentences or phrases.

D. Except as worded to the contrary, fulfill (perform) all indicated requirements whether stated imperatively or otherwise.

*** * * END OF SECTION 01001* * ***

# SECTION 01010
# SUMMARY OF WORK

## PART 1: GENERAL

1.1 GENERAL STATEMENT

A. The work to be performed under this Contract consists of furnishing all labor, material and equipment necessary for or incidental to the construction and completion of all work.

1.2 SCOPE OF WORK

A. Work consists of construction work shown on the Contract Drawings and described herein.

### 1.3 CONTRACTOR'S DUTIES

A. Except as specifically noted, provide and pay for:

1 Labor, materials and equipment.
2 Tools, construction equipment, machinery and fuel.
3 Water, heat, and utilities required for construction.
4 Other facilities and services necessary for proper execution and completion of work.

B. Pay legally required sales, consumer use and other taxes as may be required by law.

C. Give required notices.

D. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of work.

E. Promptly submit written notice to the Engineer of observed variance of Contract Documents from legal requirements. It is the Contractor's responsibility to make certain that drawings and specifications comply with codes and regulations.

F. Enforce strict discipline and good order among employees.

G. Do not employ:

1 Unfit persons.
2 Persons not skilled in assigned task.

### 1.4 CONTRACTOR FURNISHED

A. Labor, materials and equipment required for the project.

B. Water for construction, fire protection and all field offices.

C. All gates, barricades, fences, handrails, guardrails, and security required by the Contract or by laws and regulations.

D. Sanitary facilities adequate for all workers and complying with all codes and regulations.

E. Shelter and drying facilities for personnel.

F. Guards, marks, shields, protective clothing, rain gear, and other equipment required by law, ordinance, labor contracts, OSHA and other regulations for the maintenance of health and safety.

G. First Aid Kits and equipment required by law and regulations.

## 1.5 PERMITS AND LICENSES

A. The Developer shall prepare, submit and reimburse to the District for all Department of Fish and Wildlife permits, State Highway permits, railroad permits, road permits, excavation street use permits, general building permits, and shall pay the fee prescribed for all permanent franchises, permits, licenses and easements.

B. The Contractor shall acquire and pay for all specialty permits such as electrical permits, plumbing permits, transportation permits, fill and grade permits, burning permits, wage and hour regulations permits, and all other permits of a temporary nature relating to the construction of the project.

## 1.6 TYPE AND EXTENT OF WORK

A. All work incidental to and necessary for the completion of the work described herein and shown on the drawings shall be completed.

## 1.7 WORKS UNDER SEPARATE CONTRACTS

A. The Contractor should anticipate that other work under separate contracts may occur. Cooperation between construction activities, especially where the work is to be completed in the same general area, is expected of all parties concerned.

B. Contractors are cautioned to anticipate reasonable delays due to this construction by others under the separate contracts. Changes in soil or water conditions because of construction work performed by others under separate contracts may occur and shall not be the basis for a claim to the District.

C. At locations where these separate contracts are joined to form a completed system, the Contractor last completing the work at the point of connection, as determined by the Engineer, shall be responsible for making said connection.

## 1.8 DISTRICT FURNISHED PRODUCTS

A. The District will furnish no material.

## 1.9 LIMITED USE OF PREMISES

A. Limitation:

1. The Contractor shall make himself/herself aware of the limited access and limited space available at the site. Storage of equipment and materials which interfere with the use of the property by the property owners will not be allowed. The Contractor shall be responsible for making arrangements for all storage areas required for materials and equipment.

2. The Contractor shall confine his/her apparatus, storage of materials, and construction operations to such limits as are minimally necessary and shall not unreasonably encumber the premises.

3. The Contractor shall enforce any instructions of the Owner regarding signs, advertising, fires, danger signals, barricades, and smoking, and the Contractor shall require all persons employed on the work to comply with all building, post or institutional regulations while on the premises.

4. The Contractor shall not permit any part of any structure to be loaded with a weight that will injure its safety.

B. Confine operations at site to areas permitted by:

Laws.
Ordinances.
Permits.
Contract Documents.
Right-of-Way.
Easement Limitations.

## 1.10 SPECIAL CONSTRUCTION CONSTRAINTS

A. The duration of street and alley closures for the Contractor’s activities shall be minimized. The Contractor shall not restrict ingress, egress, parking, and other uses or access by local residents to any given section of street or alley for a cumulative period of time exceeding 14 calendar days.

B. Streets or alleys shall be temporarily restored (trenches backfilled and temporary pavement patches installed) for ingress, egress, parking, and other uses or access by local residents prior to each weekend or holiday and at all other times that the Contractor is not actively working on that area.

C. Where residents must use alleys for ingress and egress to garages or vehicle parking areas, the Contractor shall restore access at the end of each workday. All trenches in streets shall be backfilled at the end of each workday and at all other times that the Contractor is not actively working on that area. Where trench shoring is in place, the Contractor may cover the excavation with steel plates.

D. Upon completion of pipe installation and excavation backfilling, the Contractor shall promptly restore the alley or street driving surfaces and permit unrestricted public use and access for Engineer's inspection activities. Unless approved by the Engineer or the Owner's Representative, no more than 2 blocks of alley or street are permitted to be in construction progress (inaccessible) at any given time.

E. Asphalt paving work shall be planned to minimize displacement of street and alley parking areas needed by local residents.

*****END OF SECTION 01010*****

# SECTION 01041
# PROJECT COORDINATION

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Separate Contracts: Article 25 General Conditions
B. Subcontractors: Article 26 General Conditions
C. Summary of Work: Section 01010
D. Job Site Administration: Section 01043
E. Cutting and Patching: Section 01045
F. Field Engineering: Section 01050
G. Preconstruction Conferences: Section 01210
H. Progress Meetings: Section 01220
I. Inspection Services: Section 01420

1.2 POLICY IN PRACTICE

A. Engineer is the Owner's Advisor and Consultant:

1 Inspection and Testing Laboratories are to furnish data and guidance only and may make no decisions involving changes in the Contract.

2 All job located problems shall be handled through the Resident Engineer or Inspector.

B. Owner's desires and instructions are to be channeled through the Engineer regarding all phases of the Contract.

C. Contract related communication from Contractor shall be handled through the Engineer.

D. Coordination of all subcontractors is the responsibility of the Contractor.

E. Documents of the Contract are directed to the Contractor and not to the subcontractors involved.

F. The Contractor is solely responsible for construction methods and the results thereof regardless of any advice, information, methodology or scheduling unless such advice, methodology or scheduling is written into the Contract or given in writing by the Engineer or the Owner.

1.3 COORDINATION OF TRADES AND SUBCONTRACTORS

A. Coordination is the responsibility of the Contractor. He/She shall assure coordination with suppliers, electrical contractors, mechanical contractors and all trades to the end that:

1 All necessary equipment, work and structures are scheduled, installed and tested in proper sequence.

2 He/She shall assure that electrical and mechanical equipment, wiring and control equipment, piping and plumbing, grading and landscaping and all problems of supply, installation and scheduling are coordinated and that the relations of all elements are carried out in an orderly manner in accordance with the Contract.

3 Contractor shall coordinate all suppliers of equipment, controls and electrical supplies before submittal of shop drawings.

1.4 COORDINATION OF UTILITIES

A. Contractor shall schedule and supply utilities as required in the Contract.

1.5 PUBLIC AGENCIES

A. Contractor shall coordinate his/her schedule and activities with the Owner, the Engineer and various agencies involved as the necessity arises and as required by the Contract:

1. Power.
2. City.
3. County.
4. Other Utilities.
5. Police.
6. Fire.
7. Schools.
8. State.
9. Other public agencies.

*** * * END OF SECTION 01041 * * ***

# SECTION 01043
# JOB SITE ADMINISTRATION

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Construction Observation Services: Section 01420
B. Temporary Water: Section 01515
C. Protection of Work and Property: Section 01545
D. Traffic Regulation: Section 01570

1.2 REMOVAL OF DEBRIS, CLEANING, ETC.

A. The Contractor shall at all times keep the construction area clean and orderly and upon completion of the work shall leave all areas either broom clean or raked smooth as applicable. All other parts of the work shall be clean and free of rubbish or excess material of any kind.

B. Upon completion, the site of all work or equipment and material storage areas shall be restored to substantially their original condition.

C. Miscellaneous debris, rocks, etc., resulting from the work shall be removed and disposed of in a manner satisfactory to the Owner.

D. The site shall be left in a clean and neat condition.

1.3 TESTS

A. Where the Specifications require work to be specifically tested or reviewed, it shall not be tested or covered up without timely notice to the Engineer or the Owner’s Representative of its readiness for inspection, unless the Engineer or the Owner’s Representative waives such notice.

B. Should any such work be covered up without such notice, approval or consent, it must, if required by the Engineer or Owner’s Representative, be uncovered for examination at the Contractor's expense.

C. Where work is to be tested, all necessary equipment shall be set up and the work given a preliminary test so that any and all defects may be discovered and repaired prior to calling out the Engineer or the Owner’s Representative for the test.

1.4 COMMENCEMENT OF WORK ON PUBLIC AND PRIVATE RIGHT-OF-WAY

A. Work shall not be started on any public or private right-of-way until clearance is given to the Contractor by the Engineer or the Owner’s Representative.

B. It will be the responsibility of the Contractor to comply with any special requirements of any permits or easements for the project acquired by the Owner.

*** * * END OF SECTION 01043 * * ***

# SECTION 01045
# CUTTING AND PATCHING

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Demolition: Section 02050
B. Pavement Repair and Resurfacing: Section 02575

1.2 METHODS

A. Execute cutting (including excavating), fitting or patching of work, required to:

1 Make several parts fit properly.
2 Remove and replace defective work.
3 Remove and replace work not conforming to requirements of Contract Documents.
4 Install specified work in existing construction.

B. Do not endanger any work by cutting or altering work or any part of it.

C. Do not cut or alter work of another contractor.

1.3 SUBMITTALS

A. Submit written notice to Engineer or the Owner's Representative requesting consent to proceed prior to cutting which affects structural safety of project, or work of another contractor.

B. Submit notice to the Engineer or the Owner's Representative designating time work will be uncovered, to provide for observation.

1.4 PAYMENT FOR COSTS

A. Contractor shall pay for all costs caused by ill-timed, unnecessary or defective work or work not conforming to Contract Documents, including costs for additional services of the Engineer or the Owner's Representative.

## PART 2: PRODUCTS

2.1 MATERIALS

A. For replacement of work removed: Contractor shall comply with Specifications for type of work to be done.

## PART 3: EXECUTION

3.1 INSPECTION

A. Inspect existing conditions of work, including elements subject to movement or damage during construction.

3.2 PREPARATION (PRIOR TO CUTTING)

A. Provide shoring, bracing and support as required to maintain structural integrity of all portions of the project.

3.3 PERFORMANCE

A. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances, and finishes.

B. Execute excavating and backfilling as specified in Excavating and Backfilling.

C. Restore work which has been cut or removed.

*** * * END OF SECTION 01045 * * ***

# SECTION 01050
# FIELD ENGINEERING

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Surveys: Article 10 - General Conditions
B. Job Site Administration: Section 01043.
C. Inspection Services: Section 01420.

1.2 CONSTRUCTION STAKING BY CONTRACTOR

A. Staking performed by the Contractor shall be done by qualified licensed surveyors. The surveyor shall use NAVD 88 datum.

B. Field notes shall be kept in standard bound notebooks in a clear, orderly manner consistent with standard engineering practice including titles, numbering and indexing.

C. The Contractor shall provide the Owner with a copy of all field notes including references to monuments and property corners.

***** END OF SECTION 01050 *****

# SECTION 01070
# ABBREVIATIONS AND SYMBOLS

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Definitions: General Conditions

1.2 ABBREVIATIONS

A. Whenever the following abbreviations are used on the plans, specifications, proposals and contracts, they shall be construed to mean the words and terms as listed below.

B. Duplicate Definitions shall be interpreted in context of use.

A

| | |
|---|---|
| AASHTO | American Association of State Highway and Transportation Officials |
| AC | Asbestos Cement or Asphaltic Concrete |
| ACI | American Concrete Institute |
| AFBMA | Anti Friction Bearing Manufacturers Assoc. |
| AGA | American Gas Association |
| AGC | Associated General Contractors of America |
| AGMA | American Gear Manufacturer Association |
| AIA | American Institute of Architects |
| AISC | American Institute of Steel Construction |
| AISI | American Iron and Steel Institute |
| AITC | American Institute of Timber Construction |
| AMCA | Air Moving and Conditioning Association |
| ANSI | American National Standards Institute |
| APA | American Plywood Association |
| API | American Petroleum Institute |
| APWA | American Public Works Association |
| AREA | American Railway Engineering Association |
| ASAE | American Society of Agriculture Engineers |
| ASCE | American Society of Civil Engineers |
| ASHRAE | American Society of Heating, Refrigeration, and Air Conditioning Engineers |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |
| AWPA | American Wood Preservers Association |
| AWS | American Welding Society |
| AWWA | American Water Works Association |

B

| | |
|---|---|
| BTU | British Thermal Unit |
| BTUH | British Thermal Units Per Hour |

C

| | |
|---|---|
| C | Centigrade/Celsius |
| CB | Catch Basin |
| CBMA | Certified Ballast Manufacturers Association |
| CFM | Cubic feet per minute |
| CFS | Cubic feet per second |
| $CL^2$ | Chlorine Solution |
| CMP | Corrugated Metal Pipe |
| CO | Clean Out |
| CPM | Critical path method |
| CRSI | Concrete Reinforcing Steel Institute |

D

| | |
|---|---|
| D | Drain |
| DFP | Douglas Fir Plywood |
| DI | Ductile Iron |
| DIPRA | Ductile Iron Pipe Research Association |

E

| | |
|---|---|
| EA | Each |
| EEO | Equal Employment Opportunity |
| E/P | Edge of Pavement |
| EPA | Environmental Protection Agency (Federal) |

F

| | |
|---|---|
| F | Fahrenheit |
| FCA | Flanged Coupling Adapter |
| FED SPEC | Federal Specification |
| FHWA | Federal Highway Administration |
| FL | Flanged |
| FPM | Feet per minute |
| FT, $FT^2$, $FT^3$ | Foot, square feet, cubic feet |

G

| | |
|---|---|
| GA | Gage, gauge |
| GAL | Gallon |
| GALV | Galvanized |
| GCE | Grit Chamber Effluent |
| GPD | Gallons per day |
| GPH | Gallons per hour |
| GPM | Gallons per minute |

H

| | |
|---|---|
| HB | Hose Bib |
| HDPE | High Density Polyethylene |
| HOA | Hand-off-auto |
| HP | Horsepower or High Point |
| HR | Hour |
| HT | Height |
| Hz | Hertz |

I

| | |
|---|---|
| ID | Inside Diameter |
| IE | Invert Elevation |
| IEEE | Institute of Electrical and Electronics Engineers |
| IN, $IN_2$, $IN_3$ | Inch, square inches, cubic inches |
| IPCEA | Insulated Power Cable Engineers Association |
| ISA | Instrument Society of America |

J

| | |
|---|---|
| JIC | Joint Industry Conference of Hydraulic Manufacturers |

K

| | |
|---|---|
| KV | Kilovolt |
| KVA | Kilovolt ampere |
| KVAR | Reactive kilovolt amperes |
| KW | Kilowatts |
| KWH | Kilowatt hours |

L

| | |
|---|---|
| L | Length |
| LB | Pounds |
| LF | Linear feet |
| LS | Lump Sum |

M

| | |
|---|---|
| M | Thousand |
| MA | Milliamperes |
| MBTUH | One thousand British thermal units per hour |
| MGD | Million gallons per day |
| Mg/l | Milligrams per liter |
| MIN | Minute |
| MJ | Mechanical Joint |
| ML | Mixed Liquor |
| MSS | Manufacturers Standardization Society of the Valve and Fittings Industry |
| MV | Millivolts |
| MVA | Megavolt amperes |

N

| | |
|---|---|
| NAMM | National Association of Metal Manufacturers |
| NBFU | National Bureau of Fire Underwriters |
| NEC | National Electrical Code |
| NEMA | National Electrical Manufacturers Association |
| NESC | National Electric Safety Code |
| NFPA | National Fire Protection Association |
| NPC | National Plumbing Code |
| NPT | National pipe thread |
| NRS | Non-rising stem |
| NLMA | National Lumber Manufacturers Association |

O

| | |
|---|---|
| OD | Outside diameter |
| OECI | Overhead Electric Crane Institute |
| OSHA | Occupational Safety and Health Act |
| OZ | Ounce |

P

| | |
|---|---|
| PCA | Portland Cement Association |
| pH | Hydrogen ion concentration |
| PH | Phase |
| PPM | Parts per million |
| PSF | Pounds per square foot |
| PSI | Pounds per square inch |
| PSIG | Pounds per square inch gauge |
| PT | Pint |
| PVC | Polyvinyl chloride |

Q

R

| | |
|---|---|
| RAS | Return Activated Sludge |
| RPM | Revolutions per minute |

S

| | |
|---|---|
| S | Slip |
| SAE | Society of Automotive Engineers |
| SAMA | Scientific Apparatus Manufacturers Association |
| Sc | Scum |
| SCFM | Standard cubic feet per minute |
| SE | Secondary Effluent |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association |
| SQFT | Square foot |
| SQIN | Square inch |
| SQMI | Square mile |
| SSPC | Steel Structures Painting Council |
| SW | Service Water (Effluent) |

T

| | |
|---|---|
| THD | Threaded |
| TOW | Top of Wall |

U

| | |
|---|---|
| UBC | Uniform Building Code |
| UL | Underwriter's Laboratory |
| UPC | Uniform Plumbing Code |

V

| | |
|---|---|
| V | Volt |

W

| | |
|---|---|
| W | Plant Water |
| WAS | Waste Activated Sludge |
| WC | Water Column or Water Closet |
| WCLIB | West Coast Lumber Inspection |
| WF | Welded Wire Fabric |
| WWPA | Western Wood Products Association |

X

Y

| | |
|---|---|
| YD | Yard |

Z

*** * * END OF SECTION 01070 * * ***

# SECTION 01090
# REFERENCE STANDARDS

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. All Divisions: As referenced

1.2 AUTHORITY

A. Contractor is responsible to conform to all codes and regulations legally in effect at the location of the project.

B. Contractor shall conform to all requirements and regulations of the authority administering such codes and regulations.

1.3 REFERENCE CODES

A. Contractor shall conform to all codes and sections thereof as may be referred to in the specifications.

B. Referenced codes are, by such reference, incorporated into this Contract as if set forth herein in full.

1.4 SPECIFICATIONS INCORPORATED BY REFERENCE

A. Where Federal, AWWA, ASTM, WSDOT or any other standard specifications are referred to, or included by reference, the latest issue and/or amendment thereto published at the date of the signing of the Contract shall be incorporated in the Contract by said reference as if set forth herein in full.

*** * * END OF SECTION 01090* * ***

# SECTION 01210
# PRECONSTRUCTION CONFERENCES

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Job Site Administration: Section 01043
B. Shop Drawings, Project Data and Samples: Section 01340
C. Traffic Regulation: Section 01570
D. Material and Equipment: Section 01600

1.2 SCHEDULE

A. Not more than five days after notice to proceed but earlier if practicable, the Owner and the Contractor will schedule a preconstruction meeting.
B. Present at the meeting to represent the Contractor shall be at least the official in charge of the project, the project superintendent, a representative with authority to speak for each of the principle subcontractors, and other representatives that may deem expedient.
C. The Engineer and Owner's Representatives shall be present.

1.3 AGENDA

A. The Owner and the Contractor shall be prepared to speak to the following:

1. Name and field address of job superintendent.
2. Emergency phone and/or operator.
3. Date of Construction Start.
4. Date of Notice to Proceed.
5. Notification of utilities concerned, fire, police, schools, etc.
6. Coordination with other contractors.
7. Permits: county, city, state fisheries, government agencies as required.
8. Inspector: name, authority.
9. Field office (location).
10. Shop Drawing Submittals.
11. Responsibility for lines and grades.
12. Safety Requirements and special hazards.
13. Insurance and Bonds.
14. Traffic control.
15. Construction signs.
16. Drawings revised to conform to construction records.
17. Beneficial occupancy.
18. Retention of Contract records.
19. Guarantees and warranties.

20. Operation and Maintenance Manuals.
21. Non-Discrimination Notice.
22. Project signs.
23. Testing.
24. Progress meetings.
25. Complaint procedure.
26. Job photos.
27. Other matters concerning construction.
28. Project closeout requirements.

*** * * END OF SECTION 01210* * ***

# SECTION 01340
# SHOP DRAWINGS, PROJECT DATA AND SAMPLES

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Job Site Administration: Section 01043
B. Testing Laboratory Services: Section 01410
C. Project Record Documents: Section 01720

1.2 SCHEDULE

A. Prepare and submit a separate schedule listing dates for submission and dates that reviewed shop drawings, project data and samples will be needed.
B. Fabrication of an item or construction work shall not start before the Engineer has taken action on the shop drawing submittal. Any work shall be entirely at the Contractor's risk.
C. The Engineer will not accept work performed by the Contractor which may be affected by materials, equipment, or methods of work not submitted in a timely manner so that final review can be accomplished before the affected work is complete.
D. Incomplete shop drawings or submittal rejected by the Engineer shall not be basis for claim for delay.

1.3 SUBMITTALS

A. Shop Drawings, data and samples shall be submitted attached to a form furnished by the Engineer entitled "Shop Drawing Transmittal". Location by drawing number and paragraph of specification shall be shown on the form for the product or material being submitted. Each transmittal shall be assigned a unique number in sequential order.

B. Shop drawings shall be submitted and reviewed in the following manner:

1. The Contractor shall review, stamp with his/her approval and submit postpaid with such promptness as to cause no delay in work or in that of any other contractor, the required number of copies of all shop drawings, schedules, data, and samples required for the work of the various trades determined necessary by the Engineer, required in the General Conditions and/or described elsewhere in the project specifications.
2. Shop drawings shall establish the actual detail of all manufactured or fabricated items. All shall be drawn to scale and be completely dimensioned.

3. Sheet sizes of shop drawings shall be in multiples of 8-1/2 by 11 inches not exceeding 22 by 34 inches unless there is a special requirement for larger size sheets. All copies shall be legible. Poor quality photocopies shall not be acceptable.
4. Provide on each drawing a clear space for the Engineer's and/or Owner's review and comments.
5. Four (4) copies of shop drawings, manufacturer's literature, brochures, catalog cuts, and other pertinent printed matter or data shall be submitted in addition to the number of copies the Contractor wishes returned.
6. Shop drawings may be submitted to the Engineer in the form of a reproducible transparency, along with one blackline or blueline print.
7. The Engineer shall review the shop drawings with reasonable promptness and will affix the Shop Drawing Review Stamp with notations thereon indicating "No Exceptions Taken", "Make Corrections Noted", "Revise and Resubmit", or "Rejected -- See Remarks". The Engineer will then obtain the prints required from the transparency and forward it along with one marked up copy and the reviewed copies of the other material in excess of four to the Contractor.
8. When shop drawings and/or other submittals are required to be revised or corrected and resubmitted, the Contractor shall make such revisions and/or corrections and resubmit the drawings or other material in the same manner as specified above.
9. Contractor shall obtain and provide such number of prints or copies of drawings as is required for field distribution.
10. It shall be the Contractor's responsibility to clearly note on the shop drawings, and in writing specifically call to the Engineer's attention, any changes that vary from the Contract Drawings and Specifications. No review of the shop drawings by the Engineer shall relieve the Contractor of full responsibility and at his/her own cost and expense to comply with the Contract Documents unless the changes are clearly noted and in writing called to the Engineer's attention as above provided, in which event subsequent acceptance by the Engineer in writing shall be authority for the change or changes proposed in the shop drawings.
11. If corrections are required, the Contractor shall make the corrections required by the Engineer and file the same number of corrected copies as indicated above. The Contractor shall direct specific attention in writing or, on resubmitted Shop Drawings to revisions other than the corrections requested on previous submissions. The Engineer will

return to the Contractor copies of drawings in the same manner and number as before.

12. Shop Drawings shall give complete information necessary for the fabrication and installation of all component parts of the equipment, structure, facility, etc. In the case of structural drawings, they shall include the location, type, size and extent of all welds, if any are necessary. Manufacturer's standard details, catalogues, advertising literature, etc., shall not necessarily constitute all of the shop drawings required for any unit or facility. Additional shop details designed for the particular project shall be furnished when required by the Engineer. Shop drawings of electrical equipment shall include complete diagrams of electrical circuitry.
13. The Engineer's review of and placement of shop drawing review stamp on any shop drawing is understood to be an acceptance of the character of the details and not a check of any dimension or quantity and will not relieve the Contractor from responsibility for errors of any sort in shop drawings data or schedules, whether or not such errors are found by the Engineer in review of such details.
14. The Engineer's review of and placement of Shop Drawing Review Stamp on any shop drawing will not relieve the Contractor of responsibility for consequences due to deviations from the Contract Documents unless the Contractor has called attention to such deviations in writing by a letter accompanying the drawings at the time of submission and the Engineer accepts such deviations in writing.
15. No changes will be made in any drawing after it has been reviewed except by the consent or direction of the Engineer in writing.

C. Samples shall be submitted in the same manner as shop drawings.

1. Samples to be physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged.

    a. Office samples: of sufficient size and quantity to clearly illustrate:

        1) Functional characteristics of product or material, with integrally related parts and attachment devices.
        2) Full range of color samples.
        3) After review the Engineer will retain two samples and return the remainder to the Contractor.

    b. Field samples and mockups

        1) Erect at project site location acceptable to Engineer

2) Construct each required sample or mock-up complete, including work of all trades required in finished work.
3) Coordinate sampling of natural materials with Field Engineer.

2. If any test sample fails to meet the specification requirements, all previous approvals will be withdrawn and such materials or equipment, which fail the testing, shall be subject to removal and replacement by the Contractor with materials or equipment meeting the specification requirements.

3. Affected finish work shall not be commenced until the Engineer has given written approval for the field samples.

1.4 CONTRACTOR RESPONSIBILITY

A. Contractor shall review and approve shop drawings before submittal. Submittal directly from supplier or subcontractor will not be accepted.

B. By approving and submitting Shop Drawings and Samples, the Contractor thereby represents that all field measurements, field construction criteria, materials, catalog numbers and similar data, has been determined and verified or will do so, and that each Shop Drawing with the requirements of the Work and of the Contract Documents has been checked and coordinated and that there is no conflict with other submittals that may affect the work of another contractor or the Owner.

C. A copy of each approved shop drawing and each approved sample shall be kept in good order by the Contractor at the job site and shall be available to the Engineer.

1.5 LIMITATION

A. Two submittals of each item requiring samples and/or shop drawings will be reviewed by the Engineer in the regular course of the Contract. However, all subsequent reviews of the same item over two will be reviewed at the expense of the Contractor unless the right to an additional review without charge was previously approved in writing by the Engineer. The Contractor will be billed by the Owner at the Engineer's current established rates.

*** * * END OF SECTION 01340* * ***

# SECTION 01410
# TESTING LABORATORY SERVICES

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Construction Observation Services: Section 01420
B. Testing Requirements: Various Sections

1.2 CONTRACTOR WILL PAY FOR SERVICES OF AN INDEPENDENT TESTING LABORATORY FOR:

A. Soils gradation, moisture density standards determination, and in-place density tests per Division 2.

B. Other materials and/or workmanship specified in Divisions 2 through 16.

1.3 LIMITATION

A. Employment of a testing laboratory shall in no way relieve the Contractor of obligation to perform work in accordance with the Contract.

1.4 QUALIFICATION OF LABORATORY

A. Meet basic requirements of ASTM E329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction".

B. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection; with memorandum of remedies of any deficiencies reported by inspection.

C. Testing Equipment:

1. Calibrated at maximum 12 month intervals by devices of accuracy traceable to National Bureau of Standards.

2. Submit copy of certificate of calibration, made by accredited calibration agency.

1.5 LABORATORY DUTIES, AUTHORITY AND LIMITATION

A. Cooperate with Engineer and Contractor.

B. Provide qualified personnel promptly on notice.

C. Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards; ASTM, other recognized authorities, and as specified.
2. Ascertain compliance with requirements of Contract Documents.

C. Promptly notify Engineer, and Contractor, of irregularities or deficiencies of work which are observed during performance of services.

D. Promptly submit 2 copies of report of inspections and tests to Engineer, in addition to those required by the Contractor including:

1. Date issued.
2. Project title and number.
3. Testing Laboratory name and address.
4. Name and signature of Inspector.
5. Date of inspection of sampling.
6. Record of temperature and weather.
7. Date of test.
8. Identification of product and specification section.
9. Location in project.
10. Type of inspection or test.
11. Results of test.
12. Observations regarding compliance with Contract Documents.

F. Perform additional services as required.

G. Laboratory is not authorized to:

1. Release, revoke, alter, or enlarge on, requirements of Contract Documents.
2. Approve or accept any portion of work.

1.6 RESPONSIBILITIES OF CONTRACTOR

A. Cooperate with laboratory personnel and provide access to work.

B. Provide to laboratory, preliminary representative samples of materials to be tested in required quantities.

C. Furnish copies of mill test reports.

D. Furnish casual labor and facilities:

1. To provide access to work to be tested.
2. To assist laboratory personnel to obtain and handle samples at the site.
3. To facilitate inspections and tests.
4. For laboratory's exclusive use for storage and curing of test samples.

E. Notify laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests.

F. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory or agency, the sample or samples of materials to be tested shall be selected by such laboratory or agency, or the Engineer, and shipped to the laboratory by the Contractor at own expense.

*** * * END OF SECTION 01410* * ***

# SECTION 01420

# CONSTRUCTION OBSERVATION SERVICES

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Status of Engineer: Article 7 General Conditions
B. Rejected Work/Reinspection: Article 14 General Conditions
C. Job Site Administration: Section 01043
D. Testing Laboratory Services: Section 01410

1.2 AUTHORITY AND DUTIES OF INSPECTORS

A. Construction Observers are placed on the work to keep the Owner and Engineer informed as to the progress of the work and the manner in which it is being done; to keep records; act as liaison between the Contractor and the Engineer and Owner; also to call the attention of the Contractor to any deviations from the Contract Documents, but failure of the Construction Observer to call to the attention of the Contractor to faulty work or deviations from the Contract Documents shall not constitute acceptance of said work.

B. The Construction Observer may reject or accept materials and equipment to be incorporated in the work and such specific items as is authorized by the Engineer to accept.

C. When any material has been accepted by the Construction Observer, it passes from the control of the Construction Observer to the control of the Contractor and remains there until the job, as a whole, is complete. Since the Construction Observer cannot control how the material is used, the responsibility for its safety and proper use will be the Contractor's. Until the job is finally completed, the Contractor might do work that changes or modifies work previously done and even though at any given time a piece of work might be well done and acceptable in quality, the responsibility for keeping it in that condition until the job is completed is the sole responsibility of the Contractor. For this reason, it is impossible to accept, finally, any portion of a project until the project as a whole is acceptable and control of said project is withdrawn from the Contractor by final official written acceptance by the Owner.

D. Since one of the Construction Observer's primary interests is to see that work on the project progresses expediently and in a workmanlike manner, the Construction Observer may at various times offer suggestions to the Contractor which the Contractor may or may not follow, at own discretion.

Such suggestions are never to be considered as anything but suggestions and involve no assumption of responsibility, financial or otherwise, by the Construction Observer, the Engineer, or the Owner.

E. Any personal assistance which a Construction Observer may give the Contractor will not be construed as the basis of any assumption of responsibility in any manner, financial or otherwise, by the Inspector, the Engineer, or the Owner.

F. The Engineer is not and does not purport to be a Safety Engineer and is not engaged in that capacity by the Owner and shall have neither authority nor responsibility to enforce construction safety laws, rules, regulations, procedures or the safety of persons on and about the construction site.

G. The presence or absence of a Construction Observer on any job will be at the sole discretion of the Engineer, and such presence, or absence, of a Construction Observer will not relieve the Contractor of responsibility to obtain the construction results specified in the Contract Documents.

H. The Construction Observer will not be authorized to approve or accept any portion of the work, to make changes in the work, or to issue instructions contrary to the Contract Documents, such approvals, acceptances, or instructions, when given, must be in writing and signed by the Engineer. The Construction Observer will have authority to reject defective material; however, the failure of the Construction Observer to reject defective material or any other work involving deviations from the Contract Documents will not constitute acceptance of such work.

I. Nothing in this subsection shall in any way be so construed as to require or to place responsibility for, the method, manner or supervision of the performance of the work under this Contract upon the Construction Observer, the Engineer, or the Owner. Such responsibility rests solely with the Contractor.

1.3 EXAMINATION OF MATERIALS

A. The neglect or failure on the part of the Engineer to condemn or reject substandard material or work shall not imply an acceptance of the materials or work. The Contractor shall furnish, at own expense, such labor as may be required to enable the Engineer to make a thorough inspection and culling of the materials, and the Contractor shall bear the costs of all laboratory or other testing called for in these Specifications.

B. Where required by the Specifications, the Engineer will examine certain materials such as masonry materials, concrete, aggregates, etc., at the

manufacturer's plant prior to their delivery to the job site. The Contractor shall bear the cost of such material inspection including the Construction Observer's time, travel time and transportation expense and any other costs incurred, or chargeable to, or by, such material inspection. These inspection costs shall be billed to the Contractor at the Engineer's current billing rate. Transportation expense shall be billed at current rate. All such material inspection charges will be billed directly to the Contractor by the Owner. The Owner will not accept the project as complete until such payment has been submitted to the Owner.

*** * * END OF SECTION 01420* * ***

# SECTION 01511
# TEMPORARY ELECTRICITY

## PART 1: GENERAL

1.1 TEMPORARY SYSTEM

A. Contractor to provide an adequate system.

B. Contractor will furnish power and/or light for:

1. All construction requirements.
2. Safe working conditions.
3. Security.
4. Field office (if required).

C. Power source to be arranged by Contractor.

D. Costs paid by Contractor.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

A. Obtain permits and easements if required.

B. Comply with codes and utility regulations in force.

## PART 2: PRODUCTS

2.1 MATERIALS

A. General:

1. Materials may be new or used, but must be adequate in capacity for required purposes, and must not create unsafe conditions or violate requirements of applicable codes.

2.2 EQUIPMENT

A. Provide appropriate enclosures for environment in which used, in compliance with NEMA standards.

B. Provide ground fault protection.

C. Provide adequate short circuit duty for capacity of supplytransformers in use.

## PART 3: EXECUTION

3.1 GENERAL

A. Comply with applicable sections of Electric Codes.

B. Install work in neat and orderly manner.

C. Make structurally and electrically sound throughout.

D. Maintain to give continuous service and to provide safe working conditions.

E. Modify and extend service as work progress requires.

3.2 INSTALLATION

A. Temporary service and distribution may be overhead or underground.

B. Locate to avoid interference with:

1. Traffic and work areas.
2. Cranes.
3. Material handling equipment.
4. Storage areas.
5. Work under other contracts.

C. Do not run branch circuits on floor or on ground.

3.3 REMOVAL

A. Completely remove temporary materials and equipment upon completion of construction.

B. Repair damage caused by installation, and restore to specified, or original condition.

*****END OF SECTION 01511*****

# SECTION 01515
# TEMPORARY WATER

## PART 1: GENERAL

1.1 DESCRIPTION OF SYSTEM

A. The Contractor shall make arrangements for and provide all necessary facilities for temporary water supply at own expense, unless otherwise provided.

1.2 COSTS

A. Pay costs of temporary water services, including costs of installations, maintenance and removal of facilities.

B. The Contractor may secure water from any suitable source. If the Contractor purchases water from a water utility at a fire hydrant on or near the project, all arrangements shall be made by the Contractor at own expense and payment be made to the utility in accordance with their rate schedule.

## PART 2: PRODUCTS

2.1 MATERIALS

A. Materials may be new or used but must be adequate for purpose required, sanitary and must not violate requirements of applicable codes.

## PART 3: EXECUTION

3.1 GENERAL REQUIREMENTS

A. The water utility shall be contacted to determine if sufficient water is available at the particular time before any use.

B. Flushing overnight or excessive wasting will not be permitted.

C. The Contractor shall use only those hydrants designated by the agency in charge of water distribution and in strict accordance with its requirements for hydrant use.

D. The Contractor shall use hydrant wrenches only to open hydrants. The Contractor shall also make certain that the hydrant valve is open "full", since "cracking" the valve causes damage in the valve. An approved auxiliary valve shall be provided on the outlet line for control purposes. Fire hydrant valves must be closed slowly to avoid a surge in the system which creates undue pressure on the water lines. The Contractor shall carefully note the importance of following these directions.

E. If one of the Contractor's employees knowingly or unknowingly use the wrong wrench on a hydrant and thereby damage the hydrant valve stem, the Contractor will be responsible. The Contractor shall immediately notify the water utility so that the damage can be repaired as quickly as possible.

F. Upon completing the use of the hydrants, the Contractor shall notify the water distribution agency, so that the hydrants may then be inspected for possible damage. Any damage resulting from the use of the hydrants by the Contractor will be repaired by the water agency and the Contractor shall be responsible for the cost thereof.

G. The Contractor shall furnish all connectors, wrenches, valves, and small tools that may be necessary to meet the requirements of the water distribution agency pertaining to hydrant use.

H. Violation of these requirements will result in fines and will lay the Contractor liable for damage suits because of malfunctioning of damaged fire hydrants, in the event of fire or other emergencies.

3.2 REMOVAL

A. Completely remove temporary materials and equipment upon completion of construction.

*** * * END OF SECTION 01515 * * ***

# SECTION 01545
# PROTECTION OF WORK AND PROPERTY

## 1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Protection of Work, Property and Persons: Article 11 General Conditions
B. Property Restoration: Article 17 General Conditions
C. Lands and Right-of-Way: Article 21 General Conditions
D. Access and Haul Roads: Section 01550
E. Temporary Controls: Section 01560
F. Pavement Repair and Resurfacing: Section 02575
G. Existing Utilities/Facilities -Underground and Overhead: Section 02760
H. Landscape Restoration: Section 02990

1.2 PUBLIC AND PRIVATE PROPERTY

A. The Contractor shall protect and maintain all underground or aboveground utilities and structures affected by the work and all lawns, shrubs, trees, fences, rockeries, etc., and parking strips or private property crossed by or adjacent to his/her operation, and any damage shall be repaired and restored by the Contractor to the satisfaction of the Owner.

B. The Contractor will be responsible for all damage to roads, highways, ditches, bulkheads, walls, bridges, culverts, utilities, barricades, lights, or other property, caused by the work, whether such damage be at the site of the work or caused by transporting or hauling to or from the work; and shall repair or replace, or arrange for the repair or replacement of all such damage to the satisfaction of the Owner. Any material damaged by the Contractor's operations shall be replaced with new material.

C. Whenever construction work under this Contract is undertaken on easement, right-of-way, or franchise, all work shall be confined to the limits of such easement, right-of-way, or franchise, and accomplished so as to cause the least amount of disturbance and a minimum amount of damage.

D. Completion of work across private property shall be carried out in one continuous operation of construction of the facilities with the immediate restoration and cleanup of the construction area. If the Contractor fails to perform such construction and restoration continuously as herein provided, the Owner may give the Contractor a written notice to so perform, and in event of failure by the Contractor to complete such construction and restoration within 72 hours of such notice, the Owner may complete the installation and restoration on such private property to

the extent the Owner deems advisable and the cost of all work, labor, materials, and expenses incurred by the Owner in so doing shall be paid by the Contractor.

E. Particular care shall be exercised to see that the topsoil from the trench is preserved and replaced in its original location. It shall be the Contractor's responsibility to strip such topsoil from the trench, or construction area, and stockpile it in such a manner that it may be replaced, by the Contractor, upon completion of construction.

F. Wherever it may be necessary for the Contractor to trench through any lawn areas, the sod shall be carefully cut and rolled and replaced after ditches have been water settled, or otherwise properly compacted. All work shall be done in a manner calculated to leave the lawn area clean of earth and debris and in a condition as near as possible to that which existed before work was started.

G. The Contractor shall not remove, even temporarily, any trees or shrubs which exist on easements across private property or in parking strips, without first having notified the property owners or authorities maintaining same.

H. Ornamental trees and shrubbery shall be carefully removed with the earth surrounding their roots, wrapped in burlap and replanted in their original positions within 48 hours. Ornamental trees or shrubbery destroyed, or damaged, by the Contractor, whether on public or private property shall be replaced by the Contractor with material of equal quality, and no additional compensation will be allowed for such replacement.

I. It is expressly understood that the Contractor shall in particular restore all such easements and rights-of-way to a condition equal to its original condition and in a condition satisfactory to the property owners and the Owner. It is also understood that any private improvements made in public rights-of-way are included in the above category.

1.3 TREES

A. All existing trees and shrubs which are to be protected and are damaged during construction shall be trimmed or replaced by the Contractor or a certified tree company under permit from the jurisdictional agency or owner and to the satisfaction of said agency and/or owner.

B. The Contractor shall immediately notify the Engineer and/or owner if any tree which is to be protected is damaged by his/her operations. If, in the opinion of

said agency or the owner, the damage is such that replacement is necessary, the Contractor shall replace the tree at own expense.

C. Replacement trees shall be of a like size and variety as the tree damaged, or, if of a smaller size, the Contractor shall pay to the owner of said tree a compensatory payment acceptable to the tree owner not to exceed the cost of replacing the tree as determined from quotes obtained by the tree owner from a minimum of two local nurseries. The size of the replacement trees shall be not less than 1-inch diameter or less than 6 feet in height.

D. When trimming is permitted, symmetry of the tree shall be preserved. No stubs or splits or torn branches shall be left. Clean cuts shall be made close to trunk or large branch. Spikes shall not be used for climbing live trees. All cuts over 1-1/2 inches in diameter shall be coated with an asphaltic emulsion material.

E. When trimming of tree roots larger than 1" and less than 3" apply a 'Root Hormone' wrap with burlap.

1.4 EASEMENTS

A. Reference numbers of easements are shown on drawings.

B. The Contractor shall meet and fulfill all covenants and stipulations of each easement obtained by the Owner for this project.

C. Copies of all easements and special covenants are on file in the office of the Owner, which is incorporated in this Contract by this reference, as if set forth herein in full.

1.5 EASEMENT RELEASE

A. Where work is done on easements the Contractor shall obtain a written statement (see following form) of satisfactory restoration from each property owner involved, and furnish a copy of said statement to the Engineer. The statement will be required before the work will be accepted by the Owner, provided, however, that where the Contractor contends that the property owner is making unreasonable demands, he/she shall submit a list of such demands to the Owner in writing. If in the opinion of the Owner, such demands are unreasonable, the Contractor may be excused from the necessity of obtaining a written statement of satisfactory restoration from the property owner making such unreasonable demand.

1.6 CARE OF EXISTING FACILITIES

A. The Contractor shall take adequate precautions to protect existing sidewalks, curbs, pavements, utilities, adjoining property, and structures, and to avoid

damage thereto, and the Contractor shall, at own expense, completely repair any damage thereto caused by the operation.

B. The Contractor shall prepare pre-construction photographs to document conditions prior to the start of work.

C. Access for fire fighting equipment shall be maintained at all times.

1.7 SHORING, BRACING, ETC.

A. The Contractor shall shore up, brace, under-pin, and protect as may be necessary, all foundations and other parts of all existing structures adjoining the site of the Project, which are in any way affected by the excavation or other operations connected with the completion of the work under this Contract.

B. Whenever any notice is required to be given by the Owner or the Contractor to any adjoining or adjacent land owner or other party before commencement of any work under this Contract, such notice shall be given by the Contractor.

C. The Contractor shall indemnify the Owner and save it harmless from any damages on account of settlements or the loss of lateral or subjacent support of adjoining property and from all loss or expense and all damages for which the Owner may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.

1.8 EMERGENCIES

A. Whenever the Contractor's work endangers the safety of life or property including adjoining property or property in the immediate proximity of the Project, the Contractor shall take all reasonable precautions to prevent threatened loss or injury there from.

1.9 EXISTING UTILITIES/FACILITIES - UNDERGROUND AND OVERHEAD

A. The Contractor shall protect existing utilities/facilities, both overhead and underground as provided in Section 02760.

1.10 TEMPORARY FENCE

A. The Contractor shall be responsible for the erection of temporary fence as required to protect the work area.

B. The Contractor shall be responsible for erection and maintenance of temporary fencing or other facilities as required to retain livestock and/or periodic security of existing fenced areas.

C. Temporary fencing on facilities shall remain in place until the permanent fencing, as originally installed, is replaced under the restoration requirements of the Contract or as shown on the Contract Drawings.

*** * * END OF SECTION 01545 * * ***

# SECTION 01550
# ACCESS AND HAUL ROADS

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Lands and Right-of-Way: Article 21 General Conditions
B. Traffic Regulation: Section 01570

1.2 PRIVATE ACCESS

A. Where required by the Contract or choice of the Contractor access may be over private land.

B. Access will be maintained by and at the expense of the Contractor.

C. Comply with local regulations and permits.

D. Comply with all legal requirements to include as a minimum written permission of private property owners.

E. Control dust, noise and traffic, in compliance with local laws and regulations.

F. Leave private property in condition satisfactory to the Owner and indicated by written release from the property owner.

1.3 PUBLIC ACCESS AND HAUL ROADS

A. Comply with all laws and regulations.

B. All streets in the construction area used by Contractor's trucks or any other equipment hauling material to and from the area whether within the Contract limits or adjacent thereto shall be kept clean and shall be serviced by continuous use of sprinkling trucks to allay dust.

C. Unsurfaced roads and streets may receive an application of water to allay dust.

D. Dust control shall continue until streets are accepted by the public agency responsible for maintenance or the Contractor is relieved of responsibility by such agency.

E. Sprinkling shall be at the Contractor's expense.

F. Any damage to roadway surfaces from the direct or indirect result of the Contractor's operation shall be repaired by the Contractor to the satisfaction of the responsible agency.

*** * * END OF SECTION 01550 * * ***

# SECTION 01560
# TEMPORARY CONTROLS

## PART 1: GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Water Courses: Article 21.3 General Conditions
B. Job Site Administration: Section 01043
C. Protection of Work and Property: Section 01545
D. Access and Haul Roads: Section 01550
E. Traffic Regulation: Section 01570
F. Landscape Restoration: Section 02990

1.2 LAWS

A. Requirements of federal, state and local statutes and regulations dealing with temporary controls described in this section shall be strictly adhered to by the Contractor.

1.3 CONSTRUCTION CLEANING

A. The Contractor shall keep the site of the work and other areas used in a neat and clean condition, and free from any accumulation of rubbish.

B. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the work site, and shall establish regular intervals of collection and disposal of such materials and waste.

C. The Contractor shall keep all haul roads free from dirt, rubbish, and unnecessary obstructions resulting from project operations.

D. Equipment and material storage shall be confined to areas approved by the Engineer.

E. Disposal of all rubbish and surplus materials shall be off the site of construction, at the Contractor's expense, all in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws.

1.4 AIR POLLUTION CONTROL

A. The Contractor shall not discharge smoke, dust or other contaminants into the atmosphere that violate the regulations of any legally constituted authority.

B. The Contractor shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent the operation from producing dust in amounts damaging to

property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity.

C. The Contractor shall comply with specific requirements of air quality control laws.

D. The Contractor shall be responsible for any damage resulting from any dust originating from project operations.

E. The dust abatement measures shall be continued until the Contractor is relieved of further responsibility by the Owner.

1.5 EROSION CONTROL

A. Contractor shall provide temporary erosion control work shown in the plans, required by state or local agencies during the life of the contract. This work is intended to provide prevention, control, and abatement of water pollution/erosion within the limits of the project, and to minimize damage to the work, adjacent property, streams, and other bodies of water.

B. The Contractor shall coordinate this temporary water pollution/erosion control work with the permanent drainage and erosion control work that may be specified in the Contract to the extent practicable to ensure that effective and continuous water pollution/erosion control is maintained during the construction of the Project.

C. Clearing and grubbing operations shall be so scheduled and performed that grading operations and permanent erosion control features can follow immediately. If the project conditions do not permit this scheduling, temporary water pollution/erosion control measures will be required between successive construction stages.

D. The area of excavation, borrow, and embankment operations in progress will be limited commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other permanent erosion control measures current according to the accepted schedule.

E. If the Engineer determines that water pollution and/or erosion could occur due to seasonal limitations, the nature of the material, or the Contractor's progress, temporary water pollution/erosion control measures shall be taken immediately.

F. The Engineer may require the Contractor's operations to be scheduled so that permanent erosion control features will be installed concurrently with or immediately following grading operations.

G. Compliance with the requirements of this section shall not relieve the Contractor from the responsibility to comply with other provisions of the contract.

1.6 NOISE CONTROL

A. Comply with state and local requirements as to allowable noise levels during construction.

B. Equip all internal combustion engines in vehicles and construction equipment with effective mufflers.

C. Prevent noise disturbance to adjoining property owners and the public.

D. Construction operations shall be restricted to between the hours of 7:00 AM and 7:00 PM Monday through Friday without specific approval by the Owner except in emergencies.

1.7 SANITARY PROVISIONS

A. The Contractor shall provide and maintain sanitary facilities for the use of employees and the Engineer. The Contractor shall comply with the requirements and regulations of the agencies or organizations having jurisdiction over sanitary and health conditions and of other bodies or offices having jurisdiction there over. The Contractor will permit no public nuisances.

B. The Contractor shall establish a regular collection of all sanitary and organic wastes.

C. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the site in a manner satisfactory to the Owner and in accordance with all laws and regulations pertaining thereto.

1.8 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture.

B. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer.

1.9 PROVISION FOR WATER COURSES

A. The Contractor shall provide for the flow of all water courses, sewers or drains, intercepted or disturbed by the Contractor during the progress of

the work, and shall replace the same in as good condition as was found or shall make such final provisions for them as necessary.

B. The Contractor shall not obstruct the gutter of any street, but shall use all proper measures to provide for the free passage of surface water.

C. The Contractor shall make provisions to take care of all surplus water, mud, silt, or other runoff pumped from excavations or resulting from sluicing or other operations, and shall be responsible for any damage, of whatever nature, resulting from failure so to provide.

D. All work adjacent to or in the vicinity of marine waters or fresh water courses shall be accomplished in accordance with the requirements of the Departments having jurisdiction.

1.10 FISHERIES PERMIT

A. All construction work in the vicinity of existing creeks, rivers and lakes shall be subject to the provisions of state regulations.

B. The Developer shall prepare and submit the permit applications and furnish a copy to the District.

C. The Contractor shall conform to the requirements of the permits issued for this project.

D. Each Contractor shall secure separate approval from the Department of Fish and Wildlife concerning proposed construction methods, operation and scheduling which will affect the waterways or lakes, and shall conform to the requirements of these departments to preserve the aquatic resources. The authorized representatives of the Department of Fisheries shall be the sole judges as to the effect of the Contractor's operations on the aquatic life in the streams and waterways.

E. In the event said Department waives jurisdiction or does not approve the Contractor's method of operations, the Contractor shall secure written notice to that effect prior to construction.

F. The Contractor may be held liable for any damage to fish life or habitat which results from failure to comply with the provisions of this section.

1.11 ARCHAEOLOGICAL OR CULTURAL RESOURCES

A. The Contractor is advised that construction work within this Contract is subject to the provisions of state and federal laws and regulations pertaining to the preservation of archaeological and cultural resources.

B. In the event that any archaeological or cultural resources are uncovered during the course of construction, all work shall cease until an inspection and evaluation of the site has been made by an archaeologist to insure

that archaeological data are properly preserved. The Contractor shall notify the Owner who will in turn notify the proper authorities.

C. The Contractor should anticipate reasonable delays while the archaeological investigations are being made and should make allowance for these delays. The Contractor will be solely responsible for any costs associated with such delay.

*** * * END OF SECTION 01560 * * ***

# SECTION 01570
# TRAFFIC REGULATION

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Safety and Health Regulations: Article 11.1 General Conditions
B. Land and Rights-of-Way: Article 21 General Conditions
C. Access and Haul Roads: Section 01550

1.2 MATERIALS AND CONTRACT

A. Signs, warnings, light signals, bypass layouts, scheduling and routes shall conform to the requirements of U.S. Department of Transportation Federal Highway Administration "Manual on Uniform Traffic Control Devices", latest edition, as amended by local or state agency.

1.3 MAINTENANCE OF TRAFFIC

A. The Contractor shall conduct the work so as to interfere as little as possible with public travel, and shall at own expense provide and maintain suitable bridges, detours, or other temporary facilities for the accommodation of public or private travel including mail delivery, and shall give reasonable notice to the owners of private drives before interfering with them; provided, however, that such maintenance of traffic will not be required where the Contractor has obtained permission from the owners or tenants of private property, or the proper public authority, or both, to obstruct traffic within the said limits and time agreed upon.
B. Access for fire fighting equipment, police and ambulance services shall be provided at all times and the Contractor shall keep the local authorities informed at all times of the location of construction operations and fire lanes.
C. The Contractor shall also notify the authorities in charge of any municipal, private, or school transportation systems at least 48 hours in advance, of road closures that will force a change in the regular routing of the transportation system. The Contractor shall also provide and maintain suitable detour routes for the system.
D. Highway and arterial crossings shall be made in such a way that no more than half of the roadway is closed to traffic at any time, except where suitable detours or other arrangements are agreed to by the agency having jurisdiction.

1.4 COMPLIANCE WITH LOCAL REQUIREMENTS

A. The Contractor shall comply with all applicable state and local requirements for closure of streets.

B. The Contractor shall provide barriers, guards, lights, signs, temporary bridges, flagmen and watchmen, advising the public of detours and construction hazards.

C. The Contractor shall also be responsible for compliance with additional public safety requirements which may arise during construction.

D. The Contractor shall furnish and install, and upon completion of the work, promptly remove all temporary signs and warning devices.

1.5 TRAFFIC CONTROL PLAN

A. Not less than ten calendar days before beginning construction, the Contractor shall prepare and submit a general construction traffic control plan for the entire project, showing how detour routes will be signed and controlled.

B. The traffic control plan shall include and make provision for at least the following items:

1. Maintain at least one lane of traffic during construction in all streets and roads wherever possible.
2. Employ flag persons to direct traffic as required to assure safe vehicular traffic.
3. Provide for the protection of pedestrians at all times.
4. Provide, install, and maintain all signs, barricades, posts, guards, and notices whenever a street must be completely closed.
5. Provide for passage of local vehicles to businesses and homes.
6. Provide for passage and access of emergency vehicles, police, fire, and disaster units at all times. Assume liability for any damages resulting from failure to provide said access.
7. Revise and update specific traffic control plan to reflect changes in the project schedule as required by the Owner.

1.6 STORAGE OF MATERIALS AND EQUIPMENT

A. Materials or equipment shall not be stored where it will interfere with the free and safe passage of public traffic.

B. The Contractor shall remove all equipment and other obstructions from that portion of the roadway to be opened for use by public traffic at the end of each day's work and at other times when construction operations are suspended for any reason.

C. Materials or other obstructions shall not be placed within 20 feet of fire hydrants, which shall at all times be readily accessible to the fire department, nor within ten feet of United States mailboxes.

1.7 MAINTENANCE OF POSTAL SERVICE

A. The Contractor shall be responsible for determining and complying with the United States Postal Department's requirements for maintaining postal service within the project area and along related detour routes.

B. Where required by street closures or excessive interferences, the Contractor shall move mailboxes to temporary locations designated by the postal service and, when such closures are terminated, shall return the mailboxes to locations and conditions satisfactory to the owners and the postal service.

C. Other mailboxes removed or damaged by the Contractor shall be placed to the satisfaction of the owners and the postal service within 24 hours of their removal or damage.

*** * * END OF SECTION 01570 * * ***

# SECTION 01600
# MATERIAL AND EQUIPMENT

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Royalties and Patents: Article 9 General Conditions
B. Shop Drawings, Project Data, Samples: Section 01340

1.2 PRODUCTS LIST

A. As soon as possible but not more than thirty (30) days after date of Notice to Proceed, submit to Engineer five (5) copies of complete list of all products which are proposed for installation as substitutions or product options.

B. Tabulate list by each specification section.

1.3 CONTRACTOR'S OPTIONS

A. Unless otherwise specifically provided, all workmanship, equipment, materials and articles incorporated in the work covered by the Contract are to be new and of the best available grade of their respective kinds.

B. For products specified only by reference standards, select any product meeting standards, by any manufacturer.

C. For products specified by naming one or more products, but indicating the option of selecting equivalent products by stating "or equivalent" after specified product, Contractor must submit request, as required for substitution, for any product not specifically named.

D. For products specified by naming only one product and manufacturer, there is no option, and no substitution will be allowed.

1.4 SUBSTITUTIONS

A. Within thirty (30) days after Notice to Proceed, Engineer will consider formal requests from Contractor for substitution of products in place of those specified.

B. Submit request for substitution in accordance with requirements for submittal of shop drawings (Section 01340) and the following additional requirements.

1. For construction methods:

a. Detailed description of proposed method.
b. Drawings illustrating methods.

2. Itemized comparison of proposed substitution with product or method specification.

3. Data relating to changes in construction schedule.

4. Accurate cost data on proposed substitution in comparison with product or method specified.

C. In making request for substitution, Contractor represents:

1. The Contractor has personally investigated proposed product or method, and determined that it is equivalent or superior in all respects to that specified.

2. The Contractor will provide the same guarantee for substitution as for product or method specified.

3. The Contractor will coordinate installation of accepted substitution into work, making such changes as may be required for work to be complete in all respects.

4. The Contractor waives all claims for additional costs related to substitution which consequently becomes apparent.

5. Cost data is complete and includes all related costs under Contract, but excludes costs under separate contracts and Engineer's redesign costs. Contractor agrees to pay for all costs under separate contracts and Engineer's redesign costs.

D. Substitutions will not be considered if:

1. They are indicated or implied on shop drawings or project data submittals without formal request submitted in accord with Section 01340.
2. Acceptance will require substantial revision of Contract Documents.

E. The above shall not be construed to mean that any substitution for materials and equipment will be allowed. The Engineer reserves the right to reject and disapprove any request deemed irregular or not in the interest of the Owner.

1.5 MATERIAL CERTIFICATION

A. Upon request of the Engineer, the Contractor's material suppliers may be required to furnish a certification from a recognized testing laboratory, certifying that the material supplied is in full conformance with the Contract Documents.

1.6 ADDITIONAL ENGINEERING COSTS

A. Additional engineering costs accruing as a result of checking and/or redesign of substitutions will be charged to the Contractor and billed by the Owner at the Engineer's current established rates.

1.7 INSTALLATION

A. All materials, appliances, fixtures, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with such instructions as are commonly furnished by the manufacturers, unless herein specified to the contrary.

B. The Contractor shall use experienced millwrights, acceptable to the Engineer, in the installation and aligning of the equipment.

C. At least one copy of the installation instructions shall be furnished to the Engineer no later than four days after the equipment arrives on site.

D. Manufacturers' instructions for handling, protecting, installation, lubrication and alignments of the equipment, shall be followed to the letter and these installation instructions shall be considered a part of this Contract, with attendant penalties for insufficient performance.

E. No piping or valves shall be supported by means of its connection to any mechanical equipment. Pipe connections to equipment must be disconnected upon request to permit inspection and determination that the piping is not transmitting stresses to the equipment.

F. All motor flexible couplings shall be disconnected and checked with an indicator for misalignment after all other installation work has been completed unless the equipment installation instructions specifically prohibit this.

G. The Contractor must allow a representative of the Owner to observe the indicator readings and approve or disapprove prior to recoupling.

1.8 PUMPS AND PIPING

A. All pump and piping installations shall fully meet the standards of the Hydraulic Institute.

*** * * END OF SECTION 01600 * * ***

# SECTION 01650
# TESTING, STARTUP AND OPERATION

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Testing Laboratory Services: Section 01410
B. Construction Observation Services: Section 01420
C. Temporary Water: Section 01515
D. Contract Closeout: Section 01700
E. Operation and Maintenance Data: Section 01730

1.2 RESPONSIBILITY

A. Testing, startup and operation shall not be cause for claims for delay by the Contractor and all expenses accruing therefrom, shall be deemed to be incidental to the Contract.
B. The Contractor shall provide all materials, supplies and labor necessary to efficiently complete the testing, startup and operation.
C. All power and utility bills shall be paid by the Contractor up to and including the day of final acceptance of the Project by the Owner. If not paid, these charges shall be treated as claims against the Contractor, and the Owner will withhold final project acceptance until such bills are paid.
D. If the Owner chooses to commence operations prior to final acceptance, the Owner will assume payment of all power and utility charges effective the day that operation is assumed by the Owner and notice is given in writing.

1.3 SCHEDULE

A. Placing all phases of the project in service shall consist of three parts: testing, starting and operations.
B. Not less than thirty (30) days before anticipated time for beginning the testing, the Contractor will submit to the Engineer for approval, a complete plan for:

1. Schedules for tests.
2. Detail schedules of procedures for startup.
3. Complete schedule of events to be accomplished during startup.
4. Schedule operator training as specified.
5. An outline of work remaining under the Contract that will be carried out concurrently with the operation phases.

C. Notify the Engineer of the approximate date that water or sewage will be required for operation.

1.4 TESTING

A. Testing shall consist of individual tests and checks made on equipment intended to provide proof of performance of units and proper operation of unit controls together with such necessary tests whether or not described elsewhere in these Specifications to assure proper alignment, size, condition, capability, strength, proper adjustment, lubrication, pressure, hydraulic tests, leakage tests and all other checks deemed necessary by the Engineer to determine that all materials and equipment are of specified quality, properly situated, anchored and in all respects ready for use.

B. All gravity sewer pipe and pressure piping shall be tested as required by these specifications and applicable codes.

C. Tests on individual items of equipment, pipelines, vessels, structures, tanks, controls and other items shall be as described in various sections describing such items.

D. Testing will be done by the Contractor in the presence of a Construction Observer designated by the Engineer. Records of all official tests will be made by the Inspector.

E. During tests, the Contractor shall correct any defective work discovered or that is not in first class operating condition.

1.5 STARTUP

A. Startup shall consist of testing by a simulated operation (using clear water to be furnished by the Contractor), all operational equipment and controls. The purpose of these tests shall be to check that all equipment will function under operating conditions, that all interlocking controls and sequences are properly set and that the facility will function as an operating unit.

B. Checks for leakage of tanks, ponds, piping, valves, gates and all other hydraulic systems and structures will be made.

C. Factory representatives of all major units will be present for the startup phase. The test shall continue until it is demonstrated that all dysfunction of controls and machinery are corrected.

D. The startup shall not begin until all tests required by these Specifications have been completed and approved by the Engineer.

E. The Contractor may, if approved by the Engineer, conduct the hydraulic testing of pumps, aerators and other equipment requiring large volumes of

liquid simultaneously with the startup test. If required by the Owner, the Contractor shall dispose of the water used by pumping to waste.

1.6 OPERATION

A. Operation of the facility shall be immediately started after completion of testing and startup and after satisfactory repairs and adjustments have been made and providing supply and disposal facilities furnished by others are available. If these facilities are not available, the plant will be closed down and no further testing or operation by the Contractor will be required. The Contractor, however, will be responsible that all details required by the Contract shall remain in good order until final acceptance of the whole Contract.

B. The facility will be operated by personnel placed on the project by the Owner who will perform all duties and operate all equipment.

C. Taking possession and use of the facility shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents.

*** * * END OF SECTION 01650 * * ***

# SECTION 01700
# CONTRACT CLOSEOUT

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Protection of Work and Property: Section 01545
B. Testing, Startup and Operation: Section 01650
C. Final Cleaning: Section 01710
D. Project Record Documents: Section 01720
E. Operation and Maintenance Data: Section 01730
F. Spare Parts and Maintenance Materials: Section 01750

1.2 SUBSTANTIAL COMPLETION

A. Contractor:

1. After testing and startup, submit written certification to Engineer that Project or designated portion of Project is substantially complete.
2. Submit list of items to be completed or corrected.

B. Engineer will make an inspection after receipt of Contractor's certification, together with Owner's representative.

C. If it appears to the Engineer that work is substantially complete:

1. The Engineer may request, and the Contractor shall prepare and submit to Engineer, a list of items to be completed or corrected as determined by the inspection.
2. If the Engineer then considers the work to be substantially complete, the Engineer may, with the Owner's approval, issue a Certificate of Substantial Completion, with appropriate conditions, accompanied by a list of the items to be completed and corrected, as verified and amended by Engineer. Omission of any item from the list shall not relieve the Contractor from responsibility to complete all the work in accordance with the Contract.
3. Owner occupancy of Project or designated portion of Project:

a. Contractor shall perform final cleaning in accordance with Section 01710.

b. Owner may use all or part of the work within the time designated in the Certificate of Substantial Completion, upon notice to the insurance company or companies as provided in Article 15 of the General Conditions.

4. Contractor shall complete all the work within the time designated in the Certificate, or if not so designated within a reasonable time.

D. Should the Engineer consider that work is not substantially complete:

1. The Engineer shall notify the Contractor, in writing stating reasons.

2. Contractor shall complete work and send second written notice to Engineer certifying that Project or designated portion of Project is substantially complete.

E. Warranties: Under Article 22.1 of the General Conditions guarantee and warranty periods begin with the date of final project acceptance. However, in connection with any specific equipment certified by the Engineer as completed and its use or operation thereof for its intended purpose is assumed by the Owner, the warranty period for such equipment shall begin with the beginning date of such use or operation.

1.3 FINAL INSPECTION

A. The Contractor shall submit written certification that:

1. Contract Documents have been reviewed.
2. Work has been completed in accordance with Contract Documents.
3. Equipment and systems have been tested in presence of Owner's representative and are operational.
4. Project is completed, and ready for final inspection.

B. Engineer will make final inspection within a reasonable time after receipt of certification.

C. Should Engineer consider that work is complete in accordance with requirements of Contract Documents, the Engineer shall request Contractor to prepare closeout submittals.

D. Should Engineer consider that work is not complete:

1. The Engineer shall notify Contractor, in writing, stating reasons.
2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.
3. Engineer will reinspect work.

1.4 REINSPECTION COSTS

A. In addition to any overtime inspection due by the Contractor, should Engineer be required to perform second inspections because of failure of work to comply with original certifications of Contractor, Owner will compensate Engineer for additional services and charge the Contractor for such fees at the Engineer's currently established billing rate.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: To requirements of Section 01720

B. Operation and Maintenance Data: To requirements of Section 01730

C. Guarantees and bonds required by these specifications: See Articles 16 and 22 of General Conditions and specific equipment or material specifications.

D. Spare parts and Maintenance Materials as specified in Section 01750.

E. Easement Release: Section 01545

F. At the close of the Contract the Contractor shall:

1. Pay all utility bills.
2. Remove all electrical, sanitary, gas, telephone, water, offices and any other temporary service equipment that may remain.
3. Arrange for transfer of electrical, and water accounts to the Owner's name.

G. Deliver evidence of compliance with requirements of governing authorities:

1. Certificates of Inspection:
   a. Mechanical:
      (1) As required by codes.
   b. Electrical:
      (1) State or city as required.
      (2) Megger by Electrical Subcontractor.

1.6 POST-CONSTRUCTION INSPECTION

A. Prior to expiration one year from Date of Substantial Completion or Final Acceptance, Engineer may make visual inspection of Project in company with Owner and Contractor to determine whether correction of work is required, in accordance with provisions of General Conditions.

B. For guarantees beyond one year, Engineer will make inspections at request of Owner, after notification to Contractor.

C. Owner will promptly notify Contractor, in writing, of any observed deficiencies.

*** * * END OF SECTION 01700 * * ***

# SECTION 01710
# CLEANING

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Cutting and Patching: Section 01045
B. Temporary Controls: Section 01560
C. Contract Closeout: Section 01700

1.2 GENERAL REQUIREMENTS

A. Maintain premises and public properties free from accumulations of waste, debris, and rubbish caused by operations.

B. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

1.3 SAFETY REQUIREMENTS

A. Standards: Maintain project in accordance with the applicable federal, state and local safety standards.

B. Hazards Control:

1. Store volatile wastes in covered metal containers, and remove from premises daily.
2. Prevent accumulation of wastes which create hazardous conditions.
3. Provide adequate ventilation during use of volatile or noxious substances.

C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws:

1. Do not burn or bury rubbish and waste materials on project site unless approved by local fire and air pollution authorities.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.

## PART 2: PRODUCTS

2.1 MATERIALS

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

## PART 3: EXECUTION

3.1 DURING CONSTRUCTION

A. Execute cleaning to insure that grounds and public properties are maintained free from accumulations of waste materials and rubbish.

B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.

C. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off District's property.

D. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

E. The Contractor shall clean the right-of-way, material sites and all ground the Contractor occupied to do the work periodically throughout the duration of the project. All rubbish, surplus materials, discarded materials and debris shall be removed from the site and disposed of properly. At the minimum, the Contractor shall conduct such periodic cleaning for each 1,000 feet of pipeline installed, prior to proceeding with installation of additional pipeline. Such cleaning shall also occur immediately prior to weekends, holidays, extended work stoppages or at the direction of the District, or other regulatory agencies having jurisdiction.

3.2 FINAL CLEANING OF STRUCTURES

A. Employ experienced workers, or professional cleaners, for final cleaning.

B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.

C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine finish.

D. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.

E. Broom clean paved surfaces; rake clean other surfaces of grounds.

F. Clean windows.

G. Replace air conditioning filters if units were operated during construction.

H. Clean ducts, blowers and coils, if air conditioning units were operated without filters during construction.

I. Maintain cleaning until project is occupied by District.

3.3 FINAL CLEANUP OF PIPELINES

A. Final cleanup work shall be completed as closely behind the construction work as it is physically possible to do.

B. Unless otherwise specifically provided in writing only those portions of the completed work will be included in the partial pay estimates where, in the Engineer's opinion, the cleanup work has been satisfactorily completed.

C. Refer to specific sections for detail requirements for cleanup of pipelines.

3.4 GENERAL CLEANUP

A. Before final acceptance, the Contractor shall remove and obliterate, insofar as feasible, all objects or disturbances of the ground which mar the landscape and were caused by project operations, whether or not part of the improvement.

B. Rubbish, excess materials, temporary structures, and discarded equipment shall be removed and disposed of.

C. Temporary haul roads shall be scarified and bladed to blend with surroundings.

D. Remove snags, down trees, brush, and stumps.

E. Fill holes and grade to smooth land contours. Shape ends of cuts and fills to fit adjacent terrain.

F. Hand rake disturbed areas to remove loose objects including rock and clods in excess of two inches in any dimension.

G. Sweep pavement, curb and gutter, sidewalks and driveways.

*** * * END OF SECTION 01710 * * ***

# SECTION 01720
# PROJECT RECORD DOCUMENTS

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Documents: Article 6, General Conditions
B. Shop Drawings, Project Data and Samples: Section 01340
C. Operation and Maintenance Data: Section 01730

1.2 MAINTENANCE OF DOCUMENTS

A. Maintain at job site, one copy of:

1. Contract Drawings.
2. Project Manual.
3. Addenda.
4. Reviewed Shop Drawings.
5. Change Orders.
6. Other Modifications to Contract.
7. Field Test Records.
8. Maintenance Data Delivered with Equipment.

B. Store documents in field office, apart from documents used for construction.

C. Provide files and racks for storage of documents.

D. Maintain documents in clean, dry, legible condition.

E. Do not use record documents for construction purposes.

F. Make documents available at all times for inspection by Engineer and Owner.

1.3 RECORDING

A. Do not permanently conceal any work until required information has been recorded.

B. Keep documents current.

C. Contract Drawings: Legibly mark to record actual construction:

1. Depths of various elements of foundation in relation to variances from plan.
2. Horizontal and vertical location of underground utilities and appurtenances and references to permanent surface improvements.
3. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
4. Field changes of dimension and detail.
5. Changes made by Change Order or Field Order.

6. Details not on original Contract Drawings.
7. Side sewer locations including stubs and tees.

D. Specifications and Addenda: Legibly mark up each Section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
2. Changes made by Change Order or Field Order.
3. Other matters not originally specified.

E. Shop Drawings: Maintain as record documents; legibly annotate drawings to record changes made after review.

1.4 SUBMITTAL

A. At completion of project, deliver record documents (both mylar and CD/DVD copies) to Engineer.

B. Accompany submittal with transmittal letter, in duplicate, signed by the Contractor, or an authorized representative.

*** * * END OF SECTION 01720 * * ***

# SECTION 01730
# OPERATION AND MAINTENANCE DATA

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Testing, Startup and Operation: Section 01650
B. Material and Equipment: Section 01600
C. Contract Closeout: Section 01700
D. Spare Parts and Maintenance Materials: Section 01750

1.2 DATA

A. The Contractor shall furnish the Engineer with six (6) legible bound copies of maintenance data on all machinery and equipment furnished under this Contract. The manuals shall include the following:

1. Equipment operating and maintenance instructions.
2. Parts lists, including diagrams and cut-a-way sections.
3. Assembly and disassembly instructions.
4. Equipment specifications and guaranteed performance data.
5. Name, address and telephone of vendor and spare parts sources.
6. Factory parts list with interchangeability listings of all component sources and original manufacturer's part number.
7. Manufacturers' warranties.
8. Recommendations for preventative maintenance.
9. Step by step operating and startup procedures.

B. Wiring diagrams of all control circuits actually supplied and installed shall be included.

1.3 QUALITY

A. Data shall be bound in first quality, heavy-duty, view type, permanent type 3-ring binders. The Contractor shall submit the binding proposed to the Engineer for approval before assembling all of the material.

B. Manuals shall be assembled and indexed so that information on any piece of equipment can be readily found.

1.4 FORM

A. The operating and maintenance instructions shall be the first item listed for each piece of equipment. It shall include, in addition to necessary details, a "summary of maintenance" substantially in the following format:

1. Name of Item: _____

2. Name of Manufacturer: _____

3. Address: _____

4. Name Plate Information: _____

5. Nearest Local Representative: _____

6. Address: _____

7. Telephone No.: _____

| Maintenance Requirements | Date or Frequency | Lubrication | Remarks |
|---|---|---|---|

8. Spare Parts List (to be kept on hand)

B. The second item of each listing shall be a detailed narrative description of both the equipment and control circuits and a description of the recommended method for trouble shooting.

C. The third item of each listing shall be the lubrication chart required in Section 01750 followed by drawings, charts and details.

*** * * END OF SECTION 01730 * * ***

# SECTION 01750
# SPARE PARTS AND MAINTENANCE MATERIALS

## PART 1: GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Operation and Maintenance Data: Section 01730

1.2 SPARE PARTS

A. All equipment shall be furnished with spare parts as recommended by the manufacturer. All bearings, bushings and shaft sleeves shall be "export" packaged.

B. Additional spare parts shall be furnished when specifically listed under any products.

1.3 LUBRICANTS

A. The Contractor shall have a lubricant manufacturer's representative inspect each piece of new equipment and make a maintenance chart on which shall be shown, in a list, each item of equipment requiring lubricant, the type and quantity of lubricant required, the frequency of lubrication required and a space for the last date that each piece of equipment was lubricated.

B. The Contractor shall provide a one year's supply of every kind of packing grease, or oil required for new equipment.

C. The Contractor shall furnish all oil cans, grease guns and all other necessary items for proper lubrication.

D. Lubrication charts shall be included in the maintenance manual.

*** * * END OF SECTION 01750* * ***

# INDEX
# DIVISION 2 – SITE WORK

# SECTION 02050
# DEMOLITION

## 1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Site Clearing: Section 02110
B. Excavating, Backfilling and Compacting for Utilities: Section 02222
C. Pavement Repair and Resurfacing: Section 02575

1.2 PROTECTION

A. Streets, roads, adjacent property and other work to remain shall be protected throughout the work.

B. Pavement may be cut only where authorized and only to the extent specified.

C. Any material damaged by Contractor's operations shall be replaced with new material by the Contractor.

1.3 CUTTING PAVEMENT, CURBS AND WALKS

A. Unless specified otherwise by the authority having control over the pavement, curbs and walks, cutting and replacement shall be as specified in Section 02575.

1.4 PRIVATE DRIVEWAYS, CULVERTS AND MISCELLANEOUS

A. Pipe laying operations in certain areas may necessitate temporary removal of mail boxes, private driveways, drains, service lines, conduits, etc. to facilitate construction. In the event that the Contractor finds it necessary to remove the above mentioned items, it is to be understood that it will be the Contractor’s responsibility to restore these items in a manner equal to their original condition. The Contractor shall maintain adequate temporary provisions for domestic deliveries and utilities service and access to fire fighting equipment.

B. The preceding requirement will be the same for any temporary removal of road culverts, whether under state, county or private jurisdiction.

C. The Contractor shall make every effort to prevent blocking private driveways for more than a reasonable time and shall make such driveways immediately accessible on order of the Owner.

## 1.5 REMOVAL OF STRUCTURES

A. The Contractor shall raze, remove, and dispose of all buildings and foundations, structures, fences, and other obstructions that are indicated in the drawing.

B. Remove foundations to a depth of at least 5 feet below finished ground elevation or subgrade elevation, whichever is lower.

C. Break up basement floors to promote drainage.

D. Fill basements or other cavities left by the removal of structures to match the level of surrounding ground.

E. When salvageable material is to remain on the Owner's property, the Contractor shall remove it and deliver it to a site designated by the Engineer or project documents. Any material not designated as the Owner's property will belong to the Contractor. The Contractor shall store or dispose of such material at suitable disposal site or at a storage yard. The Contractor shall dispose of all materials associated with demolition and removal, at a site of his/her choosing. The Contractor shall be responsible for obtaining any and all necessary permits and shall comply with applicable codes, laws and standards.

## 1.6 ASBESTOS REMOVAL

A. The Contractor shall conduct all work related to existing asbestos materials in accordance with WISHA safety regulations and provisions of WAC 296-62-077, WAC 296-65 and the requirements of the regional air pollution control authority. Advance notice of work on asbestos materials may be required.

B. Work crews shall be provided with proper protective clothing and equipment.

C. Waste and abandoned asbestos materials, clothing, etc. used in asbestos handling and removal shall be disposed of in a manner consistent with the regulations and provisions cited above.

D. All costs associated with the demolition and abandonment of asbestos material shall be considered incidental to the work; and the work shall be performed at the Contractor’s expense.

E. The Contractor (person or organization removing asbestos with certified asbestos workers) shall assume ALL risk and all liability for the removal and disposal of the asbestos and the Contractor shall comply with all

federal, state and local laws, statutes and regulatory agency regulations and requirements including but not limited to the requirements relating to environmental pollutants and the requirements relating to the removal and disposal of asbestos. The Contractor shall insure that the asbestos removal is pursuant to all state and federal laws and regulations. The Contractor shall be responsible for any and all fines or penalties which may be levied due to the Contractor's violation of any of the aforementioned laws and regulations.

## 3. EXECUTION

3.1 General Demolition.

A. The Contractor shall conduct all demolition operations to avoid damage to adjacent property and structures. All electrical, mechanical and structural components shown to be demolished shall be done without impact or damage to the components that are slated to remain in service.

*** * * END OF SECTION 02050 * * ***

# SECTION 02110
# SITE CLEARING

## 1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Demolition: Section 02050
B. Excavating, Backfilling and Compacting for Utilities: Section 02222

1.2 PROTECTION

A. Streets, roads, adjacent property and other work to remain shall be protected throughout the work.

## 2. PRODUCTS

2.1 MATERIALS

A. Materials shall be at the Contractor's option.

## 3. EXECUTION

3.1 SURVEY STAKING IN UNCLEARED EASEMENTS

A. Centerlines of utility lines shall be flagged prior to clearing and it shall be the Contractor's responsibility to set offsets for clearing limits.

B. If the controls or stakes are damaged or destroyed, the cost of replacement shall be at the expense of the Contractor.

3.2 CLEARING

A. Clearing work shall be performed within the confines of the area indicated on the Drawings, or in the Specifications.

B. Debris resulting from said clearing shall be disposed of by the Contractor and the right-of-way cleaned up in a neat and workmanlike manner.

C. No logs, stumps, rocks, etc., shall be left lying in the right-of-way or on adjacent property without specified written approval by the Owner.

D. All trees shall be felled within the area to be cleared except those marked to be left standing, or required by easement stipulations or by contract to be left standing, shall be close cut parallel to the ground, removed and disposed of at the expense of the Contractor.

E. No trees or shrubbery in public right-of-way shall be cut except by approval of the Engineer and the governing agency.

3.3 GRUBBING

A. All trees or stumps within five (5) feet of the pipeline shall be removed, unless otherwise noted.

B. Grubbing will be performed where designated on the drawings or as specified herein and shall include removal from the ground of all stumps, roots, buried logs and other vegetation not otherwise provided for and the removal and disposal of the refuse.

C. In areas to be filled to a depth of three (3) feet or more above the natural ground all tree stumps and brush shall be cut off not more than three (3) inches from the ground and removed. Stumps may remain at the Contractor's option.

D. Where unsuitable surface material is to be removed, complete grubbing will be required.

3.4 DAMAGED VEGETATION

A. Neatly trim torn limbs and trunk and severed roots.

B. Apply wound paint to above-ground wounds.

C. Apply root hormone to neatly cut roots 1” and larger. Wrap in burlap.

D. Remove and replace in kind all vegetation damaged extensively.

3.5 DISPOSAL

A. Contractor shall comply with all laws and rules that govern disposal and shall secure necessary permits.

B. Contractor may sell any saleable material.

C. Material not sold shall be hauled to a disposal site secured by the Contractor at his/her own expense.

*** * * END OF SECTION 02110* * ***

# SECTION 02140
# DEWATERING

## 1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavating, Backfilling and Compaction for Utilities: Section 02222

1.2 QUALITY CONTROL

A. It shall be the sole responsibility of the Contractor to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement, erosion and subsidence.

B. The Contractor shall employ an independent qualified Professional Engineer with experience in similar dewatering problems to review and approve the Contractor's proposed method of dewatering and to at least weekly, inspect the Contractor's operations and provide a report to the Engineer.

C. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the Contractor.

D. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points should be established and observed at frequent intervals to detect any settlement which may develop. Should significant settlement be observed, recharge wells could be placed between the structure and the trench and water pumped under pressure back into the soil.

E. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the Contractor. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor.

## 2. PRODUCTS

2.1 EQUIPMENT

A. Before operations begin, the Contractor shall have available on the site of work sufficient pumping equipment and/or other machinery to assure that the operation of the dewatering system can be maintained.

## 3. EXECUTION

3.1 METHODS

A. Dewatering shall be done by such method as the Contractor may elect.

B. Dewatering, sufficient to maintain the groundwater level at or below the surface of trench bottom or base of the foundation gravel shall be accomplished prior to excavation and placing of pipeline or concrete. The dewatering operation, however accomplished, shall be carried out so that it does not destroy or weaken the strength of the soil under or alongside the excavation.

C. The normal water table shall be restored to its natural level in such a manner as to not disturb the pipe, its foundation and structures.

D. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sand packed and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the Contractor shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

E. Dewatering of the excavations shall be considered as incidental to the construction and shall be at the Contractor’s expense.

F. Dispose of water so as not to cause injury to public or private property or to cause a nuisance or menace to the public and in accordance with the requirements of regulatory agencies.

G. Construction of temporary facilities to dispose of water shall be incidental to the contract.

H. Permanent piping systems shall not be incorporated in the dewatering system.

*** * * END OF SECTION 02140 * * ***

# SECTION 02150
# SHORING

## 1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavating, Backfilling and Compacting for Utilities: Section 02222

1.2 QUALITY ASSURANCE

A. Where the depth of excavation exceeds 20 (twenty) feet the Contractor's shoring systems shall be designed by a registered professional engineer with experience in the work, all in accordance with federal, state and local safety requirements (the most stringent requirement prevailing).

B. Where the depth of excavation is less than 20 (twenty) feet, the Contractor shall provide, place and maintain responsibility for shoring, sheeting, bracing, sloping or otherwise support the sides of trenches and excavations, including embankments by a means of sufficient strength to protect employees. Such shoring and associated responsibilities shall be in accordance with federal, state and local safety requirements (the most stringent requirement prevailing).

## 2. PRODUCTS

2.1 SHORING SYSTEMS

A. Materials used shall be at the Contractor's option.

## 3. EXECUTION

3.1 SAFETY REQUIREMENTS

A. Shoring shall be placed in accordance with federal, state and local safety requirements (the most stringent requirement prevailing).

3.2 SHORING SYSTEMS

A. Unless otherwise provided, the Contractor shall provide all shoring systems needed to protect the work, adjacent property and improvements, utilities, pavement, etc., and to provide safe working conditions in the trench.

B. Removal of any or all shoring systems from the trench shall be accomplished in such a manner as to fulfill all of the above requirements and shall also be accomplished in such a manner as to prevent any damage to the work.

C. Damages or injuries resulting from improper shoring or from failure to shore shall be the sole responsibility of the Contractor.

D. Whether shoring systems shall be left in place or removed shall be at the option of the Contractor, provided that removal of any and all shoring used in trench or structure excavation shall be accomplished in the manner as to prevent the settlement of the pipes or other work and to prevent increased backfill loading which might overload the pipe or walls of the structure.

Shoring shall be removed to a minimum of 5 feet below the final grade.

3.3 SPECIAL REQUIREMENT FOR FLEXIBLE PIPE

A. Shoring to be removed, or moveable trench shields or boxes, shall be located at least two pipe diameters away from the pipe if the bottom of the shoring, shield or box extends below the top of flexible pipe, unless a satisfactory means of reconsolidating the bedding or side support material disturbed by shoring removal can be demonstrated.

B. Damages resulting from improper shoring or failure to shore shall be the sole responsibility of the Contractor.

*** * * END OF SECTION 02150 * * ***

# SECTION 02210
# GRADING

## PART 1: GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Subsurface Investigation: Section 02610
B. Demolition: Section 02050
C. Site Clearing: Section 02110
D. Excavating, Backfilling, and Compacting for Utilities: Section 02222
E. Landscape Restoration: Section 02990

1.2 QUALITY CONTROL ASSURANCE

A. Soils and Backfill: Moisture density standard ASTM D1557 or AASHTO T-180 method unless otherwise specifically approved.

B. In-place Density Determination: Sandcone method ASTM D1556 or Nuclear method ASTM D2922.

C. Classification of Soils ASTM 02487.

D. Quality control monitoring of subgrade backfill and embankment materials and construction by certified independent laboratory approved by Engineer, secured and paid for by the Contractor.

1.3 SUBMITTALS

A. Import backfill gradation and moisture density compaction curve test reports.

B. Embankment and native backfill materials gradations and moisture density standards curve test reports.

C. Certification of gradation and compliance with referenced standards, and moisture density standards test reports.

D. Density test results in approved format.

## PART 2: PRODUCTS

2.1 NATIVE MATERIAL FOR EMBANKMENT

A. Selected soil free from roots or other organic material, debris, or frozen material.

B. Maximum size to 6 inches with no stone larger than 4 inches in upper 6 inches of fill.

C. Free of excess moisture.

D. Processed to uniform moisture and texture necessary to obtain specified density.

2.2 IMPORT BACKFILL MATERIAL

A. See Section 02222 for Backfill Gravel, paragraph 2.3.

2.3 TOP SOIL

A. See Section 02990, paragraph 2.1.

2.4 WASTE MATERIAL

A. Foreign materials, buried rubble, abandoned pipes and native soil materials that cannot be processed to uniform moisture and texture necessary to achieve specified densities shall be disposed of by the Contractor at the appropriate waste site.

B. Waste site shall be provided by the Contractor. See Sections 02050 and 02110.

2.5 CRUSHED SURFACING

A. Crushed surfacing shall be manufactured from ledge rock, talus or gravel. The materials shall be uniform in quality and substantially free from wood, roots, and other extraneous material.

B. Crushed surfacing shall meet the following requirements for grading and quality:

| Sieve Size Square Opening | Percent Passing by Weight |
|---|---|
| 1 inch | 100 |
| ¾ | 100 |
| No. 4 | 55 - 75 |
| No. 40 | 8 -24 |
| No. 200 | 0 - 10 |

C. The portion of crushed aggregate retained in a No. 10 sieve shall have a minimum of 75% of the particles with at least one fractured face.

D. The portions passing the No. 40 sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 6.

E. The portions passing No. 10 sieve shall have a percentage of wear of not greater than 35% when tested in the Los Angeles machine.

## PART 3: EXECUTION

### 3.1 WORK SEQUENCE

A. Notify Engineer of any discrepancies between contractual requirements and site conditions prior to start of work.

B. Maintain backfill embankment and subgrade zones or lifts open until approval of testing is secured from the Engineer. Any work covered up prior to approval shall be excavated and reconstructed at Contractor's expense.

C. Prior to pipe installation construct embankments a minimum of 12 inches above pipe crowns and trench for all pipelines. Mounding over pipelines will not be permitted.

D. Work in inclement wet weather at Contractor's risk.

E. Any materials which become unstable as the result of improper selection of techniques, equipment, or operations during inclement wet weather shall be replaced at Contractor's expense with imported material for embankment.

F. Excavations and embankment shall be accomplished in such a manner that drainage is maintained at all times.

### 3.2 STOCKPILING NATIVE MATERIALS FOR REUSE

A. Material suitable for reuse as native backfill shall be deposited in protected, maintained piles separate from other materials and readily available.

B. Upon completion, all material storage areas shall be restored to substantially their original condition.

### 3.3 EXCAVATION

A. Remove all materials required regardless of type or character.

B. Excavate to lines and grades shown on the drawing.

C. Transport all materials to embankment areas or to waste as required.

### 3.4 PREPARATION OF GROUND SURFACE FOR FILL

A. All vegetation, such as roots, brush, heavy sods, heavy growth of grass, and all decayed vegetable matter, rubbish, and other unsuitable materials within the area upon which fill is to be placed, shall be stripped or otherwise removed before the fill is started.

B. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed, shall be plowed, stepped (benched), or broken up in such manner that the fill material will bond with the existing surface.

C. The original ground surface shall be plowed or scarified to a depth of at least six (6) inches and compacted as specified herein.

D. Soft, wet soils shall be excavated and replaced or allowed to dry before placing fill.

3.5 EMBANKMENT

A. Construct of materials specified, conditioned to proper moisture and texture necessary to assure specified densities.

B. Loose thickness lifts not to exceed 8 inches.

C. Maintain drainage at all times.

D. Construct to grades shown on the Drawings.

3.6 COMPACTION

A. Compact each lift to 95% of maximum density at optimum moisture content.

B. When working in areas outside of proposed traveled roadway or on non-traveled segments of easements, backfill material shall be compacted to a minimum of 90% of maximum density at optimum moisture content.

3.7 Gravel Roads / Driveways

A. All gravel roadways and driveways must be graded and compacted prior to use. Gravel must be restored to equal or better conditions.

3.8 FINISH ELEVATIONS

A. Contours illustrated are intended as a general guide to achieve proper aesthetics and drainage control.

B. Control grid and spot elevations to be established by Contractor.

C. Vary control grid spacing to accurately define slope, rounding of mounds and depressions.

D. Field staking of certain intermediate grid points at locations where slopes are uniform may, at Engineer's discretion, be eliminated.

E. Finished surface shall be smooth, compacted and free from irregular surface change so as to drain readily.

F. The degree of finish shall be that ordinarily obtainable from blade-grader operations, except as otherwise specified.

3.9 DENSITY TEST RECORD DOCUMENTATION

A. Location of horizontal and vertical grid and datum.

B. Density and percent of referenced standard computation.

C. Material description and appropriate compaction control standard.

*** * * END OF SECTION 02210 * * ***

# SECTION 02222
# EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES

## 1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Demolition: Section 02050
B. Site Clearing and Grubbing: Section 02110
C. Sedimentation Control: Section 02275
D. Sanitary Sewers: Section 02730
E. Sewer Force Mains: Section 02732
F. Existing Utilities/Facilities-Underground and Overhead: Section 02760
G. Shoring: Section 02150

1.2 CLASSIFICATION

A. All excavation is unclassified.

B. The terms earthwork or excavation include all materials excavated or removed regardless of material characteristics.

C. The Contractor shall make own estimate of the kind and extent of materials which will be encountered in the excavation.

1.3 QUALITY CONTROL ASSURANCE

A. Soils and Backfill: Moisture density standard ASTM 01557 or MSHTO T-180 method unless otherwise specifically approved.

B. In-place Density Determination: Sandcone method ASTM D1556 or Nuclear method ASTM D2922.

C. Classification of Soils: ASTM D2487.

D. Quality control monitoring of subgrade backfill and embankment materials and construction by certified independent laboratory approved by Engineer and secured and paid for by the Contractor.

1.4 SUBMITTALS

A. Import backfill gradation and moisture density compaction curve test reports.

B. Embankment and native backfill materials gradations and moisture density standards curve test reports.

C. Certification of gradation and compliance with referenced standards and moisture density standards test reports.

D. Density test results in approved format.

E. At any time the Contractor shall change the source and/or stockpile from which materials are obtained, certificates of gradation for these new sources will also be required.

F. During construction, the Engineer may elect to have further gradation testing completed on the materials being furnished by the Contractor. The Contractor shall provide material samples as may be necessary to complete this testing and these material samples will be furnished from material available on the job site or from the Contractor's source and/or supplier.

G. Controlled Density Fill (CDF): Furnish a certificate with each truckload of CDF product delivered to the site, indicating the composition and quality of the mix. Include size and weight of each aggregate, amount of cement, amount of water and amount and kind of any additives.

## 2. PRODUCTS

2.1 BACKFILL MATERIALS

A. These materials shall be native or imported materials and as described in this section.

2.2 CRUSHED ROCK BEDDING MATERIAL

A. Bedding for Rigid Pipe/Conduit: Crushed Rock bedding material shall be manufactured from ledge rock, talus or gravel. The material shall be uniform in quality and substantially free from wood, roots, bark, and other extraneous material.

| Sieve Size Square Opening | Percent Passing By Weight |
|---|---|
| 1-1/4" | 100 |
| 5/8 inch | 50-80 |
| 1/4” | 30-50 |
| No.40 | 3-18 |
| No.200 | 7.5 max |

B. Bedding for Flexible Pipe/Conduits: Bedding material shall be a clean screened or crushed sand/gravel mixture free from organic matter and conforming to the following gradation when tested in accordance with ASTM D422:

| Sieve Size Square Opening | Percent Passing By Weight |
|---|---|
| 3/4 inch | 100 |
| 3/8 inch | 70 -100 |
| No. 4 | 55 -100 |
| No. 10 | 35 -95 |
| No. 20 | 20 -80 |
| No.40 | 10 -55 |
| No. 100 | 0 -10 |
| No. 200 | 0-3 |

C. Minimum sand equivalent shall be 35 in accordance with ASTM D2419.

B. Recycled concrete and glass not allowable.

2.3 BACKFILL GRAVEL

A. All backfill gravel to be furnished under this Contract shall consist of naturally occurring screened or crushed gravel.

C. Be essentially free from wood waste or other extraneous or objectionable materials.

D. Shall have such characteristics of size and shape that it will compact readily and shall meet the following test requirements:

| | |
|---|---|
| Stabilometer "R" Value | 72 min. |
| Swell Pressure | 0.3 psi max. |
| Maximum Particle Size | 3 in. |
| Passing 1/4" Sq. Opening | 25% min. |
| Passing No. 200 Sieve | 10% max. |
| All percentages are by weight | |
| Dust Ratio: % Passing No. 200 Sieve / % Passing No. 40 Sieve | 2/3 max. |
| Sand Equivalent (ASTM 02419) | 30 min. |

E. The Contractor shall provide the Engineer with a certificate of gradation or sieve analysis from a qualified testing laboratory for backfill gravel furnished under this contract.

F. Recycled concrete and glass not allowable.

2.4 NATIVE MATERIAL

A. Selected soil free from roots or other organic material, debris, or frozen material.
B. Maximum size to 6 inches with no stone larger than 4 inches in upper 6 inches of fill.
C. Free of excess moisture.
D. Processed to uniform measure and texture necessary to obtain specified density.

2.5 FOUNDATION GRAVEL

A. At least two basic trench-bottom Conditions commonly cause problems: (1) where silty soils or fine sandy soils are encountered, they will usually flow in the presence of a stream of water, and (2) where clays, peats, or other soft materials are encountered, they may become saturated with water, but do not usually break down into fine particles and flow as do the silts or sands mentioned above.

B. Contractor's attention is called to conditions for use of the material as outlined in Article 3.4 of this section.

C. Condition (1) Material: Where Condition (1) is encountered, the following foundation gravel has been found by experience usually to be adequate. Foundation gravel shall consist of clean bank run sand and gravel, free from dirt, roots, topsoil, and debris and contain not less than 35% retained on a 1/4-inch sieve and with all stones larger than two (2) inches removed. Such gravel must only be used in a dry-trench bottom, free from quicksand or running sand.

D. Condition (2) Material: Where Condition (2) is encountered, Class A or Class B foundation gravel listed below, has been found by experience usually to be adequate. Other material may, however, be found more desirable by the Contractor:

| Sieve Size Square Opening | Class A % Passing | Class B % Passing |
|---|---|---|
| 2-1/2" | 98 -100 | 95 -100 |
| 2" | 92 -100 | 75 -100 |
| 1-1/2" | 72 -87 | 30 -60 |
| 1-1 /4" | 58 -75 | 0 -15 |
| 3/4" | 27 -47 | 0 -1 |
| 3/8" | 3 -14 | |
| No. 4 | 0-1 | |

E. Foundation gravel shall contain no pieces larger than five (5) inches, measured along the line of greatest dimension.

G. Recycled concrete and glass not allowable.

2.6 RIGID INSULATION

A. Insulation shall be closed-cell, extruded polystyrene foam.

B. The insulation shall have a typical five year aged thermal conductivity, k factor of 0.2 Btu/hr/sq.ft./°F/in when tested at 75° F mean temperature in accordance with ASTM C518.

C. Minimum compressive strength of 25 psi when tested in the vertical direction in accordance with ASTM D1621.

D. Maximum water absorption of 0.3% by volume when tested in accordance with ASTM C272.

2.7 CONTROLLED DENSITY FILL (CDF)

A. CDF shall be a mixture of Portland cement, fly ash, aggregates, water, and admixtures proportioned to provide a non-segregating, self-consolidating and free-flowing material which will result in a hardened, dense, non-settling and excavatable fill.

B. CDF shall be used as fill above utilities wherever non-settling backfill is required or as a hydraulic barrier between coarse and fine grained soil.

C. CDF shall be a mixture of Portland cement, fly ash, aggregates, water, and admixtures which have been batched and mixed in accordance with Section 6-02.3 of the WSDOT/APWA Specifications. Materials are as follows:

| | | |
|---|---|---|
| 1. | Portland Cement | AASHTO M 85 OR WSDOT/APWA 9-01 |
| 2. | Fly Ash | Class F |
| 3. | Aggregates | WSDOT/APWA 9-03.1(2)8 |
| 4. | Water | WSDOT/APWA 9-25 |
| 5. | Admixtures | WSDOT/APWA 9-23.6 |

D. CDF shall be used in the following proportions for one cubic yard. Batch weights may vary depending on specific weights of aggregates.

| | |
|---|---|
| • Max. gallons of Mixing Water per cubic yard | 50 |
| • Lbs. of Cement per cubic yard | 50 |
| • Lbs. of Fly Ash per cubic yard | 250 |
| • Lbs. of Dry Aggregate per cubic yard, Class 1 or 2 Sand as per WSDOT/APWA 9-03.1(2)B | 3200 |

E. CDF shall be batched to provide a flowing, non-segregating mix, with a slump between 6" to 8".

2.8 SHOULDER GRAVEL

A. Shoulder Gravel shall meet the requirements of Section 9-03.9(8), Crushed Surfacing, Base Course.

## 3. EXECUTION

3.1 TRENCHING

A. Material shall be excavated from trenches and piled adjacent to the trench and maintained so that the toe of the slope of the spoil material is at least two (2) feet from the edge of the trench.

B. Material shall be piled in such a manner that will cause a minimum of inconvenience to public travel.

C. Free access shall be provided to all fire hydrants, water valves and meters, and clearance shall be left to enable the free flow of storm water in all gutters, conduits, and natural watercourses.

D. Ledge rock, boulders, or stones shall be removed to provide a minimum clearance of six (6) inches under and around the pipe.

E. Contractor shall keep excavations free of water in accordance with Section 02140.

F. Contractor is responsible for shoring in accordance with Section 02150.

3.2 TRENCHING FOR SEWERS AND DRAINS

A. Trenches must be of sufficient width to permit proper jointing of the pipe and backfilling of material along the sides of the pipe.

B. Trench width at the surface of the ground shall be kept to the minimum amount necessary to install the pipe in a safe manner.

C. Trenches wider than the maximum specified may result in a greater load of overburden than the pipe is designed for, and consequently, if the maximum trench width is exceeded by the Contractor, the Contractor shall at his own expense, provide pipe of higher strength classification, or provide a higher class of bedding where necessary to assure that the pipe will not be overloaded.

D. The normal maximum permissible trench width, at the bottom of the trench and up to a point at the crown of the pipe, shall be 1.5 times the inside diameter plus 18 inches or 60 inches, whichever is greater.

E. Excavation for manholes and other structures shall be sufficient to provide a minimum of 12 inches between their outside surfaces and the sides of the excavation to allow proper backfill and compaction.

F. The length of trench excavated in advance of the pipe laying shall be kept to a minimum, and in no case shall it exceed 150 feet unless specifically authorized by the Engineer.

G. Trenches shall be excavated below the barrel of the pipe a sufficient distance to provide for bedding material specified.

H. All ditches shall be closed at the end of the work day in accordance with Section 00700, subparagraph 11.3.

## 3.3 TRENCHING FOR SEWER FORCE MAINS

A. Trenches shall be dug to true and smooth bottom grade and in accordance with the lines given by the Engineer.

B. Trench widths shall not exceed 40 inches maximum or 1.5 times outside diameter of the pipe plus 18 inches whichever is greater.

C. Standard excavation equipment shall be adjusted so as to excavate the narrowest ditch possible.

D. The depth of trenching shall be such as to give a minimum cover of 48 inches over the top of the pipe unless otherwise specified.

E. Where profile of pipeline and ground surface is shown on the Plans, pipeline shall be laid to elevation shown regardless of depth.

F. Trench shall be graded so that there is an upward slope at all times from low point to high point.

G. The length of trench excavated in advance of the pipe laying shall be kept to a minimum and in no case shall length of open trench exceed 150 feet unless otherwise specifically authorized by the Engineer.

I. Trenches shall be overexcavated below the specified grade to provide for bedding material specified.

J. All ditches shall be closed at the end of the work day in accordance with Section 00700, subparagraph 11.3.

## 3.4 PIPE FOUNDATIONS

A. Where the trench bottom is in a material which is unsuitable for foundation or which will make it difficult to obtain uniform bearing for the pipe, such material shall be removed and a stable foundation provided in accordance with Standard Detail entitled "Foundation Gravel and Backfill".

B. Proper preparation of foundation and placement of foundation material where required, shall precede the installation of all pipe.

This shall include the necessary preparation of the native trench bottom and/or the top of the foundation material to a uniform grade so that the entire length of pipe rests firmly on a suitable properly compacted material.

C. Gravel to be used for foundation purposes shall be of a type and gradation to provide a solid compact bedding in the trench. Since trench conditions vary, foundation gravel requirements will change.

D. Neither approval or disapproval of the foundation material proposed by the Contractor shall relieve the responsibility for providing adequate pipe foundation and guaranteeing his work as elsewhere required by the Contract.

E. Unsuitable material for foundation purposes below the depth required for the specified bedding shall be removed and replaced with suitable foundation gravel.

F. Excavated materials shall be disposed of at an approved waste site.

3.5 PIPE BEDDING

A. Placement of bedding material in the pipe zone shall be as specified in the section regarding the pipeline being constructed.

3.6 BACKFILLING

A. Placement of pipe bedding to a point 6 inches over the top of the pipe shall be completed before backfilling operations are started.

B. The Contractor shall take all necessary precautions to protect the pipe from any damage, movement or shifting. In general, backfilling shall be performed by pushing the material from the end of the trench into, along and directly over the pipe so that the material will be applied in the form of a rolling slope rather than by side filling which may damage the pipe. Backfilling from the sides of the trench will be permitted after sufficient material has first been carefully placed over the pipe to such a depth as to protect the pipe.

C. Compaction equipment used above the pipe zone shall be of a type that does not injure the pipe.

D. Provide for the proper maintenance of traffic flow and accessibility as may be necessary.

E. Make adequate provisions for the safety of property and persons.

F. Temporary shoring shall be removed unless specifically authorized in writing.

G. Dewatering shall be continued until the trench is completely backfilled.

H. Brush, stumps, logs, planking, disconnected drains, boulders, etc., shall be removed from the material to be used for backfilling the trench.

I. Where original excavated material is unsuitable for trench backfill, backfill gravel shall be placed. The unsuitable material shall be removed to a disposal area. Backfill gravel shall be used for trench backfill only where original material is unsuitable and in all excavations running perpendicular to the sewer main line trench. Use of import backfill gravel upon approval by the Engineer.

J. Sewer laterals or any sewer main lines running perpendicular to the roadway alignment shall have 100% import gravel backfill placement.

K. Where it is required that a blanket of select material or bank run gravel be placed on top of the native backfill, the backfill shall be placed to the elevations shown on the Plans, or to the elevation the Engineer may direct, and shall be leveled to provide for a uniform thickness of the selected material. Compaction of the native material shall be as required by the Owner and shall be performed prior to placing the select material except where the backfill is settled by the jetting method. In this case, the bank run material shall be placed before jetting. The top layer of material shall be then loosened by scarifying or other method and recompacted. Surface material shall be loosened to whatever depth is required to prevent bridging of the top layer, but shall in no case be less than 18-inches.

L. Backfill Gravel: Wherever a trench is excavated in a paved roadway, sidewalk or other area where minor settlements would be detrimental and where the native excavated material is not suitable for compaction as backfill, the trench shall be backfilled to such depth as the Engineer may direct with Backfill Gravel.

M. Controlled Density Fill: Controlled density fill shall be placed as shown on the drawings, or wherever mechanical compaction cannot be achieved due to physical space and/or clearance limitations (not allowing access for mechanical compaction equipment) and where additional excavation to provide the required space and/or clearance is not practical or possible. CDF shall be used as fill above utilities wherever non-settling backfill is required.

## 3.7 GENERAL COMPACTION REQUIREMENTS

A. Requirements of this section shall apply unless more stringent requirements are established by the local agency involved.

B. When working in an existing traveled roadway, restoration and compaction must be achieved as the trench is backfilled so as to maintain traffic.

C. Trench backfill under roadway shall be mechanically compacted to 95% of maximum density.

D. In any trench in which 95% density cannot be achieved with existing backfill, the fill shall be replaced with imported backfill gravel and mechanically compacted to 95%.

E. When working in areas outside of the proposed or existing rights-ofway or on non-traveled easements, backfill may be compacted to 90% density.

3.8 MECHANICAL COMPACTION

A. Method of compaction shall be at Contractor's option.

B. The Contractor shall be responsible to provide the proper size and type of compaction equipment and select the proper method of utilizing said equipment to attain the required compaction density.

C. In place compaction tests may be made. Contractor shall remove and recompact material that does not meet specified requirements at contractor's expense.

3.9 WATER SETTLING

A. Water settling shall not be allowed.

3.10 INSULATION BOARD INSTALLATION

A. Prior to placement of the insulation board, the subgrade shall be leveled and compacted to provide a smooth, firm foundation.

B. Insulation board shall be placed 12 inches above the pipe line whenever shown on the drawing.

C. The insulation shall be 2 feet wide and extend 5 additional feet along the length of pipe after minimum cover has been achieved.

D. Insulation shall be anchored prior to backfilling using a minimum of two 6-inch by 3/8-inch wooden skewers per board, driven at an angle to the vertical and flush to the surface of the insulation.

E. Layering of insulation to obtain the specified thickness shall be allowed as long as all joints are overlapped at least 6 inches.

3.11 CONTROLLED DENSITY FILL (CDF)

A. Mix and deliver CDF in commercial concrete ready mix trucks. CDF shall be discharged from the mixer by any reasonable means (which does not segregate the material) into the area to be filled.

B. Contain CDF at either end of the excavation by bulkhead or earth fill.

C. Place CDF using suitable equipment to avoid injury to or displacement of installed utility lines, manholes, and other structures. CDF shall not be placed on frozen ground.

D. Vibrate fill with concrete vibrators during placement for complete consolidation, 95% minimum.

E. Provide steel plates to span utility trench and prevent traffic contact with the CDF for at least 12 hours, but not more than 24 hours or until fill has set sufficient to prevent rutting.

F. Placement of CDF shall be scheduled during favorable weather conditions. At the time of placement, CDF must have a temperature of at least 40° F. Mixing and placing shall stop when the temperature is 38° F or less and falling. Each filling stage shall be as continuous an operation as practical.

*** * * END OF SECTION 02222 * * ***

# SECTION 02275
# SEDIMENTATION CONTROL

## 1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavating, Backfilling and Compacting for Utilities: Section 02222

1.2 QUALITY CONTROL

A. Conform to regulatory requirements.

B. Sedimentation control systems depicted on drawings are intended to be minimum requirements to meet anticipated site conditions.

1.3 SCHEDULE

A. Required sedimentation control facilities must be constructed and in operation prior to land clearing and/or other construction to ensure that sediment laden water does not enter the natural drainage system.

B. Sediment facilities shall be maintained in a satisfactory condition until such time that clearing and/or construction is completed and potential for on-site erosion has passed.

C. The implementation, maintenance, replacement and additions to erosion/sedimentation control systems shall be the responsibility of the Contractor.

## 2. PRODUCTS

2.1 PLANTING MATERIALS

Refer to Section 02990

2.2 STRAW

A. Be in an air dried condition free of noxious weeds, weed seeds, and other materials detrimental to plant life.

B. Be seasoned before baling or loading and shall be acceptable to the Engineer.

2.3 JUTE MATTING

A. Be of a uniform open plain weave of unbleached, single jute yarn treated with a fire retardant chemical.

B. The yarn shall be of a loosely twisted construction and shall not vary in thickness by more than 1/2 of its normal diameter.

C. Furnished in rolled strips 48 inches wide by approximately 50 yards long.

D. Average weight of 0.92 pounds per square yard with an allowable tolerance of plus or minus 1 inch in width and 5% in weight.

2.4 FILTER FABRIC

A. Filter fabric for the erosion protection barriers shall be Mirafi 140, or equivalent.

2.5 WIRE

A. Wire for the erosion protection barriers shall be 2 x 2 mesh, 14 gauge galvanized wire.

2.6 SUPPORT POSTS

A. Support posts for the erosion protection barriers shall be 2-inch by 4-inch, Doug-FR No. 1 or better wood posts or 1-1/2-inch by 4/8-inch medium weight steel fence posts.

2.7 CLEAR PLASTIC COVERING

A. Clear plastic covering for protection of slopes and cuts shall meet the requirements of the NBS Voluntary Product Standard, PS 17 for Polyethylene sheeting having a minimum thickness of 6 mil.

## 3. EXECUTION

3.1 EROSION CONTROL

A. Erosion control provisions shall meet or exceed the requirements of the local agency having jurisdiction.

B. When provisions are specified and shown on the Drawings, they are the minimum requirements.

C. Contractor shall not permit sediment laden waters to enter drainage facilities.

D. As construction progresses and seasonal conditions dictate, more siltation control facilities may be required. It shall be the responsibility of the Contractor to address new conditions that may be created and to provide additional facilities over and above minimum requirements as may be required.

3.2 FILTER FABRIC FENCES

A. Filter fabric fence shall consist of filter fabric fastened to wire fabric with staples or wire rings.

B. Wire shall be fastened to posts set at 4-foot centers.

C. Fabric shall be buried into ground approximately 8 inches to prevent silt from washing under fabric.

D. Fence shall be located to catch silt and prevent discharge to drainage courses.

3.3 STRAW BALE FILTER

A. Installed in drainage way to catch silt.

B. Dig bales into ground approximately 6 inches and stake in place with 2 wooden stakes in each bale.

C. Bales to extend above anticipated surface of stream.

3.4 PLACING JUTE MATTING

A. Seed and fertilizer shall be placed prior to placing of matting.

B. Jute matting shall be unrolled parallel to the flow of water. Where more than 1 strip of jute matting is required to cover the given area, it shall overlap the adjacent mat a minimum of 4 inches. The ends of matting shall overlap at least 6 inches with the upgrade section on top.

C. The up-slope end of each strip of matting shall be staked and buried in a 6-inch deep trench with the soil firmly tamped against the mat. Three stakes per width of matting (1 stake at each overlap) shall be driven below the finish ground line prior to backfilling of the trench.

D. The Engineer may require that any other edge exposed to more than normal flow of water or strong prevailing winds be staked and buried in a similar manner.

E. Check-slots shall be placed between the ends of strips by placing a tight fold of the matting at least 6 inches vertically into the soil. These shall be tamped and stapled the same as upslope ends. Check-slots must be spaced so that one check-slot or one end occurs within each 50 feet of slope.

F. Edges of matting shall be buried around the edges of catch basins and other structures as herein described. Matting must be spread evenly and smoothly and in contact with the soil at all points.

G. Matting shall be held in place by approved wire staples, pins, spikes or wooden stakes driven vertically into the soil. Matting shall be fastened at intervals not more than 3 feet apart in 3 rows for each strip of matting, with 1 row along each edge and 1 row alternately spaced in the middle. All

ends of the matting and check slots shall be fastened at 6-inch intervals across their width. Length of fastening devices shall be sufficient to securely anchor matting against the soil and driven flush with the finished grade.

3.5 PLACING CLEAR PLASTIC COVERING

A. Clear plastic covering shall be installed on erodible embankment slopes as shown in the plans or as designated by the Engineer.

B. The clear plastic covering shall be installed immediately after completion of the application of roadside seeding.

C. The Contractor shall maintain the cover tightly in place by using sandbags or tires on ropes with a minimum 10-foot grid spacing in all directions. All seams shall be taped or weighted down full length. There shall be at least a 12-inch overlap of all seams.

D. The Contractor shall be responsible to immediately repair all damaged areas.

3.6 EXISTING DRAINAGE FACILITIES

A. Should a storm sewer or culvert become blocked or have its capacity restricted due to discharge siltation from Contractor's operations, the Contractor shall make arrangements with the jurisdictional agency for the cleaning of the facility at the Contractor’s expense.

3.7 DRAINAGE DIVERSION

A. Contractor shall divert the surface runoff water around the site as may be required.

B. Drainage shall be restored to condition existing prior to construction unless otherwise shown on the Drawings.

*** * * END OF SECTION 02275 * * ***

# SECTION 02575
# PAVEMENT REPAIR AND RESURFACING

## 1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Traffic Regulation: Section 01570
B. Demolition: Section 02050
C. Site Clearing: Section 02110
D. Excavation, Backfilling, and Compacting for Utilities: Section 02222
E. Concrete: Section 03300

1.2 QUALITY ASSURANCE

A. Qualifications of Asphalt Concrete Producer: Use only materials which are furnished by a bulk asphalt concrete producer regularly engaged in production of hot-mix, hot-laid asphalt concrete.

B. The cost of all special inspections shall be borne by the Contractor where applicable.

1.3 PAVING QUALITY REQUIREMENTS

A. General: In addition to other specified conditions, comply with following minimum requirements:

1. Comply with requirements of Road Agency having jurisdiction.
2. Provide final surfaces of uniform texture, conforming to required grades and cross-sections.
3. Patches shall match existing grade and cross-section unless otherwise directed by the Road Agency.

B. Surface Smoothness:

1. Test finished surface of each asphalt concrete course for smoothness, using a 10 foot straight edge applied parallel to and at right angles to centerline of paved areas.

2. Surfaces will not be acceptable if exceeding 0.25 inch in 10 feet unless more rigid requirements are established by the Road Agency.

1.4 SUBMITTALS

A. Certify that materials comply with specification requirements.

B. Certificate to be signed by asphalt concrete producer and Contractor.

1.5 JOB CONDITIONS

A. Weather Limitations:

1. Construct only when temperatures are above minimum specified in State Highway Standard Specifications unless waived by Road Agency having jurisdiction.

2. Do not construct pavement or base when the base surface is wet or contains an excess amount of moisture which would prevent uniform distribution and the required penetration.

B. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.

C. Traffic Control:

1. Maintain vehicular and pedestrian traffic during paving operations, as required for other construction activities.

2. Provide flagmen, barricades, warning signs, and warning lights for movement of traffic and safety and to cause the least interruption of work.

3. See Section 01570 for additional requirements.

1.6 ROAD AND STREET RESTORATION REQUIREMENTS

A. The Contractor's responsibility as to road restoration shall include, but not be limited to, proper backfill and compaction of excavation, shaping and general restoration of the roadway, restoration of public and private improvements when damaged by construction, restoration of drainage facilities, scarification of existing surfacing, if required, removal of debris and surplus material and all other requirements of these Specifications. In addition, upon completion of the above restoration, backfill gravel and crushed gravel or crushed rock surfacing shall be placed where required, in the opinion of the Engineer.

B. Unless otherwise specifically authorized by the authority responsible for the roadway, the final grade and cross-section shall conform to applicable Road Agency standard cross sections. In case of existing private roads, they shall conform to the roadway that existed prior to construction. The removal and disposal of existing materials necessary to fulfill the above requirements shall be considered incidental to the construction and the costs thereof shall be included in the items for which payment is provided.

C. Manhole rings, valve boxes and monument cases shall be adjusted as necessary to be flush with the restored surface.

D. The Contractor shall comply with all requirements of all permits for installation of pipelines in authorized rights-of-way.

E. The Contractor will place and maintain sufficient and proper lights and barricades at all locations on roads not accepted by the Road Agency involved.

F. After completion of pipeline installation the Contractor shall clean up drainage ditches and restore all existing drainage structures that may have been damaged during the course of construction. The Contractor shall also comply with all drainage requirements of the agency involved upon which the agency's acceptance of the roads is conditioned.

G. The Contractor shall restore any private improvement on road rights-of-way including, but not limited to, culverts, driveways, curbs, sidewalks, parking strips, parking areas, or other permanent improvements, whether or not a permit for such improvements has been obtained.

H. All streets in the construction area as well as any unpaved streets used by Contractor's trucks or any other equipment hauling material to and from the area, whether within the construction area or adjacent thereto, and any unpaved streets used as detours during the construction shall be serviced with continuous use of sprinkler trucks to control the dust. The cost thereof shall be included in the various items for the improvements. The sprinkling of the dust on roads or streets will continue until accepted by the Road Agency or the roads or streets have been graveled or resurfaced. All streets, when required, shall be sprinkled at least twice daily.

I. It is specifically understood and agreed that the Contractor is responsible for complying with all requirements of the Road Agency necessary to obtain written acceptance of the roads by the agency concerned, and for such work the Contractor will be paid only for the items included in this Contract.

J. Until accepted in writing by the Road Agency, the Contractor will maintain all roads in a condition satisfactory to the agency concerned. This shall include periodic grading of all streets on which traffic is allowed wherever in the opinion of the Engineer, such grading is required. A suitable motor grader shall be available for this work.

K. Any settlement which occurs during the first year after final contract acceptance shall be repaired by the Contractor at own expense.

## 2. PRODUCTS

2.1 CRUSHED SURFACING

A. Crushed surfacing shall be manufactured from ledge rock, talus, or gravel. The materials shall be uniform in quality and substantially free from wood, roots, bark, and other extraneous material.

B. Crushed surfacing shall meet the following requirements for grading and quality:

| Sieve Size Square Opening | Percent Passing by Weight |
|---|---|
| 1 inch | 100 |
| 3/4 | 70-100 |
| 3/8 | 50-80 |
| No. 4 | 35-65 |
| No. 10 | 25-50 |
| No. 40 | 15-30 |
| No. 200 | 0-10 |

C. The portion of crushed aggregate retained on a No. 10 sieve shall have a minimum of 75% of the particles with at least one fractured face.

D. The portions passing the No. 40 sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 6.

E. The portions passing No. 10 sieve shall have a percentage of wear of not greater than 35% when tested in the Los Angeles machine.

2.2 ASPHALT CONCRETE PAVEMENT

A. Asphalt-concrete pavement shall conform to the Technical Requirements of the state highway department in which the project is located for plant mix asphalt concrete unless otherwise set forth herein.

2.3 ASPHALT TREATED BASE

A. Asphalt treated base shall conform to the Technical Requirements of the state highway department in which the project is located for asphalt treated base.

2.4 HMA CLASS ½" MINUS OVERLAY

A. Asphalt Concrete Pavement: Asphalt Concrete for Pavement shall be Hot Mix Asphalt (HMA) Class ½" PG 64-22. Asphalt concrete shall be manufactured and mixed in accordance with the requirements of Section 5-04 of the Washington State Department of Transportation (WSDOT) Standard Specifications.

## 3. EXECUTION

3.1 GENERAL PAVEMENT REPAIR REQUIREMENTS

A. Pavement patching shall be scheduled to accommodate the demands of traffic and shall be performed as rapidly as possible to provide maximum safety and convenience to public travel.

B. The placing and compaction of the trench backfill, and the preparation and compaction of the subgrade shall be in accordance with the requirements of Section 02222 of these Specifications.

C. Prior to trench excavation in pavement surfaces, straight vertical trim lines shall be cut in order to minimize breakage and cracking of the remaining surfacing. Pavement shall be saw cut in a neat line a minimum of one (1) foot on either side of the trench width.

D. Before the patch is constructed all pavement cuts shall be trued so that the marginal lines of the patch will form a rectangle with straight edges and vertical faces.

E. After completion of the patches, the entire roadway surface shall be cleaned by brooming, flushing, or such other methods as may be required. The early completion of this phase of the restoration is required, not only to facilitate public relations, control dust and traffic problems, but also to prevent the further break-up and cracking of the existing asphalt mat. If, in the opinion of the Engineer, the Contractor is not diligently pursuing the work in such a manner as to place the patch as soon as reasonably possible, the Contractor may be required to retrim and remove any and all cracked areas in such a manner to produce a straight uniform edge.

F. Finished grade and cross section of patch shall match grade and cross-section of existing pavement.

G. All incidental work required to complete the patching of street surfaces as specified, including joints where required, shall be considered as incidental to the patching.

## 3.2 ASPHALT CONCRETE TRENCH PATCH

A. Preparation:

1. As soon after compacting the trench backfill and placing and compacting backfill gravel, where required, the Contractor shall place and compact crushed surfacing in the trench area to a minimum depth of four (4) inches or depth to match the original cross-section, whichever is greater.

2. A tack coat of asphalt applied at the rate of 0.02 to 0.08 gallon per square yard of retained asphalt shall be applied through the use of mechanical equipment to all surfaces on which any course of asphalt concrete is to be placed or abutted. The spreading equipment shall be capable of uniformly distributing asphalt materials over any area in controlled amounts and shall be equipped with hand operated spray equipment for use only on inaccessible and irregularly shaped areas.

3. The tack coat shall be a heated cutback asphalt, or emulsified asphalt, mixing grade. The emulsified asphalt may be mixed with water at the rate of 1 to 2 parts water to 1 part of emulsified asphalt.

B. Two Lift Patch:

1. Immediately after completion of placing the base the Contractor shall place a two inch minimum compacted thickness of asphalt concrete surfacing. The final surface of this lift shall be not lower than 1/2 inch below the existing surface.

2. If the existing pavement is more than two inches, the first lift of asphalt concrete shall be of the same depth as the existing pavement.

3. When ordered by the Owner or when required herein, the Contractor shall begin the placement of the second lift. A tack coat shall be placed over the patch area. Asphalt concrete modified so that maximum size aggregate is 1/2 inch shall be placed over the tack coat. Prior to rolling, the aggregate in the asphalt concrete shall be hand raked back from the edges and rolled in such a manner to produce a uniform "feather" edge over the existing surface. The minimum compacted thickness of the second lift over the trench area shall be one inch.

4. Where excess settlement of the first patch occurs, a leveling course shall be used to prevent the thickness of the second lift from exceeding two inches.

5. The edge of the patch shall be sealed by painting with a cutback asphalt or SS-1 emulsion and immediately covered with sand and heated.

C. Single Lift Patch:

1. Immediately after completion of placing the base the Contractor shall place a two-inch minimum thickness of asphalt concrete surfacing.

2. If the existing pavement is more than two inches the asphalt concrete shall be of the same depth as the existing pavement.

3. The edge shall be hand raked to produce a smooth edge where the patch abuts the existing pavement.

4. The thickness shall be adjusted so that a smooth uniform grade exists after rolling.

5. The edge of the patch shall be sealed by painting with a cutback asphalt or SS-1 emulsion and immediately covered with sand and heated.

3.3 CEMENT CONCRETE PAVEMENT PATCH

A. After the subgrade for the pavement has been compacted and constructed to line and grade, the cement concrete pavement patch shall be placed, compacted and struck off to the grade of the adjacent pavement.

B. Minimum thickness shall be eight inches or the thickness of the existing pavement plus two inches, whichever is greater.

C. Through and dummy joints shall be placed and edged to match existing joints.

D. The surface shall be finished and brushed with a fiber brush.

E. Approved curing compound shall be placed on the finished concrete immediately after finishing.

3.4 ASPHALT CONCRETE OVERLAY

A. Before construction of an asphalt concrete pavement overlay on an existing surface, all fatty asphalt patches, grease drippings, and other

objectionable matter shall be removed from the existing pavement. Excess asphalt joint filler shall be removed and premolded joint filler shall be removed to at least one-half inch below the surface of the existing pavement. Existing pavement or bituminous surfaces shall be thoroughly cleaned by sweeping to remove dust and other foreign matter.

B. Prior to placing asphalt concrete, a tack coat shall be applied using a heated cut back asphalt or emulsified asphalt at the rate of 0.02 to 0.05 gallons per square yard.

C. When the surface of the existing pavement or old base is irregular, it shall be brought to uniform grade and cross section as required by the Road Agency involved. Preleveling of uneven or broken surfaces over which asphalt concrete is to be placed is required and may be accomplished by the use of asphalt concrete placed with a motor patrol grader, a paving machine, by hand raking, or by a combination of these methods. After placement, the asphalt concrete used for preleveling shall be compacted with rollers.

D. When asphalt concrete pavement is to be constructed over an existing paved or oiled surface, in addition to the preparation as outlined hereinbefore, all holes and small depressions shall be filled with an appropriate class of asphalt concrete mix. The surface of the patched area shall be leveled and compacted thoroughly. All previous patches that have settled shall be preleveled so that depth of overlay does not exceed two inches in thickness.

E. After preparation of the base a one inch minimum compacted full width layer of asphalt concrete shall be placed on top of an existing paving surface. Surfacing shall be placed in such a manner as to prevent disturbing existing drainage. Surfacing shall be feathered out as required to meet existing driveways, catch basins, traffic control pads, street intersections, etc., and shall include thickened edge paving where it is now existing.

F. The edges of the overlay shall be sealed by painting with a cutback asphalt or SS-1 emulsion and immediately covered with dry sand and heated.

## 3.5 BITUMINOUS SURFACE TREATMENT REPLACEMENT

A. Unless otherwise specified, all light bituminous surface treatment shall be replaced with a one inch asphalt concrete overlay over a crushed surfacing base.

B. Base shall consist of four inches of crushed surfacing.

3.6 CRUSHED SURFACING

A. Existing crushed surfacing shall be replaced with new material.

B. Thickness of course shall be as directed by the Owner.

C. When the utility line is along the shoulder of a roadway, the Contractor may be directed to place a course of crushed surfacing along shoulder of the roadway. Thickness shall be as required by the Road Agency.

D. During dry periods, the Engineer may require water sprinkling prior to and during the placement of crushed surfacing. The cost of such sprinkling shall be included in the unit bid for crushed surfacing.

3.7 TEMPORARY TRENCH PATCH

A. The Contractor may be required to furnish and install a temporary trench patch only when specifically directed by the Owner or as provided on the Plans.

B. Area to be patched shall be cleaned out and graded to the bottom of the base course. Any loose asphalt shall be removed.

C. Place a patch consisting of 2-inch minimum course of crushed surfacing base and a 2-inch minimum course of cold asphalt plant mix placed over the trench area.

D. Both the base and surface course shall be placed and compacted so that the finished surface will match the grade and cross-section of the existing pavement.

E. Surface of pavement shall be cleaned of all dirt and debris before opening to traffic.

F. The Contractor shall maintain temporary patch until the permanent patch is installed.

3.8 CEMENT CONCRETE CURBS AND GUTTERS

A. Constructed with air entrained concrete.

B. Side forms shall rest throughout their length on firm ground and shall be full depth of the curb. They shall be either metal of suitable gauge for the work or surfaced "construction" grade lumber not less than two (2) inches (commercial) in thickness. Forms shall be cleaned and well oiled prior to use. Forms used more than one time shall be cleaned thoroughly and any

forms which have become worn, splintered, or warped shall not be used again. Forms shall be adequately supported to prevent deflection or movement.

C. The foundation shall be watered thoroughly before the concrete is placed.

D. Concrete shall be well tamped and spaded or vibrated in the forms.

E. Exposed surfaces shall be finished full width with a trowel and edger. Remove forms of all roadway face of curbs within 24 hours of placement of concrete and treat with a float finish. The top and face of the curb shall receive a light brush finish and the top of the gutter shall receive a broom finish.

F. Joints shall be spaced to match joints in the abutting pavement. If the abutting pavement is not jointed or the curb or gutter is not abutting pavement, joints in the curb and gutter shall be spaced at 15 foot intervals. These joints shall be 1/8 inch minimum thickness and constructed to a minimum depth of 1 inch by sawing or scoring with a tool which leaves the corners rounded and destroys aggregate interlock to a depth specified. Expansion joints, filled to full cross-section with filler 1/4 inch thick shall be placed in the curb and gutter to match joints in the abutting pavement, at structures, curb returns and where shown in the plans.

G. Curing and cold weather and hot weather placement shall be in conformance with Section 03300.

H. Curb and gutter may be constructed by the use of slip-form equipment provided the completed curb or gutter retains its shape, grade, and line. Finishing, joints, and curing shall be as provided above.

I. Top of the form shall not depart from grade more than 1/8 inch when checked with a 10 foot straight edge. Alignment shall not vary more than 1/4 inch in 10 feet.

## 3.9 ASPHALT CONCRETE CURBS AND GUTTERS

A. Placed, shaped and compacted true to line and grade with machine capable of shaping and compacting the materials to the required cross section.

B. Provide tack coat of asphalt applied to the surface upon which asphalt concrete curb is to be placed immediately prior to placing of curb.

## 3.10 CEMENT CONCRETE SIDEWALKS

A. The concrete in the sidewalks shall be air entrained concrete in accordance with the requirements of Section 03300.

B. Forms shall be of wood or metal and shall extend for the full depth of the concrete. All forms shall be straight, free from warp and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

C. The foundation shall be brought to the grade required and well wetted before placing the concrete.

D. Place concrete in the forms and strike off with a heavy iron-shod straight edge, trowel surface smooth with a steel trowel as soon as surface can be worked. After troweling and before jointing or edging, the surface of the walk shall be lightly brushed in a transverse direction with a soft brush. On grades of over 4%, the surface shall be finished with a stipple brush.

E. Joints shall be constructed at the locations and of the sizes as indicated in the plan.

F. Cured for at least 72 hours by means of moist burlap or quilted blankets. Exclude all traffic, both pedestrian and vehicular, during curing period.

## 3.11 PAVEMENT MARKINGS

A. The Contractor shall restore any and all pavement striping and traffic buttons damaged during construction under this Contract.

B. Restoration shall be in accordance with the current standards of the Road Agency involved.

C. Cost of restoration of pavement striping and traffic buttons shall be incidental to pavement restoration or as otherwise directed.

## 3.12 ADJUSTING MANHOLES TO GRADE

A. The Contractor shall adjust manhole castings to final grade by adding brick and/or mortar under the casting and patching with asphalt concrete. Paving adjusting rings will not be allowed.

B. The Contractor shall exercise extreme care in preventing foreign material from entering the manhole.

C. All manholes shall be adjusted to grade after the asphalt concrete surfacing has been placed. Disturbed area around cover shall be patched and sealed to the satisfaction of the Road Agency having jurisdiction.

D. The Contractor shall take care not to extend the manholes above finished grade.

3.13 ADJUSTING MONUMENT CASES AND VALVES BOXES TO GRADE

A. Monument cases and/or valve boxes shall be adjusted to final grade and patched with asphalt concrete.

B. Adjustment shall be made after the resurfacing.

C. Patching around monument cases and/or valve boxes shall be done to the satisfaction of the Road Agency having jurisdiction.

D. Valve boxes shall be adjusted to the satisfaction of the utility having jurisdiction.

E. The Contractor shall take care not to extend the monument cases and/or valve boxes above the finished grade.

*** * * END OF SECTION 02575 * * ***

# SECTION 02605
# MANHOLES AND CLEANOUTS

## 1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Construction Observation Services: Section 01420
B. Shoring: Section 02150
C. Excavating, Backfilling and Compacting for Utilities: Section 02222
D. Sanitary Sewer: Section 02730

1.2 QUALITY ASSURANCE

A. Testing By Manufacturer:

1. Manufacturer shall test all material as required by these Specifications and the Standards referenced.

2. Manufacturer shall submit to the Engineer two (2) copies of all test results which shall include a certification that materials to be delivered are represented by the samples tested and that such delivered materials meets or exceeds the specification requirements.

3. No material shall be delivered until test results and certifications are in the possession of the Engineer.

4. The Engineer shall have free access to all testing and records pertaining to materials to be delivered to the job site.

5. The Engineer may elect to be present at any or all material testing operations.

1.3 SUBMITTALS

A. The submittal of shop drawings, project data and samples shall be consistent with Section 01340.

B. Submittals required include the following:

1. Precast manhole
2. Frames and covers
3. Wall penetrations
4. Joint seals
5. Grout
6. Waterproofing
7. Manhole steps and ladders

8. Cleanout frames and covers
9. Drop manhole connections and appurtenances
10. Manhole pipe entry couplings

## 2. PRODUCTS

2.1 PRECAST MANHOLES

A. Precast concrete manholes shall conform to the requirements of ASTM C478 except as specifically modified herein.

B. Joints between precast elements used for sanitary sewers shall be tongue and groove designed to accommodate a rubber gasket joint similar to pipe joints conforming to ASTM C443. Design of joints shall be approved by the Engineer before manufacture. Shop drawings shall be submitted for review. Variations in joint dimensions shall meet the gasket design requirements but shall in no case be more than the minimum requirement of ASTM C478.

C. Joints between precast sections used for storm sewers may be rubber gasketed or cement mortar.

D. Base sections shall be made with the base slab integral with the wall in such a manner to achieve a completely watertight structure. Design of base shall be in accordance with the following table for all manholes up to 25 feet deep using Grade 60 reinforcing steel.

| Manhole Inside Diameter | Minimum Base Thickness | Minimum Steel-Sq.In/LF Both Directions | |
|---|---|---|---|
| | | Separate Base | Base Integral With Wall |
| 48" | 6" | 0.23 | 0.15 |
| 54" | 8" | 0.19 | 0.19 |
| 72" | 8" | 0.35 | 0.24 |
| 96" | 12" | 0.39 | 0.29 |

E. Proportion of Portland cement in concrete mixture shall be not less than 564 pounds per cubic yard of concrete.

F. Openings to receive pipes shall be circular, and shall be sized to equal the outside diameter of the pipe to be inserted in the joint plus the manhole wall thickness.

G. The manufacturer may produce each manhole riser and base in one section if approved by the Engineer.

H. Cones with diameter at small end of 36 inches shall be not less than 24 inches in height. Cones with a diameter at the small end of 24 inches shall be not less than 17 inches in height.

I. The openings in the top slab shall be eccentrically located so as to provide at least 6 inches minimum radial distance from the edge of the opening to the outer edge of the slab but not more than 2.5 inch off-set distance from the edge of the opening to the inside face of the standard section.

J. Unless otherwise provided, steps shall be installed in each section so that sections placed together in any combination will provide a continuous vertical ladder.

2.2 MANHOLE PIPE ENTRY COUPLINGS

A. Manhole entry coupling for PVC pipe connections to manholes shall provide a watertight joint and utilize a rubber ring to seal against the pipe. The coupling's exterior surface shall be sand impregnated epoxy or similar rough surface to insure adhesion with the mortar.

B. Resilient connectors conforming to ASTM C923 may be used at the Contractor's option. Such connectors shall not be cast-in-place in precast structures.

2.3 DROP MANHOLES

A. Drop manholes shall be an inside drop only as specified and constructed in accordance with the Standard Details.

B. One length of ductile iron pipe shall be provided outside the manhole, to reach original solid bearing ground.

C. An inside drop shall be fabricated with polyvinyl chloride pipe as detailed on the details.

D. All inside drop manholes shall have, at a minimum, 54-inch inside diameter.

2.4 MANHOLE STEPS AND LADDER

A. Conform to applicable requirements of ASTM C478 and as shown on the Standard Details.

B. Conform to OSHA or WISHA requirements, whichever is more stringent.

C. Designed so that foot cannot slide off the ends.

D. Vertical spacing at 12 inches. The first step shall be not less than 6 inches or greater than 18 inches below grade.

E. Project uniformly inside wall.

F. Steps shall be steel reinforced polypropylene. The reinforcement shall be 1/2 inch Grade 60 deformed reinforcing bar per ASTM A

615. Polypropylene shall conform to ASTM D-4101.

G. Design utilizing other materials or shapes that conform to the requirements of this specification may be used upon written approval of the Engineer.

H. Step dimensions and pattern shall conform to the Standard Details.

I. Ladders: Base sections of precast manholes shall be provided with a ladder made of steel reinforced polypropylene and shall conform to the Standard Details. Ladder shall be adjusted so that it is in line with manhole steps above and extends out the same distance from the wall as the steps above. Ladder shall be securely imbedded and grouted into manhole shelf. Ladder rungs shall be reinforced with 1/2 inch Grade 60 reinforcing bar per ASTM A-615. Ladder rails shall be reinforced with 9/16 inch cold drawn bar per ASTM C1018. Polypropylene shall conform to ASTM D-4101.

2.5 CAST METAL FRAMES AND COVERS

A. Conform to Manhole Frame and Cover Detail

B. Frames shall be gray-iron conforming to the requirements of AASHTO M105 (ASTM A48), Grade 30B. Covers shall be cast iron conforming to ASTM A536, Grade 80-55-06.

C. Be free of porosity, shrink cavities, cold shuts, or cracks or any surface defects which would impair serviceability.

D. Repair of defects by welding, or by the use of "smooth-on" or similar material will not be permitted.

E. Manufacturer shall certify that the product conforms to the requirements of these specifications.

F. Apply a bituminous coating to all surfaces. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun, and shall be strongly adherent to the casting.

G. The Owner shall have the right to require inspection and approval of all castings prior to painting.

H. Machine finish the horizontal seating surface and inside vertical recessed face of the frame, and the horizontal seating surface and vertical outside edge of the cover to the following tolerances.

1. Frame +3/32 inch to -3/32 inch. Cover +3/32 inch to -3/32 inch.

2. Cover shall not rock when it is seated in any position in its frame.

3. There shall be not more than 3/16 of an inch side play in any direction between the cover and the frame when any cover is placed in any position in its frame. All covers shall be interchangeable within the dimensions shown on the details.

I. All frames and covers shall be identified by the name or symbol of the manufacturer in a plainly visible location when the frame and cover is installed. In addition to the manufacturer's identification, when ductile iron is furnished, the material shall be identified by the notation "DUC" or "DI". The manufacturer's identification and the material identification shall be adjacent to each other and shall be minimum 1/2-inch to maximum 1-inch high letters recessed to be flush with the adjacent surfaces.

J. Cover shall have type of service indicated on cover with two inch raised letters such as WATER, SEWER OR DRAIN.

K. Cover shall be the bolt-down type with separate provision for lifting/removal per detail.

2.6 CLEANOUT FRAMES AND COVERS

A. Conform to Sewer Cleanout Detail

2.7 MANHOLE COLLAR

A. Manhole collar shall be constructed of ½-inch Hot Mix Asphalt (HMA).

B. Collar shall extend vertically from grade (top of cover elevation) to bottom of highest adjustment ring. Collar shall extend a minimum of 12 inches measured radially beyond the manhole cover frame.

2.8 MANHOLE JOINT ENCAPSULATION

A. All manhole joints, including riser sections, shall be encapsulated using Best Seal Wrap or approved equal.

## 3. EXECUTION

3.1 MANHOLE INSTALLATION

A. Manholes sections shall be constructed of precast units. Bases shall be constructed of precast units or cast-in-place concrete.

B. Foundations:

1. Adequate foundations for all manhole structures shall be obtained by removal and replacement of unsuitable material with well graded granular material, or by tightening with coarse ballast rock, or by such other means as provided for foundation preparation of the connected sewers.

2. Where water is encountered at the site, all cast-in-place base shall be placed on a one-piece waterproof membrane to prevent any movement of water into the fresh concrete.

3. Place base on a well-graded granular bedding course conforming to the requirements for sewer bedding, not less than 4 inches in thickness and extending either to the limits of the excavation or to a minimum of 12-inches outside the outside limits of the base section. In the latter case, the balance of the excavated area shall be filled with select material, well tamped to the level of the top of the bedding to positively prevent any lateral movement of the bedding when the weight of the manhole is placed upon it.

4. Bedding course shall be firmly tamped and made smooth and level to assure uniform contact and support of the precast elements.

C. Precast Base Section:

1. Place on the prepared bedding so as to be fully and uniformly supported in true alignment.

2. Make sure that all entering pipes can be inserted on proper grade.

D. Cast-in-place Bases:

1. At least 6 inches in thickness. Extend at least 6 inches radially outside of the manhole wall.

2. Concrete shall have minimum of 4000 psi 28-day compression strength.

3. Place first precast section on the cast-in-place base structure before the base has taken initial set and adjust to true grade and alignment with all inlet pipes installed so as to form an integral, watertight unit or mortar the section into a suitable groove provided in the top of the cast-in-place base.

4. The first section shall be uniformly supported by the base concrete, and shall not bear directly on any of the pipes.

E. Precast Sections:

1. Placed and aligned to provide vertical sides and vertical alignment of the ladder rungs.

2. The completed manhole shall be true to dimensions, and watertight.

3. Lift holes and all joints between precast sections shall be thoroughly wetted and then be completely filled with mortar, smoothed and pointed both inside and out to ensure watertightness.

4. Steel loops must be removed and the remaining void shall be covered with mortar, smoothed and pointed.

5. All joints shall be grouted inside and out and encapsulated with Best Seal Wrap or approved equal. The encapsulation material shall be placed and installed in strict accordance with the manufacturer's recommendations.

F. Pipe Connections:

1. Provide flexible joint at a distance from the face of the manhole of not more than 1-1/2 times the nominal pipe diameter or 12 inches, whichever is greater, for all rigid pipes entering or leaving any manhole.

2. No flexible joint shall be placed within 10 feet of the manhole wall, when flexible pipe is used.

3. Firmly compact bedding under pipe within the area of the manhole excavation.

4. Openings through which pipes enter the structure are completely and firmly rammed full of mortar to ensure watertightness.

5. Provide a watertight joint where flexible PVC pipe enters the manhole wall by utilizing a manhole entry coupling that is mortared into the wall.

Where resilient connectors are used, the Contractor shall extend the channel into the connector to insure pipe support and a watertight joint. Resilient connectors shall be installed in accordance with the manufacturer's requirements.

G. Channels:

1. Constructed in field.
2. Conform accurately to the sewer grade and bring together smoothly with well rounded junctions.
3. Channel sides shall be carried up vertically to the crown elevation of the various pipes, and shall be the full diameter of the pipe.
4. Shelf between channels shall be constructed with concrete and smoothly finished and warped evenly with slopes to drain.
5. All channels shall be finished to a "plaster-smooth" texture.

H. Manhole Cover:

1. Final elevation and tilt of cover shall conform to the restored street surface unless otherwise specified.
2. Warping of surfacing to meet grade of castings will not be allowed.
3. Provide not less than 4 inches or more than 16 inches of grade rings between the top of the cone or slab and the underside of the manhole casting ring for adjustment of the casting ring to street grade or ground surface.
4. Both inside and outside of the grade rings shall have a smooth uniform mortar finish to ensure a watertight seal.

I. Backfill:

1. Extend around manhole and at least one pipe length into each trench.
2. Hand place and tamp selected backfill material up to an elevation of six inches above the crown of all entering pipes.

J. Manhole Collar:

1. Contractor shall install an asphalt collar of sufficient size around the neck and frame to hold assembly in place in traffic areas.

3.2 CONNECTIONS TO EXISTING MANHOLES

A. The Contractor shall verify the existing manhole invert elevations prior to construction.

B. Keep the manhole in operation at all times and take precautions necessary to prevent any debris or other materials from entering the sewer.

C. Contractor may be required to install a tight pipeline bypass through the existing channel. If the connection is to a dead end manhole, the outlet shall be plugged watertight with a metal mechanical screw type plug. Plug shall be secured to the ladder with a rope or chain.

D. Bring laterals into the existing manhole so that the crowns of the two incoming pipes are at the same elevation unless otherwise specified.

E. Reshape the existing base to provide a channel equivalent to that specified for a new manhole.

F. The Contractor shall be responsible for repairing all damage to the manholes resulting from project operations.

3.3 CLEANOUTS

A. Sewer cleanouts shall be constructed as shown on the standard plan.

B. All materials incorporated into the cleanout structure shall meet the requirements of the various applicable sections of these specifications.

C. Pipe joints shall be the type specified for sewer pipe used.

D. The trench excavation shall be made in such a manner as to provide an undisturbed base upon which the pipe shall be placed.

E. Bedding around and under the pipe shall be tamped.

*** * * END OF SECTION 02605 * * ***

# SECTION 02610
# PIPE AND FITTINGS

## 1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Inspection Services: Section 01420
B. Excavating, Backfilling and Compacting for Utilities: Section 02222
C. Sanitary Sewers: Section 02730
D. Sewer Force Mains: Section 02732

1.2 QUALITY ASSURANCE

A. Testing by Manufacturer:

1. Manufacturer shall test all materials as required by these Specifications and the standards referenced.

2. Manufacturer shall submit to the Engineer two (2) copies of all test results which shall include a certification that materials to be delivered are represented by the samples tested and that such delivered materials meet or exceed the specification requirements.

3. No material shall be delivered until test results and certifications are in the possession of the Engineer.

4. Engineer shall have free access to all testing and records pertaining to material to be delivered to the job site.

5. The Engineer may elect to be present at any or all material testing operations.

B. Joint tests are intended for qualification of joint design and shall be considered to be a qualification test to establish the adequacy of the manufacturer's joint design. The manufacturer shall certify that tests have been performed within the last year with pipes equivalent in size and design and that they have passed the test enumerated in the specifications. Tests may be waived for pipes of different strength class if joint design is the same as the pipe tested.

1.3 SUBMITTALS

A. The submittal of shop drawings, project data and samples shall be consistent with Section 01340.

B. Submittals required include the following:

1. Pipe as noted on the drawings
2. Flexible couplings
3. Tee or Wye Fittings

## 2. PRODUCT

2.2 POLYVINYL CHLORIDE (PVC) PRESSURE PIPE (4 INCHES AND OVER)

A. Conform to AWWA C900.

B. Outside diameter equal to ductile iron pipe and with gasket bell ends.

C. Minimum wall thickness shall be equal to or greater than dimension ratio (DR) of 18 (150 psi) unless otherwise specified.

D. Joints shall conform to ASTM D3139 using a restrained rubber gasket conforming to ASTM F477.

E. All PVC water pipe shall be considered flexible conduit.

2.5 FLEXIBLE COUPLINGS

A. Use for connection between plain end pipe of same or different material.

B. Sleeve: Gray iron ASTM A126 Class B or ductile iron ASTM A536. Ends have a smooth inside taper for uniform gasket seating.

C. Followers: Ductile iron ASTM A536.

D. Gaskets: Grade 30 specially compounded rubber of all new materials.

E. Bolts and nuts: High strength low alloy steel with heavy, semi-finished hexagon nuts to AWWA C111 (ANSI-A21.11).

2.6 POLYVINYL CHLORIDE (PVC) SEWER PIPE

A. Conform to ASTM D3034, SDR 35, or ASTM F789.

B. Joints shall conform to ASTM D3212 using a restrained rubber gasket conforming to ASTM F477.

C. Fittings shall be injection molded tees or factory solvent welded saddle tees. Saddles fastened to pipe with external bands are not acceptable on any new system, unless specifically approved by the Engineer.

D. All PVC sewer pipe shall be considered flexible conduit.

E. Maximum size - 15 inches.

F. Solvent welded joints will not be allowed.

2.7 TEE FITTINGS FOR SEWERS

A. Unless otherwise specified, all tee connections shall be 6 inches inside diameter and shall be factory made.

B. All fittings shall be the same material as the pipe, unless otherwise specified. Cast iron fittings may be used for ductile iron pipe.

C. Fittings shall have sufficient strength to withstand handling and load stresses normally encountered.

D. All fittings shall be sealed with plugs of same material as the pipe and gasketed with the same gasket material as the pipe joint.

2.8 CLEANOUTS, CLEANOUT TEES, AND CAST IRON LIDS

A. Cleanouts and cleanout tees and wyes shall be constructed out of PVC pipe and fittings conforming to Section 02610.

B. Cast iron lid shall be heavy duty, rated for H-20 traffic loading, round with the label “Cleanout”.

## 3. EXECUTION

3.1 INSTALLATION

A. Install pipe in accordance with specification section for pipeline being installed.

*** * * END OF SECTION 02610* * ***

# SECTION 02730
# SANITARY SEWERS

## 1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Inspection Services: Section 01420
B. Dewatering: Section 02140
C. Shoring: Section 02150
D. Excavating, Backfilling and Compacting for Utilities: Section 02222
E. Manholes and Cleanouts: Section 02605
F. Pipe and Fittings: Section 02610
G. Sewer Force Mains: Section 02732
H. Existing Utilities/Facilities-Underground and Overhead: Section 02760

1.2 QUALITY ASSURANCE

A. Testing Before Acceptance:

1. The Engineer may require that the first section of pipe, not less than 300 feet in length, installed by each of the Contractor's crews be tested in order to qualify the crew and/or the materials.

2. Pipelaying shall not be continued more than an additional 300 feet until the first section shall have been tested successfully.

B. Final Acceptance:

1. Prior to final inspection all pipelines shall be flushed and cleaned and all debris removed.

2. Before sewer lines are accepted, all lines shall be tested as specified herein and inspected for line and grade by checking each section between manholes for alignment. A full circle of light shall be seen by looking through the pipe at a light held in the manhole at the opposite end of the section of sewer line being inspected.

3. All lines shall be tested for leakage.

4. Deflection test shall be performed on all flexible pipe.

5. Owner will perform, at the Contractor’s expense, a TV inspection.

6. Any corrections required shall be made at the expense of the Contractor and the line retested.

1.3 PROTECTION OF LIVE SEWERS

A. All existing live sewers including septic tanks and drain fields shall remain in service at all times. Adequate provision shall be made for disposal of existing sewage flow if any existing sewers are damaged.

B. Any damage to the Owner's existing system shall be repaired to a condition equal to or better than that existing prior to the damage at no cost to the Owner.

C. The existing system is discharged through some sewers with flat grades and in some cases through lift stations. All water accumulating during construction shall be removed from the new sewers and shall not be permitted to enter the existing system. The Contractor will be required to flush out the existing lines and/or repair lift stations or other facilities if gravel, rocks or other debris are permitted to enter the existing lines.

D. The physical connection to an existing manhole or sewer line shall not be made until so authorized by the Owner. This authorization will not be given until all upstream lines have been completely cleaned, all debris removed, and where applicable, a pipe temporarily placed in the existing channel and sealed.

1.4 USE OF SEWERS PRIOR TO COMPLETION

A. The Owner hereby reserves the right to make use of any portion of the work prior to completion of the entire Contract without constituting acceptance of any of the work.

1.5 SUBMITTALS

A. The submittal of shop drawings, project data and samples shall be consistent with Section 01340.

B. Submittals required include the following:

1. Bedding material
2. Import backfill material

**2. PRODUCTS**

2.1 BEDDING MATERIALS

A. Refer to Section 02222.

2.2 GENERAL REQUIREMENTS FOR PIPE MATERIAL

A. Pipe used for sewer construction may be polyvinyl chloride (PVC) or ductile iron as specified in Section 02610 unless otherwise provided.

B. All pipe shall have flexible watertight joints utilizing rubber gaskets.

C. All pipe shall meet the minimum strength requirements as specified for concrete pipe unless otherwise provided. Any rigid pipe material substituted for the class specified shall have a minimum three edge strength equal to or greater than that of the concrete pipe class indicated. Flexible pipe of the class specified herein or on the drawings shall be considered equivalent in load supporting capacity to rigid pipe as indicated, unless otherwise specified.

D. When ductile iron pipe is specified, no substitute is permitted.

## 3. EXECUTION

3.1 SURVEY LINE AND GRADE

A. The Contractor shall constantly check line and grade of the pipe and in the event they do not meet specified limits, the work shall be immediately stopped, the Engineer and the Owner's Representative notified, and the cause remedied before proceeding with the work.

3.2 BEDDING

A. Proper preparation of foundation, placement of foundation material where required, and placement of bedding material shall precede the installation of all sewer pipe. This shall include the necessary preparation of the native trench bottom and/or the top of the foundation material as well as placement and compaction of required bedding material to a uniform grade. Backfill material around the pipe will be placed in a manner to meet requirements specified herein.

B. Bedding specified for rigid pipe is in Section 02222, 2.2 (A) and shall be installed as described in Section 02730, 3.2 (G) – Class B.

C. Bedding specified for flexible pipe is in Section 02222, 2.2 (B) and shall be installed as described in Section 02730, 3.2 (G) – Class B.

D. The pipe bedding shall be placed so that the entire length of the pipe will have full bearing on the bedding. No blocking of any kind shall be used to adjust the pipe to grade except when used with embedment concrete. Bell holes shall be dug to assure uniform support along the pipe barrel.

E. It may be necessary to change bedding classifications and the limits thereof during the progress of the construction, consistent with the requirements outlined under the definitions and requirements of the various classifications contained herein.

F. Where unauthorized excavation has been made below the established grade, the Contractor shall provide, place and compact suitable bedding material to the proper grade elevation at own expense.

G. Classification of Bedding:

1. Class A (Special Concrete Bedding) shall consist of a pipe cradle constructed of Portland cement concrete containing not less than four (4) sacks of cement per yard. Maximum aggregate size shall be 1/2 inches. Maximum slump shall be 4 inches. The Contractor shall protect pipe against flotation during the pouring of the concrete. The bottom of the trench shall be fully compacted before placement of pipe or cradle. Cradle construction shall conform to the Standard Details.

2. Class B (Normal Gravel Bedding) shall consist of the leveling of the bottom of the trench and/or the top of the foundation material at the appropriate elevation, and the furnishing and placing of bedding materials under the pipe and along the sides of the pipe. Minimum thickness of the layer of bedding material required under any portion of the pipe shall be six inches for all pipe sizes. Bedding shall extend up to 6 inches over the crown of the pipe. Bedding material shall be carefully placed and firmly compacted to provide a firm, uniform cradle for the pipe.

3. Class C (Shallow Gravel Bedding) shall meet the requirements outlined for Class B bedding except that bedding material need be placed only to the lower quadrant of the pipe. This type of bedding will be used only where specifically designated on the Plans and only for shallow pipelines.

4. Class D (Native Bedding) shall consist of carefully excavating the trench to proper grade and placing select native material around the pipe. Native bedding, as described, shall be considered as incidental to the construction and all costs thereof are included in the unit contract price of the Contract. Native bedding shall be used only where specifically called for or specifically authorized by the Engineer.

## 3.3 PIPE LAYING

A. Laying of sewer pipe shall be accomplished to line and grade in the trench only after it has been dewatered and the foundation and/or bedding has been prepared.

B. Mud, silt, gravel and other foreign material shall be kept out of the pipe and off the jointing surfaces.

C. Variance from established line and grade shall not be greater than 1/32 of an inch per inch of pipe diameter, not to exceed 1/2 inch provided that such variation does not result in a level or reverse sloping invert; provided also, that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed 1/64 inch per inch of pipe diameter, 1/2 inch maximum.

D. The sewer pipe shall be laid upgrade from point of connection on the existing sewer or from a designated starting point. The sewer pipe shall be installed with the bell end forward or upgrade.

E. When pipe laying is not in progress the forward end of the pipe shall be kept tightly closed with a temporary plug.

F. As the pipe is installed, it shall be backfilled with the specified crushed rock bedding material up to an elevation 6 inches above the pipe crown, taking care that the backfill is in contact with the entire periphery of the pipe. The backfill shall be so carefully placed and firmly compacted that the subsequent backfilling operations will not disturb the pipe in any way.

G. Pipe branches, stubs or other open ends that are not to be connected immediately shall be plugged with approved material consistent with these Specifications and secured in place.

H. The markings on reinforced concrete pipe indicating the minor axis of the elliptical reinforcement shall be placed in a vertical plane (top of bottom) when the pipe is laid.

I. Install concrete anchors on sewers laid on slopes of 20% or greater in accordance with the Standard Details.

3.4 PIPE JOINTING

A. All extensions, additions and revisions of the sewer system, unless otherwise specified, shall be made with sewer pipe jointed by means of a flexible gasket which shall be fabricated and installed in accordance with these Specifications.

B. Pipe handling after the gasket has been affixed shall be carefully controlled to avoid disturbing the gasket and knocking it out of position, or loading it with dirt or other foreign material. Any gaskets so disturbed shall

be removed and replaced, cleaned and relubricated if required before the jointing is attempted.

C. Care shall be taken to properly align the pipe before joints are entirely forced home. During insertion of the tongue or spigot, the pipe shall be partially supported by hand, sling or crane to minimize unequal lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Since most flexible gasketed joints tend to creep apart when the end pipe is deflected and straightened, such movement shall be held to a minimum once the joint is home.

D. Sufficient pressure shall be applied in making the joint to assure that it is home, as described in the installation instructions provided by the pipe manufacturer. Sufficient restraint shall be applied to the line to assure that joints once home are held so, until fill material under and alongside the pipe has been sufficiently compacted.

E. At the end of the work day, the last pipe laid shall be blocked to prevent creep during "down time."

F. Pipe required to be laid on curved alignment shall be joined in straight alignment and then be deflected, joint by joint. Special care shall be taken in blocking the pipe just previously laid, by tamped fill or otherwise to resist the misaligning forces generated during compression of the joints being made.

G. For dissimilar pipes where suitable adaptor couplings are not available, the jointing shall be accomplished with a special factory fabricated coupling.

3.5 SIDE SEWER STUBS

A. All applicable Specifications given herein for sewer construction shall apply to side sewer stubs.

B. Provide side sewer stubs extending 5-feet beyond the right of way line for all properties adjacent to main line sewer unless otherwise directed by the Owner.

C. Sewers are designed to serve the downstream side of properties. Exceptions shall be as directed by the Owner at the time of construction. Such exceptions shall be marked by a stake or other suitable marker. Contractor shall be responsible that a "tee" be located in the main line opposite each marker and shall construct a side sewer to terminate at the property lines, edge of easements, or as otherwise directed by the Owner.

D. The Contractor shall be responsible that the side sewer stub depth at the property line is 5 feet below the floor to be served. Where the property is vacant, the side sewer stub shall be constructed on a slope of 2% unless otherwise approved in writing by the Owner.

E. Side sewer stubs shall not be installed as vertical risers, but shall be laid on a slope not to exceed two feet vertical to one foot horizontal, unless otherwise directed.

F. Side sewer stubs shall be constructed with a maximum deflection not to exceed manufacturer's recommendations. Larger changes in direction shall be made by use of standard 1/8 (22-½°) bends.

G. Plugs shall be installed at end of line and blocked to withstand test pressures without leakage.

H. A 1 1/4-inch white PVC pipe, ASTM 2241 SDR 21 200 psi shall be placed vertically at the end of each stub and shall rise 2 feet above finish grade level. Both ends of the PVC pipe shall have caps glued on and the pipe interior kept clean for the purpose of future depth measurement.

I. No side sewers shall be constructed inside private property unless approved in writing by the Owner.

J. The Contractor shall not backfill any side sewer stubs until the Owner has visually inspected and approved the installation. Should any such work be covered up without such approval or consent it must, if required by the Owner, be uncovered for examination at the Contractor's expense.

3.6 CLEANING

A. Before acceptance testing is performed, the pipe installation should be reasonably clean. The pipe shall be cleaned either before or after testing the pipe in the following or equivalent manner.

B. The Contractor shall furnish an inflatable rubber ball of a size that will inflate to fit snugly into the pipe to be tested. The ball may, at the option of the Contractor, be used without a tag line; or a rope or cord may be fastened to the ball to enable the Contractor to know and control its position at all times. The ball shall be placed in the last cleanout or manhole on the pipe to be cleaned, and water shall be introduced behind it. The ball shall pass through the pipe with only the pressure of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole where its presence is noted. In the event cemented or wedged debris or a damaged pipe shall stop the ball, the Contractor shall

remove the obstruction and/or repair any damaged pipe. All visible leaks showing flowing water in pipelines or manholes shall be stopped even if the test results fall within the allowable leakage.

## 3.7 LEAKAGE TESTING

A. General Requirements:

1. All sanitary sewer pipe and appurtenances shall be cleaned and tested after backfill by the low-pressure air test method. Concrete pipe over 36-inches in diameter may be tested a joint at a time with the water exfiltration method or by low pressure air test.

2. All work involved in cleaning and testing sewer lines between manholes shall be completed within fifteen (15) working days after the backfilling of sewer lines and structures.

3. The Contractor shall furnish all labor, materials, tools and equipment necessary to make the test, clean the lines and to perform all work incidental thereto.

4. Precautions shall be taken to prevent joints from drawing during tests, and any damage resulting from tests shall be repaired by the Contractor at the Contractor's expense.

5. In the event that the Contractor elects to test large-diameter pipe one joint at a time, leakage allowances for water exfiltration per 100 feet shall be converted to allowances per joint by dividing by the number of joints occurring in 100 feet.

6. If the pipe installation fails to meet these requirements, the Contractor shall determine the source or sources of leakage, and shall replace all defective materials or workmanship, at the Contractor's expense. The completed pipe installation shall then be retested as required to meet the requirements of this test.

B. Low Pressure Air Test:

1. Recommended Procedure:

a. Pipe may be tested with or without pre-wetting.

b. Plug all pipe outlets with suitable test plugs. Brace each plug securely.

c. If the pipe to be tested is submerged in groundwater, insert a pipe probe by boring or jetting into the backfill material adjacent to the

center of the pipe and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to groundwater submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.

d. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig in excess of any groundwater backpressure.

e. Check exposed pipe and plugs for abnormal leakage by coating with a soap solution. If any failures are observed, bleed off air and make necessary repairs.

f. After an internal pressure is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

g. After that two-minute period, disconnect air supply.

h. When pressure decreases to 3.5 psig over groundwater backpressure, start stopwatch. Determine the time in seconds that is required for the internal air pressure to drop 1.0 psig. This time interval should then be compared with the time required by Specification.

2. Safety Precautions:

a. Plugs used to close the sewer pipe for the air test must be securely braced to prevent the unintentional release of a plug which can become a high velocity projectile. Gauges, air piping manifold and valves shall be located at the top of the ground. No one shall be permitted to enter a manhole where a plugged pipe is under pressure. Air testing apparatus shall be equipped with a pressure release device designed to relieve pressure in the pipe under test at 6 psi.

3. Basis of Acceptance:

a. Concrete pipe (36 inches and under): The rate of air loss shall not exceed 0.003 CFM per square foot of internal pipe surface except that the computed rate for the test shall be not less than 2 CFM nor more than 3.5 CFM.

b. Other pipe materials: The time for the test shall be four (4) times that computed for concrete and clay pipe.

c. Pipe over 36 inches in diameter: Each joint shall show no appreciable loss of pressure when held for thirty (30) seconds.

d. PVC pipe shall show no appreciable loss of pressure when held for five minutes.

e. The basis for acceptance shall be determined upon the time in seconds it takes for the pressure to drop from 3.5 psig to 2.5 psig. The measured value will be considered acceptable if the value is equal to or greater than the required time as calculated below:

$K = 0.0111d^2L$

$C = 0.0003918dL$

If $C_T \leq 1$, then time (seconds) = $K_T$
If $1 < C_T < 1.75$, then time (seconds) = $K_T/C_T$
If $C_T \geq 1.75$, then time (seconds) = $K_T/1.75$

Where: d = Pipe diameter (inches)
L = Pipe length (feet)
K = Value for each length of pipe of a specific diameter
C = Value for each length of pipe of a specific diameter
KT = Sum of all K values
CT = Sum of all C values

The given equation above is developed for air permeable materials, for all other non air permeable materials the time in seconds for the pressure drop shall be equal to or greater than four (4) times than the time for air permeable materials. For further definition refer to WSDOT Standard Specifications Section 7-17.3(2) E and 7-17.3(2) F.

4. Limit of Test Section:

a. Pipe less than 36 inches in diameter shall be tested from manhole to manhole or such shorter lengths as the Contractor may choose.
b. Pipe greater than 36 inches in diameter shall be tested one joint at a time.
c. PVC pipe shall be tested from manhole to manhole.

5. Excessive Infiltration:

a. The Engineer may require an infiltration test if it appears that there is excessive infiltration after air tests are completed. The Engineer shall also be the sole judge of whether or not this test is required. Excessive infiltration shall be cause for rejection.

C. Exfiltration Test:

1. Exfiltration test for concrete pipe shall be used only if specifically authorized by the Engineer.

2. Contractor may fill the pipe any time up to 24 hours prior to the time of exfiltration testing to permit normal absorption into the pipe walls.

3. Leakage shall be no more than 0.28 gph per inch diameter per 100 feet of sewer, with a hydrostatic head of six feet above the crown at the upper end of the test section, or above the natural groundwater table at the time of test, whichever is higher.

4. Where the test head is other than six feet, the measured leakage shall not exceed 0.28 gph per inch diameter per 100 feet times the ratio of the square root of the test head to the square root of six.

5. The length of pipe tested shall be limited so that the pressure at the lower end of the section tested does not exceed 16 feet of head above the invert, and in no case shall be greater than 700 feet or the distance between manholes when greater than 700 feet.

6. It shall be the Contractor's responsibility to determine the level of the water table at each manhole.

3.8 DEFLECTION TEST FOR FLEXIBLE PIPE

A. Sanitary sewers constructed of flexible pipe shall be deflection tested not less than 30 days after the trench backfill and compaction has been completed.

B. The test shall be conducted by pulling a solid pointed mandrel with a circular cross section with diameter equal to 95% of the inside pipe diameter through the completed pipeline. Minimum length of circular portion shall be equal to the diameter of the pipe.

C. Testing shall be conducted on a manhole to manhole basis and shall be done after the line has been completely flushed out with water.

D. Contractor will be required, at own expense, to locate and repair any sections failing to pass the test and to retest the section.

3.9 TELEVISION INSPECTION

A. The Owner requires all sewers to be inspected by the use of a television camera before final acceptance. The costs incurred in making the initial inspection shall be borne by the Contractor.

B. If pipe is checked for grade a device will be attached in front of the camera to measure the depth of any ponding water.

C. Any observed defects or ponded water with a depth of over 3/4 inch shall be cause for the rejection of the line.

D. The Contractor shall bear all costs incurred in correcting any deficiencies found during television inspection including the cost of any additional television inspection that may be required by the Owner to verify the correction of said deficiency.

E. The Contractor shall be responsible for all costs incurred in any television inspection performed solely for the benefit of the Contractor.

3.10 REPAIRS

A. Any pipe or appurtenance which has been laid or jointed that is not in conformance with the Specifications shall be repaired or be removed and replaced at the expense of the Contractor.

*** * * END OF SECTION 02730 * * ***

# SECTION 02760
# EXISTING UTILITIES/FACILITIES
# UNDERGROUND AND OVERHEAD

## 1. GENERAL

1.1 LEGAL REQUIREMENTS-UNDERGROUND FACILITIES

A. The Contractor shall, before commencing excavation in any area, comply with the provisions of any applicable laws relating to or governing the identification, location, marking, and responsibility for protecting and repairing of underground facilities.

B. Whenever there may be a conflict between the provisions of any law and the provisions of these specifications, the provisions of law shall control.

1.2 IDENTIFICATION

A. The underground utilities identified on the plans have not and cannot be precisely located by the Owner or its agents or engineers and location is approximate only because such information is within the control of the owners of the underground utilities. The Owner does not warrant the location of underground utilities.

B. NOTICE: Overhead electrical service lines are generally not shown on the drawings. Electrical transmission lines shown on the drawings are located by point to point, power pole to power pole connections. The transmission cables or wires may be located on either side of the drawing location depending upon the configuration of the crossarms on the power poles or towers. Line voltage is not shown.

C. Other overhead utility lines are generally not shown on the drawings.

1.3 NOTIFICATION

A. It is the responsibility of the Contractor to give notice to the Owner or owners of any utilities known or suspected to be within the area of any proposed excavation or construction activities.

B. The Contractor is responsible to have the locations of underground utilities marked by the utility owners prior to beginning excavation.

C. The Contractor is responsible for determining the extent of any hazard created by electrical power in all areas and shall follow procedures during construction as required by law and regulation. Prior to construction, the Contractor shall meet with utility owners and determine the extent of

hazards and remedial measures and shall take whatever precautions may be required.

D. The Contractor's attention is directed to federal, state, and local safety codes relative to limitations of work in proximity to overhead power lines.

1.4 QUALITY ASSURANCE

A. The Contractor will be required to have available a pipe finder and a person capable in its use and to utilize same to satisfy himself/herself as to the exact location of such underground facilities in the interest of avoiding unnecessary damage, maintenance costs, and to insure continuity of customer service.

B. Contractors shall cooperate with utility owners to aid in locations and maintenance of existing utilities.

1.5 ELECTRICAL TRANSMISSION AND SERVICE LINES

A. Since neither the Engineer nor the Owner can anticipate the construction methods or techniques and equipment to be used by the Contractor in performing the work, the extent of the possibility of the Contractor's equipment and personnel coming in contact with electrical transmission lines cannot be fully anticipated, and there is no representation that all electrical transmission lines are shown on the plans.

B. The Contractor is charged with the responsibility of observing and investigating the presence of any electrical transmission lines which might impinge on the work whether overhead or underground and shall consult with and utilize the information given by utility owners and operators to determine the extent of any hazards and remedial measures required, and follow appropriate safety procedures.

1.6 ABOVE GROUND UTILITIES

A. Existing above ground utilities, whether shown on the drawings or not, shall be maintained, relocated, rerouted, removed and restored as may be necessary by the Contractor in a manner satisfactory to owners and operators of the utilities.

1.7 UTILITY SERVICE LATERALS

A. Minor underground utility service lines, including but not limited to sanitary sewer services, gas services, water services, house or yard drains, and electricity or telephone services and driveway culverts shall be maintained, relocated, rerouted, removed and restored by the Contractor with the least possible interference with such services.

1.8 RESTORATION BY UTILITY OWNER

A. The right is reserved by owners of public utilities and franchises to enter upon any street, road, right-of-way, or easement for the purpose of maintaining their property and for making necessary repairs or adjustments caused by the Contractor's operations.

B. The Contractor shall save the Owner harmless of any costs so incurred in restoration of a utility damaged by the Contractor except in special cases outlined above, and subject to the provisions of any law.

1.9 RESTORATION OF DRAINAGE FACILITIES

A. Where it is necessary for drainage facilities to be removed and replaced, existing pipe and catch basins may be reinstalled when approved by the agency having jurisdiction.

B. The materials shall be cleaned.

C. When it is necessary to replace existing pipe or catch basins, the new materials shall be of equal strength and similar design to existing materials.

D. Installation shall be in accordance with the applicable provisions of these specifications.

*** * * END OF SECTION 02760 * * ***