

**2022 RULES AND REGULATIONS
OF THE
CLINTON COUNTY SEWER DISTRICT**

46 S. South Street
Wilmington, Ohio 45177

The following **Rules and Regulations** are for the information and guidance of all users and potential users of the sanitary sewer and water supply facilities of the sewer districts in Clinton County, Ohio, operated by the Clinton County Sewer District under the jurisdiction of the Board of County Commissioners, Clinton County, Ohio

These **Rules and Regulations** are established under the authority of Sections 6103.02 and 6117.01 of the Ohio Revised Code.

Adopted by Resolution No. 96-490, adopted April 29, 1996

Revisions:

Resolution No.	Adopted Date:
22-638	May 25, 2022

TABLE OF CONTENTS

PART A – REGULATIONS

SECTION 1 – DEFINITIONS

Page

1.1	Definitions	7
-----	-------------------	---

SECTION 2 - GENERAL PROVISIONS

2.1	Authority	14
2.2	Ownership and Control	14
2.3	Effective Date	14
2.4	Validity	14
2.5	Enforcement	14
2.6	Violations	14
2.7	Penalties	14
2.8	Jurisdiction	14
2.9	Agreement	15
2.10	Interpretation	15
2.11	Personnel	15

SECTION 3 – SANITARY COLLECTION SYSTEM

3.1	General	16
3.2	Prohibited Wastes	16
3.3	Waste Quality Judgment	18
3.4	Special Appurtenances	18
3.5	Sanitary Sewer Design	18
3.6	Testing.....	21
3.7	Pretreatment Standards.....	22
3.8	Billing Methods and Procedures	22
3.9	Repair and Maintenance	23
3.10	Tampering With the System	23

SECTION 4 – SANITARY SERVICE CONNECTIONS

4.1	Connection to Public Sewer	25
4.2	Contractor Registrations	25
4.3	Sanitary Sewer Connection Permit.....	25
4.4	Permit Revocation	25
4.5	Sewer Connection Regulations.....	26
4.6	Inspection of Connections	27
4.7	Use of Sanitary Sewer Connections	28
4.8	Storm Water Connection Prohibition.....	28
4.9	Septic Tank Connections	28
4.10	Individual Sewer Connections	28
4.11	Local Sewer Construction Charge	29
4.12	Bedding and Backfilling	30
4.13	Connection with Plumbing	30
4.14	Sewer-Tap Installations.....	30
4.15	Incidental Work to the Installation of Sewer Connections	30
4.16	Contractor Safety/Liability.....	31

SECTION 5 – WATER SYSTEM

5.1	General	32
5.2	Design Criteria for Water Mains.....	32
5.3	Water Meters	34
5.4	Special Water Meters	36
5.5	Meter Testing	36
5.6	Meter Repair	36
5.7	Miscellaneous Appurtenances	36
5.8	Fire Line Policy	37
5.9	Backflow Prevention	40
5.10	Deviations	40
5.11	Billing Methods and Procedures	40
5.12	Repair and Maintenance	41
5.13	Tampering with the System	42
5.14	Guarantee of Supply	42
5.15	Backflow Prevention and Cross Connection Control Policy	42

SECTION 6 – WATER SERVICE

6.1	Contractor Registration.....	44
6.2	Water Connection Permit	44
6.3	Permit Revocation	44
6.4	Inspection	44
6.5	Contractor Responsibility	45
6.6	Individual Water Connections	45
6.7	Local Water Construction Charge	46
6.8	Incidental Work to the Installation of Water Connections	46
6.9	Contractor Safety/Liability	46
6.10	Water Connections Material	46
6.11	Water Connections Location and Depth	47
6.12	Abandoning Wells and Cisterns	47
6.13	Curb Connection Installation	47
6.14	Single Residence Connections	47
6.15	Commercial, Industrial, or Multi-Family Connections	48
6.16	Testing Connections	48
6.17	Payment for Service Connections	48

SECTION 7 – SCHEDULE OF CHARGES

7.1	Charges.....	49
7.2	Owner’s Responsibility	49
7.3	Billing Period	49
7.4	Billing and Payment	49
7.5	Unpaid Sewers	50
7.6	Vacant Premises, Changes in Occupancy, Etc.	50
7.7	Water Supply and Waterworks Facilities	50
7.8	Sanitary Sewerage Treatment Facilities	52
7.9	Miscellaneous Charges	54

SECTION 8 – DEVELOPMENT PROCEDURES

8.1	Construction Plans	55
8.2	Physical Format	55
8.3	Easements	56
8.4	Sewage Pumping Stations	57

8.5	Specifications.....	57
8.6	Revisions to Approved Plans	57
8.7	Approval Period	58
8.8	As-Built Drawings.....	58

SECTION 9 – DELINQUENT BILLS, PENALTIES, BILLING DISPUTES, AND VIOLATIONS

9.1	General	59
9.2	Delinquent Bills	59
9.3	Resolution of Billing Disputes	60
9.4	Landlord/Tenant Responsibility	62
9.5	Application of Payment	62
9.6	Water Emergency Violations	62
9.7	Cease and Desist Order	63
9.8	Remedies for Non-Compliance	64
9.9	Falsifying Information	64
9.10	Enforcement	64

PART B – GENERAL NOTES, SPECIFICATIONS AND STANDARD DETAILS

GENERAL NOTES

GENERAL NOTES	69
GENERAL NOTES (SEWERS)	73
GENERAL NOTES (WATER)	74

SPECIFICATIONS

INDEX	76
-------------	----

Division 1 - General Requirements

01650	Leakage Test and Disinfection	77
-------	-------------------------------------	----

Division 2 - Site Work

02110	Clearing and Grubbing	80
02225	Trench Granular Backfill	82
02227	Excavation, Backfill, and Embankment	84
02271	Slope Protection	91
02510	Temporary Bituminous Pavement	93
02520	Roadways, Driveways, Parking Areas, and Walks	95
02570	Interference with Traffic	98
02610	Ductile Iron Mains	100
02620	Fittings, Ductile Iron	108
02625	Existing Utilities and Related Structures	110
02640	Buried Valves	112
02645	Fire Hydrants	115
02655	Manual Air Release Outlets	117
02656	Potable Water Service Connections	119
02657	Connections to Existing Mains	121
02705	Manholes and Inlets	123
02731	Concrete Sanitary Sewer Pipe	126
02733	Polyvinyl Chloride Sanitary Sewer Pipe	133
02735	Wye, Riser, and House Service	140

02755	Interceptions and Connections	143
02934	Temporary Seeding	145
02935	Sodding	147
02936	Grading and Seeding	149

Division 3 – Concrete

03300	Cast-in-Place Concrete	152
-------	------------------------------	-----

STANDARD DETAILS

GENERAL

G-1	TRENCH IN DRIVE
G-2	TRENCH IN NON-PAVED AREA
G-3	TRENCH IN PAVED AREA
G-4	PAVEMENT REPLACEMENT
G-5	DRIVE & WALK REPLACEMENT
G-6	CASING PIPE
G-7	STREAM CROSSING
G-8	CONCRETE ENCASEMENT

SANITARY SEWER

SA-1	48" PRECAST MANHOLE FOR PIPE SIZES 8"-42"
SA-2	STANDARD MANHOLE FRAME & COVER CASTING
SA-3	MANHOLE BASE CHANNELIZATION
SA-4	OUTSIDE DROP MANHOLE
SA-5	KEY BLOCK
SA-6	MANHOLE STEPS
SA-7	WYE BRANCH
SA-8	RISER PIPE
SA-9	HOUSE SERVICE
SA-10	PIPE CONNECTION TO EXISTING MANHOLE

WATERLINE

W-1	WATERLINE LOWERING
W-2	BACKING FOR HORIZONTAL BENDS & VERTICAL SAGS
W-3	BACKING FOR TEES
W-4	BACKING FOR VERTICAL BENDS (OVER BENDS ONLY)
W-5	CONCRETE VALVE SUPPORT
W-6	FIRE HYDRANT, TYPE "A"
W-7	FIRE HYDRANT, TYPE "B"
W-8	FLUSH HYDRANT
W-9	MANUAL AIR RELEASE VALVE
W-10	AUTOMATIC AIR RELEASE VALVE
W-11	METER BOX & SERVICE TAP INSTALLTION

APPENDIX

A	Contractor Registration
B	Application for Plan Approval of Wastewater Facilities
C	Application for Sewer Connection Permit
D	County Inspection Form for Sewer Connection Work
E	Notice of Public Water Service Repair, Upgrade, and/or Expansion

PART A – REGULATIONS

SECTION 1 - DEFINITIONS

1.1 DEFINITIONS

Unless the context specifically indicates otherwise, the following terms and phrases, as used in these regulations, shall have the meanings hereinafter designated.

Applicant: A Customer who enters into a service agreement for sewer service at a premise.

Authorized Representative of a user: An authorized representative of a user may be: (1) A principal executive officer, if the user is a corporation; (2) A general partner or proprietor if the user is a partner or proprietorship, respectively; (3) A duly authorized representative of the individual designated above if such representative is responsible for the overall operation of the facilities from which the indirect discharge originates.

Backflow: The flow of water or other liquids, mixtures, or substances into the distribution pipes of a potable water supply from any source other than the intended source of the potable water supply.

Backflow Prevention Device: Any device, methods, or type of construction intended to prevent backflow into potable water systems.

Beneficial users: Uses of the waters of the County or the State of Ohio which may, or do require protection against quality degradation thereof, including but not limited to waters used for domestic, municipal, agricultural, power generation, recreation, aesthetic enjoyment or navigation purposes, or for the preservation and enhancement of fish, wildlife or other aquatic resources or reserves, and such other uses, both tangible or intangible, as are or may be specified by federal and state law as beneficial users.

BOD: Biochemical Oxygen demand: the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure, five (5) days at twenty (20) degrees centigrade expressed in terms of weight and concentration (milligrams per liter).

Building Drain: The portion of the lowest horizontal piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer beginning two (2) feet outside the inner face of the building wall.

Building Sewer: That portion of any sewer beginning at a point two (2) feet outside of the foundation line of any building and running to the property line, street right-of-way line or sewer easement right-of-way or to a private sewerage disposal system.

Bypass: The intentional diversion of waste streams from any portion of an industrial user's treatment facility.

Carbonaceous Biochemical Oxygen Demand (CBOD): The quantity of oxygen utilized for the biochemical degradation of organic matter under standard laboratory procedures in five (5) days in the presence of a nitrification inhibitor, expressed in milligrams per liter (mg/l).

Clean Water Act: The Federal Water Pollutions Control Act of 1972, also known as the Clean Water Act, and any amendments thereto.

Combined Sewer: A sewer intended to receive both wastewater and storm or surface runoff.

Compatible Pollutants: This term shall include biological oxygen demand (BOD), total suspended solids (TSS), pH, and fecal coliform bacteria.

Connection Charge: The amount paid by the owner of each new structure connected to the treatment works to partially pay for the County's share of facilities required to serve the premises. The charge shall be in proportion to the probable demand placed on the system.

Contractor: An individual, firm, corporation, partnership or association duly licensed by the appropriate agencies to perform the type of work to be done under the permit.

Cooling Water: Any water used for the purpose of carrying away excess heat, both direct and indirect, and which may or may not contain biocides used to control biological growth.

County: Clinton County, Ohio or its authorized agents or representatives.

Customer: Any individual, firm, company, partnership, corporation, association, group, or society, including the State of Ohio, agencies and political subdivisions created by or pursuant to State law, and Federal agencies, who have executed a Service Agreement with the Clinton County Sewer District.

Developed Parcel: Any parcel of land on which any building or structure is located in which plumbing fixtures are installed through which sewage and/or wastewater is disposed.

Director: The Director of the Department of Environmental Services who is appointed by the Board of Commissioners and is responsible for the operation and maintenance of all public wastewater facilities of the County, or his authorized agents or representatives. Synonymous with "County Sanitary Engineer".

Discharge: Means an Indirect Discharge; "To Discharge" means to cause or allow the introduction of material into the treatment plant.

District: The Clinton County Water and Sewer District

Domestic Wastewater: The liquid and solid waterborne wastes derived from the ordinary living processes of humans. Domestic wastewater shall be of such character as to permit satisfactory disposal, without special treatment, into the public sewer system or by means of private disposal system. For the purposes of this definition, domestic wastewater shall have a BOD and a suspended solids concentration of less than 300 milligrams per liter.

Easement: A grant of a specified use of land by its owners to the County Commissioners for installation, maintenance, repair, removal, and replacement of sanitary sewer and water lines and their appurtenances.

Existing Source: Any source of discharge, the construction and operation of which commenced prior to the publication by EPA of proposed categorical pretreatment standards, which will be applicable to such source if the standard is thereafter promulgated in accordance with Section 307 of the Act.

Fee: A charge established pursuant to this Resolution for the services and facilities furnished by the District to any premises in connection with operation of the sanitary sewer.

Floatable Oil: Any oil, fat, or grease in a physical state such that it will separate by gravity from wastewater by treatment in an approved pretreatment facility.

Garbage: The solid wastes from the preparation, cooking, and the dispensing of food, and from the handling, storage and sale of produce.

Grab Sample: A sample, which is taken from a waste stream and without consideration of time.

Holding Tank Waste: The waste from holding tanks such as vessels, chemical toilets, campers, trailer septic tanks, and vacuum-pump tank trucks.

Incompatible Pollutants: Any pollutant not included as a compatible pollutants.

Indirect Discharge: The discharge or introduction of non-domestic pollutants from any source into the Treatment Plant (including holding tank waste discharged into the Treatment Plant).

Industrial User: Shall mean, for the purpose if industrial cost recovery:

- i) Any government, nonresidential or commercial user of the treatment works which discharge to the sanitary sewer. In determining the amount of user's discharge for the purpose of high strength surcharges, the County may exclude domestic wastes or discharges from sanitary conveniences.
- ii) Any user of the treatment works that discharge wastewater to the treatment works which contain toxic pollutants or poisonous solids, liquid, or gases in sufficient quantity either singly or by interaction with the other wastes, to contaminate the sludge of any County systems, or to injure or to interfere with any sewage treatment process, or which constitutes a hazard to humans in or has an adverse effect on the waters receiving any discharge from the treatment works.

Industrial Waste: The wastewater from industrial processes, trade, or business as distinct from domestic or sanitary sewer.

Infiltration: Water other than wastewater that enters a sewer system (including building drains and building sewers) from the ground through such means as defective pipes, pipe joints, connections, or manholes, downspouts, groundwater drains, foundation drains, infiltration does not include, and is distinguished from, inflow.

Infiltration/Inflow: The total quantity of water from both infiltration and inflow without distinguishing the source.

Inflow: Water other than wastewater which enters sewer system (including building drains and building sewers) from sources such as roof leaders, cellar drains, yard drains, area drains, foundation drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, cooling towers, storm waters, surface run-off, street wash waters, or drainage, inflow does not include, and is distinguished from, infiltration.

Inspector: A duly appointed representative of the County who is responsible for the enforcement of the specifications and quality of construction.

Interference: The inhibition or disruption of wastewater treatment plant operations or processes, wastewater reclamation or march processes or operation, which contribute to a violation of any requirement off the District's NPDES Permit or other State and/or Federal requirements.

Lateral Sewer (Service Line): The portion of the sewer lying within a street or sewer right-of-way connecting a building sewer to the main sewer.

Local Sewer: A sewer that abuts and directly serves individual properties. The main purpose of these sewers is to receive the wastewater discharge from individual buildings for

subsequent conveyance to the treatment facility through trunk sewers. Sometimes called street sewers.

Main Extension: The extension of service requiring the construction of one or more additional sewers including pumping stations and force or pressure mains.

Maintenance Cost: Those costs, including labor, materials, supplies, equipment, accessories, and appurtenances required to maintain the capacity and performance of the wastewater facilities during the design or actual life of such facilities.

Manhole: An opening in a sewer provided for the purpose of permitting a man access to the sewerage system for maintenance and/or inspection.

May: Means permissive.

Medical Waste: Any isolation wastes, infectious agents, human blood and blood products, pathological wastes, sharps, body parts, contaminated bedding, surgical wastes, potentially contaminated laboratory wastes, and dialysis wastes.

Multiple-Family Dwelling: Any structure under one ownership constructed for occupancy of more than one family, each separate living quarters to be referred to as a unit.

Natural Outlet: Any outlet into a watercourse, pond, ditch, lake, or other body of surface or groundwater.

New Source: Any building, structure, facility or installation from which there may be a discharge of pollutants, the construction of which commence after the adaption of this Resolution provided that: (1) The building, structure, facility or installations is constructed at a site at which no other source is located; or (2) The building, structure, facility or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or (3) The production or wastewater generating processes of building, structure, facility or installation are substantially independent of an existing source as at the same site. (In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant, and the extent to which the new facility is engaged in the same general type of activity as the existing source would be considered).

Normal Domestic Waste: Any waste which is characterized by a loading of 200 mg/l BOD, 200 mg/l TSS, and 20 mg/l ammonia nitrogen commonly termed normal domestic sewage.

NPDES Permit: The National Pollutant Discharge Elimination System Permit as issued by the Ohio Environmental Protection Agency.

Nuisance: damage to the community resulting from prohibited practices in the disposal of sewage or individual waste.

ODOT: The Ohio Department of Transportation.

Ohio EPA: The Ohio Environmental Protection Agency, or where appropriate, the Director or other fully authorized official of that agency.

Operating Cost: Those costs, including labor, materials, supplies, equipment, accessories, and appurtenances required to operate the wastewater facilities at the level of performance required by the NPDES permit.

Operation and Maintenance (O&M): Those functions that result in expenditures during

the useful life for material, labor, utilities, and other items, including periodic equipment replacement, which are necessary for managing and for which such works were designed and constructed.

Owner: Person who is legal owner of the premises as shown on the last tax assessment rolls of the County Assessor.

Permit: Written authorization required pursuant to this and any other regulation of the District for the installation of any sewage works or for the use of public sewers.

Permitee: Any human being, individual, firm, company, partnership, association, and private municipal corporations.

Person: Any individual, firm, company, association, society, municipal or private corporation, group, partnership, copartnership, joint stock company, trust, estate, institution, enterprise, governmental agency, the state of Ohio, the United States of America, or other legal entity, or their legal representative, agents, or assigns. The masculine gender shall include the feminine, the singular shall include the plural where indicated by context.

pH: The logarithm (base 10) of the reciprocal of the concentration of hydrogen ions expressed in grams per liter of solution.

Pollutant: Any dredged spoil, solid waste, incinerator residue, sewage, garbage, sewer sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discharged equipment, rock sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

Pollution: An alteration of the quality of the water of Clinton County, Ohio or the State of Ohio which adversely affects such waters for any beneficial use, or affects facilities serving such beneficial use, or which constitutes a hazard to the public health or to the environment.

Premises: A parcel of land or portion thereof, including any improvements thereon, which is connected to the sanitary sewer system. Each separately owned unit of a duplex, apartment or any other multi-family residence shall be deemed a separate premise.

Pretreatment: The facilities used in the reduction in the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater to a less harmful state prior to or in lieu of discharge, or otherwise introducing pollutants to the treatment plants. The reduction or alteration can be obtained by physical, chemical, or biological processes, process changes, or other means, except dilution as prohibited by 40 CFR Section 403.6 (d).

Property: A lot or piece of land with or without buildings.

Property Accessible to the Sewer System: Property that adjoins, abuts on, is adjacent to, or via easement or right-of-way, and has access to the sewer system.

Public Sewer: A sewer lying within a street and which is controlled by or under the jurisdiction of the District.

Public Street: All of any dedicated public highway, road, street, avenue, alleyway, easement or right-of-way.

PVC: Polyvinyl chloride.

RCP: Reinforced concrete pipe.

Sanitary Engineer: The appointed representative of the County Commissioners in the Clinton County Sanitary Engineering Department who is a registered professional engineer.

Sanitary Sewer: A sewer, which carries sewage and to which storm, surface and ground waters are not intentionally admitted.

Septage: the liquid and semisolid contents removed by pumping from a septic tank, outhouse, portable sanitation unit or holding tank.

Septic Tank Waste: Any sewage from holding tanks such as vessels, chemical toilets, campers, trailers, and septic tanks.

Service Line (Lateral Sewer): The service pipe extending from the sewer main to the point immediately inside the portion of the customer's property, which abuts the street or road.

Severe Property Damage: Substantial physical damage to property, damage to the treatment facilities which cause them to become inoperable, or substantial and permanent loss of natural resources. Severe property damage does not mean economic loss caused by delays in production.

Sewage or Wastewater: A combination of water-carried wastes from residence, business building, institutions and industrial establishments.

Sewer: A pipe or conduit for carrying sewage.

Sewerage or Sewerage Works: All facilities for collecting, pumping, treating and disposing of sewage or wastewater.

Sewer Service Charge: Refers to the monthly charge for sewer service which is intended to provide sufficient revenues to cover all operation, maintenance, and replacement costs for the treatment facilities; operation and maintenance costs for the wastewater collection and transmission system; associated administration, engineering, and business operation costs; and the annual debt service costs associated with the owning of the total facility.

Shall: Means mandatory.

Side Sewer: the sewer line beginning at a point two (2) feet outside the foundation wall of any building and terminating at the main sewer and includes the building sewer and lateral sewer together.

Single-family Unit: Any structure constructed for occupancy of one single-family. This classification includes trailer and mobile home units with connections to the District Sewer System.

Slug: Any discharge of water, wastewater or industrial waste which exceeds for any period of duration longer than fifteen (15) minutes, (1) more than five (5) times the average twenty-four (24) hour concentration of any constituent therein, or (2) more than five (5) times the average rate of flow(s) during normal operation.

Standards and Specifications: The set of documents containing design and construction standards for all sewer work in the District.

State: The State of Ohio.

Storm Drains: A pipe or conduit, which carries storm and surface waters and drainage, but excludes wastewater.

Storm Water: Any flow occurring during or following any form of natural precipitation, and resulting from precipitation, including snowmelt.

Surcharge: A fee, in addition to the normal user charge, collected to recover costs to treat higher than normal domestic sewage strength wastes.

Total Suspended Solids (TSS): Total suspended matter that either floats on the surface of, or is in suspension in, water, wastewater, or other liquids, and that is removable by laboratory filtering and referred to as nonfilterable residue, expressed in milligrams per liter (mg/l) by weight.

Trunk Sewer: A sewer that conveys wastewater from a group of homes, subdivision, community, etc., to the wastewater treatment facility.

User: Any person, who discharges, caused or permits the discharge of wastewater into the sanitary sewer system.

Wastewater Collection System: The entire system of collection sewers, trunk sewers, and interceptor sewers and all appurtenances provided to collect and transport wastewater to the wastewater treatment plant.

Wastewater Facilities: The structure, equipment, and processes required to collect, carry away, and treat domestic and industrial wastes, and dispose of the effluent.

Wastewater Treatment Plant: An arrangement of devices and structures for treating wastewater, industrial wastes, and sludge.

Water Meter: A water volume measuring and recording device furnished and/or installed by a user and approved by the County.

Watercourse: A channel in which a flow of water occurs, either continuously or intermittently.

SECTION 2 – GENERAL PROVISIONS

2.1. AUTHORITY

The Ohio Revised Code, Sections 6103 and 6117 permits the County Commissioners of Clinton County to adopt rules and regulations governing policies essential to the operation of the Sanitary Engineering Department under their jurisdiction.

2.2 OWNERSHIP AND CONTROL

The public water and sewer systems of Clinton County, Ohio including all appurtenances, is under the control of the Sanitary Engineering Department and its authorized agents and employees. Such control shall include all phases and fixtures of metering for water and sewerage works.

2.3 EFFECTIVE DATE

These rules and regulations shall be effective from the date of adoption of a resolution of the County Commissioners of Clinton County. Henceforth, any other rules and regulations previously adopted which are in direct conflict with this set of rules shall be deemed to be repealed and superseded and all others shall remain in force.

2.4 VALIDITY

Should any section or individual provision of these rules and regulations be decided by the courts to be unconstitutional or invalid, such a decision shall not affect the validity of the rules and regulations as a whole or any part thereof, other than the portion so held to be unconstitutional or invalid. It is the intention that these rules and regulations are deemed to be independent from the other.

2.5 ENFORCEMENT

These rules and regulations shall be enforced by the Sanitary Engineering Department as directed by the County Commissioners of Clinton County.

2.6 VIOLATION

It shall constitute a violation for any person, firm, group or corporation, either owner or agent, to tamper with or attempt to use facilities provided by Clinton County without first obtaining the necessary permits and approvals. Any person, firm, group, or corporation, either owner or agent, that obtains a permit or approval based on a false statement made in order to deceive the County shall be held in violation of these rules and regulations and subject to prosecution.

2.7 PENALTIES

Any person, firm, group, or corporation, either owner or agent, committing a violation of these rules and regulations shall be subject to revocation or suspension of permits or license, and may be deemed guilty of a misdemeanor, and if convicted may be fined as the penalties provide in the Ohio Revised Code. In addition, the violator of these rules and regulations shall be liable and responsible for any and all damages incurred as a result of the violation.

2.8 JURISDICTION

These rules and regulations shall be made applicable to all persons within the Clinton County Sewer District as established or amended.

2.9 AGREEMENT

Application for a permit shall thereby evidence the applicant's acceptance of, and agree to be bound by these rules and regulations.

2.10 INTERPRETATION

The provisions of these rules and regulations shall be the minimum requirements adopted for the promotion of health, safety, and welfare of the constituents of Clinton County. These rules and regulations are not intended to repeal, abrogate, annul or in any manner interfere with any existing laws or rules of any governmental agency that are more stringent. Where these rules and regulations impose greater restrictions than are required by existing laws or rules, then the provisions of these rules and regulations shall take precedence and govern.

2.11 PERSONNEL

Inspectors, Meter Readers, or employees of the Sanitary Engineering Department whose duty constitutes entrance upon private property, or into private premises, in connection the Sanitary Engineering business, shall be equipped with proper credentials as the County may deem necessary to identify them as agents of the County. Such authorized employees shall have access to the premises, at reasonable hours, to examine fixtures and record amounts and manners in which systems are being utilized. Should access be denied, these services shall be discontinued and not restored until such time as access is granted.

SECTION 3 – SANITARY COLLECTION SYSTEM

3.1 General

- A. Wastes which shall be discharged into the sanitary sewer system include all water-borne waste from toilets, lavatories, bathtubs, showers, laundry tubs, washing machines, refrigeration drips, soda fountains, drinking fountains, and sinks. Any other waste will be permitted only upon written permission from the Clinton County Sanitary Engineering Department.
- B. Extensions or connections to a sanitary sewer shall only be permitted where it can be demonstrated to the satisfaction of the Clinton County Sanitary Engineer that the downstream sewage system has sufficient capacity to safely handle the additional anticipated loading.
- C. No downspouts, surface inlets, foundation drains, subsurface drains or any other source of ground or surface water shall be connected, either directly or indirectly, to any sanitary sewer. Such shall be so constructed as to drain or be pumped to the gutter, ditch or storm sewer.
- D. All costs and expenses associated with the installation of the building sewer shall be borne by the property owner. The owner shall indemnify Clinton County against any loss or damage that may directly or indirectly result from the installation of the building sewer.

3.2 Prohibited Wastes

No person shall discharge or cause to be discharged, any substances, materials, waters, or wastes into the sanitary sewer if it appears likely in the opinion of the Sanitary Engineer that such wastes can harm either the sewers, sewage treatment process, or equipment, have an adverse effect on the receiving stream, or can otherwise endanger life, health, public property, or constitute a nuisance.

The following prohibited wastes are:

- A. Any storm water, surface water, ground water, roof runoff, sub-surface drainage, uncontaminated cooling water, or unpolluted industrial process waters. Storm water and all other unpolluted drainage shall be discharged to such sewers as are specifically designated storm sewers or a natural watercourse.
- B. Any waters or wastes having a pH lower than 6.0 or higher than 9.0 or having any other corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sewage works.
- C. Any solid or viscous substances in quantities or of such size capable of causing obstruction to the flow in sewers, or other interference with the proper operation of sewage works such as, but not limited to, ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, unground garbage, whole blood, paunch manure, hair and fleshings, entrails, and paper dishes, cups, milk containers, etc., either whole or ground by garbage grinders.
- D. Any waters or wastes containing iron, chromium, magnesium, copper, zinc, and similar objectionable or toxic substances; or wastes exerting an excessive chlorine requirement, to such degree that any such material received in the composite sewage at the sewage treatment plant exceeds the limits established by the Clinton County Sanitary Engineer for such materials.

- E. Any waters or wastes containing phenols or other taste or odor producing substances, in such concentrations exceeding limits which may be established by the Sanitary Engineer as necessary, after treatment of the State, Federal, or other public agencies of jurisdiction for such discharge to the receiving waters.
- F. Any radioactive wastes or isotopes of such half-life concentration as may exceed limits established by the Sanitary Engineer in compliance with applicable State or Federal regulations.
- G. Any unusual concentrations or inert suspended solids (such as, but not limited to: Fullers earth, lime slurries, and lime residues) or of dissolved solids (such as, but not limited to: sodium chloride and sodium sulfate).
- H. Any excessive discoloration (such as, but not limited to: dye wastes and vegetable tanning solutions).
- I. Any unusual Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), or chlorine requirements in such quantities as to constitute a significant load on the sewage treatment plant.
- J. Any unusual volume of flow or concentration of wastes constituting "slugs" as defined herein.
- K. Any waters and wastes containing substances which are not amenable to treatment by reduction by the sewage treatment processes employed are not to be discharged except by written approval of the Sanitary Engineer. Industrial discharges must meet the requirements of any other governmental agencies having jurisdiction over discharge to the receiving waters.
- L. Any liquid or vapor having a temperature higher than one hundred and fifty degrees Fahrenheit (150°F) or sixty-five degrees Centigrade (65°C).
- M. Any water or waste containing fats, wax, grease, oils, whether emulsified or not, in excess of one hundred milligrams per liter (100 mg/l) or containing substances which may solidify or become viscous at temperatures between thirty-two degrees Fahrenheit (32°F), one hundred and fifty degrees Fahrenheit (150°F) and sixty-five degrees Centigrade (65°C).
- N. Any commercial garbage that has not been properly shredded. The installation and operation of any garbage grinder equipped with a motor of three-fourths (3/4) horsepower or greater shall be subject to the review and approval of the Sanitary Engineering Department.
- O. Any waters or wastes containing strong acid iron pickling wastes or concentrated plating solutions whether neutralized or not.
- P. Any gasoline, benzene, naphtha, fuel oil or other flammable or explosive liquid, solid, gas, or phenols.
- Q. Any waters or wastes containing toxic or poisonous solids, liquids, or gases, in sufficient quantity, either singularly or by interaction with other wastes, to injure or interfere with any sewage treatment process, constitute a hazard to humans or animals, create a public nuisance, or create any hazard in the receiving waters of the sewage treatment plant, including, but not limited to, cyanide in excess of two (2) mg/l as cyanide in the wastes as discharged to the public sewer.

- R. Any other discharge of material into the sanitary sewer determined to be harmful to human or aquatic life, or deemed detrimental to efficient operation of the sanitary sewer system, as specified by the Sanitary Engineer.
- S. All deviations or waivers from the requirements of this section shall be approved in writing by the Sanitary Engineer.

3.3 Waste Quality Judgment

If any waters or wastes are discharged, or are proposed to be discharged, to the public sewers, which waters or wastes might contain the substances or possess the characteristics enumerated previously, and which in the judgment of the Sanitary Engineer may have a deleterious effect upon the sewage works, processes, equipment, or receiving waters, or which otherwise create a hazard to life or constitute a public nuisance, the Sanitary Engineer may:

- A. Require immediate cessation of discharge and/or
- B. Reject the wastes; and/or
- C. Require pre-treatment to an acceptable condition for discharge to the public sewers.
- D. Require control over the quantities and rates of discharge.
- E. Require payment to cover the added cost of handling and treating the wastes not covered by existing taxes or sewer charges, as determined by the Sanitary Engineering Department.

All industrial wastes discharged to public sewers by industries shall, at a minimum, meet applicable categorical pretreatment standards or best practical control technology currently available for incompatible pollutants, 40 CFR Part 128. If the County Sanitary Engineer permits or requires pretreatment or equalization of waste flows, the design and installation of the plants and equipment shall be subject to the review and approval of County Sanitary Engineer and state regulatory agencies and be subject to the requirements of all applicable codes, ordinances, and laws. When such facilities are provided, they shall be operated and maintained in satisfactory and effective condition by the applicant, at his expense, and in accordance with 40 CFR Part 403.

3.4 Special Appurtenances

- A. Grease, oil and sand interceptors - In the opinion of the Sanitary Engineer, interceptors shall be provided for the proper handling of liquid wastes containing grease in excessive amounts, or any flammable wastes, sand, or other harmful ingredients. Such structure shall be safely located and readily accessible at all times.
- B. When required by the Sanitary Engineering Department, the owner of any property serviced by a sanitary sewer carrying industrial wastes shall install a suitable control manhole, together with such necessary meters and other appurtenances to facilitate observation, sampling, and measurement of the wastes when directed by the Sanitary Engineer. The control manhole shall be installed by the customer; at the customer's expense; and shall be maintained by the customer.

3.5 Sanitary Sewer Design

Any sanitary sewer installed in a public right-of-way or easement for the purpose of receiving wastewater from two (2) or more customers, shall be considered a public sewer. All sanitary sewers shall be constructed in strict accordance with the approved construction plans, these

Rules and Regulations, and "Recommended Standards for Wastewater Facilities," latest edition, by The Great Lakes – Upper Mississippi River Board of State Public Health and Environmental Managers.

Sanitary sewer installed on private property for collecting wastewater from an individual customer shall be classified as a sewer service connection and shall be governed by Section 4 of these Rules and Regulations.

As a matter of convenience, the following general minimum requirements pertaining to sanitary sewer construction are provided:

A. Materials

The following pipe materials, as specified in Part B of these Regulations, are acceptable for sanitary sewers and building storm drainage systems.

1. Pipe fifteen inches (15") in diameter or smaller; may be constructed of polyvinyl chloride (PVC) minimum SDR 35, reinforced concrete, High Density Polyethylene (HDPE), or ductile iron.
2. Pipe eighteen inches (18") in diameter and larger; may be constructed of reinforced/lined concrete pipe, solid wall PVC ASTM F679 (18" thru 27") and profile wall PVC pipe as approved by Clinton County.
3. All pipes shall have sufficient strength to withstand an HS-20 live load and dead loads. If PVC pipe is used, a Mandrel Test is required just prior to expiration of the 1-year guarantee to ensure that maximum deflection of 5 percent has not been exceeded. Rerounding of failed pipe may be performed only if fewer than 10 percent of the tested sewers fail the Mandrel Test. All failed pipe shall be rerounded or replaced and warranted an additional 2-years.
4. Other materials may be considered on a case-by-case basis upon submittal of data substantiating the strength, durability, and stability of the proposed product. All jointing material shall be of a premium type subject to review and approval of the Sanitary Engineer

B. Minimum Pipe Size

The minimum size of pipe used for sanitary sewer mains shall be eight inches (8") in Diameter. Sewer mains shall be sized to accommodate the peak flow generated by the service district.

C. Sewer Grade

1. All sewers shall be laid and maintained to the required line and grade with wye branches, tee branches and slants installed and with all joints centered and all spigots driven home. Line and grade shall be given to the Contractor by the Owner's engineer. All stakes, once set by the consulting engineer, shall be protected by the Contractor.
2. If a laser beam method of setting line and grade is used, grade bars will not be necessary. The Contractor shall furnish all labor and material to establish line and grade of the generated laser beam from the line and grade furnished by the Owner's engineer.

3. The following minimum grades shall be used for sanitary sewers:

Line Size	Minimum Slope
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21	0.10
24	0.08
27	0.067
30	0.058
36	0.046
42	0.037

D. System Design

1. All sanitary sewers shall be installed in public right-of-ways or public easements. The width of public easements shall be a minimum of twenty feet (20') in width or twice the depth of the sewer.
2. The maximum spacing between manholes shall be four hundred feet (400').
3. Manholes are required at each end, at changes in pipe direction, at changes in pipe diameter, and at points in between as per spacing requirements.
4. Sanitary sewers shall not normally be installed under pavements or other permanent structures. Access must be provided for continued operation and maintenance of the sanitary sewer.
5. A permit for construction within a State Highway right-of-way must be obtained from the Ohio Department of Transportation.
6. Crossing of County Roads and Township Roads will be bored or open cut as required by the appropriate Authority.
7. Steel casing pipe shall be used wherever required by the authority having pavement responsibility or as shown on the approved construction plans.
8. Manhole frames and covers shall be as shown on the Standard Details. Unless directed otherwise by the Sanitary Engineer, manholes located within public easements shall have bolt down lids. Manholes located within areas prone to flooding shall have gasketed, water-tight, bolt-down lids.
9. Rim elevations for manholes shall be set flush with grade in pavement, sidewalks, and highly visible lawn and easement areas. Rim elevations for manholes located in rural easements, or heavily wooded areas shall be six inches (6") to twenty-four inches (24") above grade.
10. Drop connections to manholes shall be outside drop style.
11. Knock-outs or stubs are not typically permitted in manholes for future sewer extension. At the time the sewer extension occurs, the manhole shall be core drilled.

12. Storm and sanitary sewers shall be spaced a minimum of eight feet (8') apart unless the storm sewer has a premium jointing material meeting the same specifications as the sanitary sewer.
13. The Contractor shall be required to maintain and by-pass, if necessary, the flow in all existing live sanitary and storm sewers during construction. The proposed method shall be submitted and be approved by the Sanitary Engineer prior to the initiation of construction.
14. All sanitary sewers are to have a minimum of four feet (4') cover above the crown of the pipe.
15. On manholes built over existing sanitary sewers, cement shall be placed around the inside sanitary sewer to prevent infiltration and to guide sewage flows into the pipe flow line.

E. Extension of Sewer Mains

1. When a sanitary sewer is to be extended from an existing Clinton County sewer, assuming all fees and charges have been paid and all approvals and permits have been obtained, the Contractor shall furnish all materials as may be required for the core-drilled manhole connection and extension.
2. When extending the sanitary sewer from an existing manhole, the Contractor shall core drill and utilize a link seal, or boot for the new sewer penetration through the manhole wall. Any existing manhole steps which interfere with the proposed sewer extension shall be removed and relocated, or replaced within the manhole. The invert, or flow channel of the manhole, shall be reconfigured, or replaced with new concrete to properly direct all influent sewers to the effluent pipe. Influent sewers are not permitted to discharge on the invert shelf, but shall be formed to join the main flow with as little turbulence as possible.

3.6 Testing

- A. All measurements, tests, and analysis of the characteristics of waters and wastes, to which reference is made in these Rules and Regulations, shall be determined in accordance with the latest edition of "Standard Methods for the Examination of Water and Waste Water", published by the American Public Health Association, or USEPA-accepted methods and shall be determined at the control manhole. In the event that no special control manhole has been required, the nearest downstream manhole shall be used. Measurements, tests, and analysis of the characteristics of waters and wastes shall be carried out by customarily accepted methods to reflect the effect of constituents upon the sewage works and to determine the existence of hazards of life, health and property. The particular application involved shall determine the method used to obtain samples. Normally, but not always, BOD and suspended solids analysis are obtained from twenty-four (24) hour composites of all outfalls, whereas pH is determined from periodic grab samples.
- B. It is not the intent of any statement contained herein to prevent any special arrangement and/or agreement between the Sanitary Engineering Department and any user of the sanitary sewer system that discharges a waste of unusual strength of character, subject to special payment to the Sanitary Engineering Department by this user for the treatment of this waste.

- C. New industrial and commercial customers shall supply the Sanitary Engineering Department with a series of sample wastes to be tested by the Sanitary Engineering Department so that guidelines can be used to assist in establishing rates for billing purposes.

3.7 Pretreatment Standards

- A. National Categorical Pretreatment Standards, as set forth in 40 CFR Chapter I Subchapter N – Effluent Guidelines and Standards, are hereby incorporated by references as fully as if written herein. All users subject to said pretreatment standards shall comply therewith. The County Sanitary Engineer shall endeavor to make timely notification of U.S. EPA actions affecting users of District wastewater works. However, affected industrial users are nonetheless constrained to comply with categorical standards and any applicable reporting requirements, irrespective of any District notifications.
- B. Compliance by existing sources with categorical pretreatment must be made within 3 years of the date the standard is effective unless a shorter compliance time is specified. Existing sources that become industrial users subsequent to promulgation of an applicable categorical pretreatment standard will be considered existing industrial users unless they meet the definition of a new source. New sources must install and have in operating condition all pollution control equipment required to meet applicable pretreatment standards and obtain relevant Ohio EPA permits to install and such other permits as may be required.
- C. Reporting Requirements, Compliance Schedules, and Monitoring Reports
 - 1. Industrial users subject to pretreatment standards shall submit to the County Sanitary Engineer compliance schedules and self-monitoring and other reports required by 40 CFR 403.12 and/or Ohio Administrative Code 3745.
 - 2. If a user subject to pretreatment requirements monitors any required pollutant more frequently than prescribed by applicable regulations using procedures defined in F 4, then the results of this monitoring shall also be included in the self-monitoring reports.
 - 3. If sampling performed by an Industrial User indicates a violation, the User shall notify the Clinton County Sewer District within 24 hours of becoming aware of the violation. The user shall also repeat sampling and analysis and submit written results of both initial and repeat analyses to the Clinton County Sewer District within 30 days of becoming aware of the violation.

3.8 Billing Methods and Procedure

- A. For any lot, parcel of land, building or premises, discharging sanitary sewage, industrial wastes, water or other liquids, into the sanitary sewerage system, rental shall be based upon the quantity of water used as measured by the Sanitary Engineering Department water meter. Bills will be rendered quarterly or monthly at the discretion of the Sanitary Engineering Department. Where applicable, a flat rate charge will be established by the Clinton County Commissioners, where water service is not under the control of Clinton County.
- B. The rates charged shall be in accordance with the rates established by the County Commissioners for the areas served.

- C. A fee is paid on or before the dates set forth in this section if the payment is received by the county treasurer on or before the last day for payment of such fee, or if the payment is received after such date in an envelope that was postmarked by the United States postal service on or before the last day for payment of such fee. In the event there is more than one date of postmark on the envelope, the earliest date imprinted by the United States postal service shall be the date of payment. A private meter postmark on an envelope is not a valid postmark for purposes of establishing the date of payment of such fees. A late charge of ten percent (10%) shall be added on all sewer bills which are not paid by the date specified on the bill. This date shall not be less than seven (7) days from the date the bills are rendered.
- D. When final readings are requested between regular reading dates, the minimum charge will be determined in proportion to the time elapsed since the regular reading compared to the normal time between regular reading dates.
- E. In the event the owner of a lot, parcel of land, building or premises, discharging sanitary sewage, industrial wastes, water or other liquids, into the sanitary sewerage system, is not a User of water supplied by the Sanitary Engineering Department, and the water used thereon or therein is not measured by a Sanitary Engineering Department water meter or by a meter acceptable to the Sanitary Engineering Department, then, in each case, the amount of water so used shall be measured or determined by the Sanitary Engineering Department in order to ascertain the sewer service charge. Otherwise, the owner or other interested party, at his expense, shall be required to install and maintain a meter acceptable to the Sanitary Engineering Department for said purpose. Also, in the event a lot, parcel of land, building or premises discharges sanitary sewage, industrial wastes, water or other liquids, into the sanitary sewer system, and the Sanitary Engineering Department finds that it is not practical to attempt to measure said wastes by meter, he shall measure these wastes by any such manner and method as he may find practical.
- F. If the premises are found to be discharging sewage or other wastes, as defined herein, into the Sanitary Sewer System without payment of a sewer service charge or rental, the Sanitary Engineering Department shall, by which method as he may find practical, measure or estimate the quantity of such wastes for the purpose of establishing a proper charge in accordance with the schedule of charges, and the said premises shall be charged for the total term of the prior usage on the basis of the quantity so determined.

3.9 Repair and Maintenance

- A. The Sanitary Engineering Department shall maintain all mainline sanitary sewers within dedicated right-of-ways or in easements dedicated to Clinton County. No maintenance will be performed on sanitary sewers that do not lie within easements or dedicated right-of-ways.
- B. Sanitary sewers not within easements or dedicated right-of-ways shall be maintained by the owner. The County may require the property owner to make any repairs or perform any maintenance on the building sewer that it deems necessary for the proper functioning of the sewerage system. If the County is called upon or finds it necessary to repair or maintain any building sewer, the cost of such repair or maintenance shall be billed directly to the property owner.
- C. Temporary interruptions of sanitary sewer service by the County may be necessary for improvements or repairs. Whenever possible, and as time permits, all consumers will be notified prior to such interruption.
- D. The County expressly disclaims any responsibility for damages caused by, or arising

from, any stoppage within the sewerage system.

3.10 Tampering with the System

- A. No person, firm, group, or corporation, either owner or agent, shall attempt to make any type of physical connection to the sanitary sewer without first having obtained a permit from the Sanitary Engineering Department.
- B. No act shall be committed that would tend to hamper or restrict in any way the normal function of the sanitary sewer system.
- C. No physical connection shall be made between potable water supply and the sanitary sewer.

SECTION 4 – SANITARY SERVICE CONNECTIONS

4.1 Connection to a Public Sewer

When a public sewer is constructed to reduce or eliminate an existing health problem or a water hazard, the County Sanitary Engineer may order the Owner of any premises to connect the premises to the sewer for the purpose to discharge water and wastes originating on the premises into the sewer and to cease the discharge of waste water or other wastes into a cesspool, ditch, private sewer, privy, septic tank, or other outlet within 180 days after receipt of said order.

4.2 Contractor Registrations

- A. No person or persons, firm, or corporation, or any employee of such person, firm, or corporation, shall install or repair any house connection pipe, unless such person or persons shall have first registered with the Clinton County Health Department; with the exception of the individual homeowner, who is required to sign a waiver accepting full responsibility and liability for work performed and for any damages resulting from this work. Unless a waiver is signed, the house connection work shall be performed under the supervision of the registered contractor at all times.
- B. Any competent person, firm, or corporation shall, on application to the Clinton County Health Department, be granted a registered status. The application must be accompanied by satisfactory evidence of insurance qualifications and responsibility. Such registration shall remain in effect until the 31st day of December of the year from which it is issued, unless previously revoked. Both sewer and water work is authorized under this registration. Registration will be revoked if the holder violates any of these Rules and Regulations or instructions of the Sanitary Engineer.
- C. Any work performed by the individual homeowner, or their unregistered contractor, that does not comply with the Rules and Regulations will be the responsibility of the individual homeowner to repair to the satisfaction of Sanitary Engineer.

4.3 Sanitary Sewer Connection Permit

- A. No connection with any sewer, repair or removal thereof, shall be made without a permit from the Sanitary Engineer. A fee will be charged for the permit to cover the costs of issuance and inspection. The Contractor or the Owner shall make written application for each permit and present evidence that a road opening permit has been secured.
- B. Existing record and location information is not guaranteed by the Sanitary Engineer. Contractor is cautioned to conduct field investigation to locate before digging.

4.4 Permit Revocation

- A. Application for permits shall be made on the prescribed form and shall include legible plans and specifications of the work, showing location and character. Any misrepresentation in such application shall constitute sufficient grounds for revocation of the applicant's license and any permits issued.

- B. Permits shall be kept on the job at all times while work is in progress. The permit shall become void if the covered work is not completed and approved within one hundred eighty (180) days of issuance. The Sanitary Engineer may extend the expiration date of the permit an additional one hundred eighty (180) day period if conditions warrant and upon payment of a six (6) month portion of the frontage tap-in fee. In no instance is the permit fee refundable.

4.5 Sewer Connection Regulations

All sanitary connections shall be constructed in strict accordance with the approved plans and/or these Rules and Regulations. As a matter of convenience, the following general minimum requirements are provided:

- A. Separate service connections shall be provided to all properties in areas served by sewers.
- B. Service connections shall be ASTM D3034 SDR35 PVC gasketed sewer pipe at two percent (2%) minimum grade unless special permission of the Sanitary Engineer is obtained. No traps shall be placed in the connection and change in direction shall be made with bends with an angle equal to or less than forty-five degrees (45°). The distance between bends shall be no less than two feet (2').
- C. Service connection sewer pipe shall be a minimum of 4 inches (4") in diameter.
- D. When required by the Sanitary Engineer, manholes must be provided for commercial or industrial service connections to a street sewer to provide for inspections and/or sampling.
- E. Individual residential service connections to street or easement sewers shall not be made into manholes, without approval of the Sanitary Engineer.
- F. When necessary to install wyes on an existing sanitary sewers, the wye shall be installed only by the Sanitary Engineer upon payment of the sewer tap fee.
- G. Service connection sewers from wash racks, grease racks, loading docks, commercial or industrial installments, restaurants or any other facility where grease, oil and/or petroleum waste products could be discharged must install appropriately sized grease interceptors and/or traps preceding the connection to the sanitary sewers.
- H. All sanitary service connections shall have a minimum of three feet (3') of cover over their entire length. If cover is less than three feet (3'), the pipe shall be insulated on three (3) sides and capped with a minimum twelve inches (12") of concrete (with CCSE approval only). A clean out within five feet (5') from exit point of house is required.
- I. Yards or parking areas shall not be drained through building sanitary sewers but shall be independently sewered with building storm drains to a separate storm drain system.
- J. Clean-outs shall be provided at the street, at a change in alignment, within five (5) feet

of point of exit of service line from structure and/or at locations which will insure a maximum distance between clean-outs of one hundred feet (100'). Clean-out caps shall be set at or above finish grade and shall be water-tight. Clean-outs in pavement shall be enclosed in an appropriate traffic-bearing casting and lid.

- K. Schedule 40 PVC from internal building plumbing shall change to ASTM D3034 SDR35 PVC with gasketed joints within thirty inches (30") of the outside face of the building with a gasketed SDR-35 to Schedule 40 adapter. If building is a residential house, schedule 40 PVC is still permitted.
- L. All sanitary sewer building connections shall be located a minimum of:
 - Ten feet (10') from gas lines.
 - Five feet (5') from lot lines.
 - Fifty feet (50') from private well.
 - One hundred feet (100') from public or semi-public well.
- M. No gravity flow sewer connection permit shall be issued where the basement floor elevation is less than 4 feet above the invert elevation of the collector sanitary sewer line or where the 6-inch service lateral has a grade less than 1.0 percent. All buildings having a basement floor elevation or sewer lateral elevation where it exits the building of less than 4 feet, but not less than 2 feet above the invert elevation of the collector sanitary sewer, may be granted a gravity flow connection permit if the owner, at his expense, installs a backflow valve in the lateral line acceptable to the Clinton County Sewer District. The site plan shall show the location of the backflow valve in the lateral line. It must be placed within the owner's property and located inside the structure to be connected. The owner shall be responsible for the maintenance and repair of the backflow valve. The district shall not be liable for any malfunctioning or repairs of the backflow valve.

4.6 Inspection of Connections

- A. All work shall be inspected by an authorized inspector representing the Sanitary Engineer. The sewer contractor shall provide notice to the Sanitary Engineers Permit Office at least twenty-four (24) hours prior to the desired time of inspection.
- B. No connection shall be covered with stone until inspected and approved by the Sanitary Engineer's Inspector. The actual tapping of a connection into the main sewer shall be completed only by a representative of the Sanitary Engineer. All materials and workmanship in making of a sewer service connection shall be in strict accordance with the Standard Specifications. All service connection piping shall be connected using premium gasketed joints.
- C. The Sanitary Engineer shall be the final judge to decide if materials and workmanship conform to design criteria and standard specifications and shall have the right to inspect the same at all times.
- D. The Sanitary Engineer shall have free access to all buildings and fixtures connected to the sanitary sewers, to inspect said fixtures and take samples of any wastes entering the sewer. Should access be denied, these services shall be discontinued and not restored until such time as access is granted.

4.7 Use of Sanitary Sewer Connection

- A. The sanitary sewers shall be used for all water borne wastes from water closets, urinals, slop sinks, lavatories, bath tubs, refrigerator drips, soda fountains, drinking fountains, sinks, etc.; whether from residences, factories, or business buildings, schools or public buildings, and for no other purpose except by written permission of the Sanitary Engineer. Wastes from said fixtures shall not be permitted to enter the storm sewers.
- B. Wastes which are likely to cause damage to or stoppage of sewers or which may interfere with the treatment of the sewage shall not be permitted to enter the sanitary sewers. Should such wastes be discovered by the CCSE, the sewer discharging said waste shall be disconnected and the offending waste shall be treated or otherwise disposed of by the owner.

4.8 Storm Water Connection Prohibition

Roof drains, ground water runoff, catch basin drainage, yard drains, down spout water from roofs, cistern overflows, subsoil drains, water from foundations, loading dock floor drains, and any other clean water connection shall not be connected to the sanitary sewer system.

4.9 Septic Tank Collections

- A. No person, firm or corporation shall discharge septic tank or holding tank wastes into any manhole or other appurtenance of any sanitary sewer.
- B. When an existing home being served by a septic system is to be connected to the sanitary sewer system, the septic tank must be pumped clean, crushed and backfilled with dirt, sand or stone. The backfilling of the septic tank or cesspool must be completed to the satisfaction of the Clinton County Sewer Department.

4.10 Individual Sewer Connections

- A. Each single family residential dwelling unit and each separate industrial or commercial establishment must have a separate and individual sewer connection to the County maintained sanitary sewerage system. Each connection shall be maintained by the property owner. It is the intent of this Regulation to provide each dwelling, industrial or commercial unit with a separate and distinct connection to the County maintained sewerage system whether or not the unit is located in the same structure with other units. The Sanitary Engineer may, on a case-by-case basis, authorize exceptions to this Regulation, when satisfied that the intent of the Regulation is not violated. Each dwelling, industrial or commercial unit will have maintenance responsibility for its own sanitary sewer connection.
- B. The Clinton County Sanitary Engineer shall require the following relative to specific individual sewer connections:
 - 1. Single Family Residential - A plot plan showing topography, the location of the proposed house relative to the road right-of-way line, first floor elevation and basement elevation if plumbing is proposed for basement service.

2. Condominiums, apartments, and any other type of multi-family residential construction shall submit plans including number of units, number of suites, type of building (two-story, three-story, two-story garden, etc.), set backs from existing or proposed sanitary sewers and any other information the Clinton County Sanitary Engineer may require to verify the service size and location. The Sanitary Engineer may require more than one (1) connection, a private collector sewer and manholes depending on the size and configuration of the building to be served. Apartment owners are responsible for all aspects of sewer service on the apartment premises. This includes payment of sewer bills, maintenance of the sewer system, etc.
3. Commercial and industrial buildings shall submit site plans with topographic information, building details and plumbing plans along with any other information the Clinton County Sanitary Engineer may require to verify the service connection size, volume and nature of wastewater to be discharged.
4. Where a connection is proposed to service more than one (1) customer, the Sanitary Engineer may consider the connection as a sanitary sewer extension. The sanitary sewer would then be sized for the service area and be required to be installed in an easement provided to Clinton County for the purpose of maintenance of the sanitary sewer extension.
5. Where a single-family home, or individual commercial or industrial building, cannot be connected to the sanitary sewer system by gravity, the Sanitary Engineer will consider grinder pump stations with a public force main connection to the sanitary sewer. As a minimum, the grinder pump station shall be simplex arrangement for residential, or duplex arrangement for commercial/industrial with audible and visual alarm to indicate pump or other system failures. A ball valve with hand operation and check valve shall be placed on the discharge lines of the pumps. The check valve shall be located between the shutoff valve and the pump. Force mains shall be minimum 1-1/2" ASTM D2241, SDR26 PVC material or HDPE if approved by the Sanitary Engineer, designed along with the pump system, to maintain scouring velocity greater than two feet (2') per second in the force main. The Clinton County Sewer District will install at property owner's expense. Clinton County Sewer District will own and maintain residential grinder pump station. Home owner is required to provide a 20 Amp, 240 volt 4 wire dedicated circuit to the control box outside of house. Grinder stations for commercial/industrial applications shall be equipped with high water alarms, and shall comply with Ten States Standards requirements.

4.11 Local Sewer Construction Charge

Any building, located on any property which was not assessed when the sewer was constructed by the County, or a private individual under contract with the County, shall pay a special local sewer construction charge per Equivalent Residential Unit (ERU) prior to the issuance of a sewer permit. The amount of said charge to be fixed by the County Commissioners. Said charge shall be based on the cost of constructing the sewer to which the tap is made and the volume of wastewater to be discharged by the permit application. Said local sewer construction charge shall be in addition to any permit or tap-in fees established for treatment, sanitary sewers, pump

stations, and/or work performed by the County.

4.12 Bedding and Backfilling

The bedding and backfilling requirements of the Standard Specifications for sanitary sewer shall apply for sanitary sewer connections. Bedding of sanitary sewer connections shall consist of #57 or #8 limestone.

4.13 Connection with Plumbing

If a sanitary connection is made into a structure for which the rough interior plumbing has not been completed, the end of the connection shall be sealed with a gasketed cap or in a manner approved by the Sanitary Engineer until final plumbing construction is complete. The connection between the interior plumbing and the building connection shall be made at a point approximately thirty inches (30") outside the outer face of the foundation wall.

4.14 Sewer-Tap Installations

- A. Where it is necessary to install a wye on an existing sanitary sewer within the right-of-way, the installation shall be completed by the Clinton County Sewer District at the owner's expense, upon payment of all applicable fees. Applications for sewer-taps must be made at least five (5) working days in advance of the actual tapping operation. The sewer-tap will be made by the Sanitary Engineer's office in the excavation prepared by the Contractor for the property owner.
- B. The Contractor must be present at the work site when the tap is made, and the excavation shall be prepared by the Contractor in such a manner that;
 - 1. The main sewer is exposed around its total circumference so the tapping machine can be attached to the pipe.
 - 2. Sufficient working room is provided to make the tap. The size of the excavation necessary will vary depending on the depth of the main sewer and the soil conditions.
 - 3. It is the Clinton County Sanitary Engineer's policy that all excavations deeper than five feet (5') performed in connection with water and sewer taps shall be properly boxed, shored, or laid back to the satisfaction of the Sanitary Engineer's representative at the work site.

Clinton County will perform all work in the right-of-way at owner's expense.

4.15 Incidental Work to the Installation of Sewer Connections

The Clinton County Sewer District will perform all work at owner's expense.

- A. All pavement replacement, protection of structures and all other work incidental to the installation of the sanitary sewer connection shall be accomplished by the Contractor in the manner specified in the Standard Specifications.
- B. It is the Contractor's responsibility to replace, reconstruct, repair and/or perform any

other work necessary to complete the proposed project and restore the site to its original condition. The presence of, or inspection by, the Sanitary Engineer or his authorized inspector, does not relieve the Contractor of this responsibility nor does CCSE inspection verify the grade at which the connection is installed.

- C. In the event that Standard Specifications do not exist to cover a specific construction or restoration situation, the Contractor shall inform the Sanitary Engineer, who will then specify how the work is to be accomplished.
- D. Should the project be of such magnitude or complexity that the Sanitary Engineer feels it is warranted, he may require that the proposed construction route be videotaped prior to construction to assure the adequacy of restoration. The Owner shall bear the cost of all videotaping.

4.16 Contractor Safety/Liability

Contractors shall fill, cover or otherwise protect any excavations which he may make in the public streets, roads, or alleys, with sufficient barriers and shall maintain warning lights at night as required under the road authority's specifications. He shall take all necessary precautions to guard the public effectually against all accidents from the beginning and continuing until the completion of the work. The Contractor may only install sewer service connections on the condition that he is held responsible for all damages that may result from his neglect from taking any or all reasonable precautions against any accident to persons, animals, vehicles, or property of any kind.

SECTION 5 – WATER SYSTEM

5.1 General

- A. No physical connection shall be made between any other source of water or liquid and the County water supply piping. No spigot or outlet shall be physically connected to a drain or sewer.
- B. There shall be no electrical grounding of direct current permitted on the water system or any private extension thereof.
- C. Any consumer may have a service discontinued by request to the Sanitary Engineering Department. The meter will be removed and water shut off at the curb stop by the Sanitary Engineering Department. Should it not be possible to obtain a final reading, a final billing will be estimated on the time elapsed since the last reading and the estimated consumption as determined by the Sanitary Engineering Department. The final billing shall not be less than the fixed charges prorated for the time the water was used.
- D. Meter readings will normally be taken monthly and as near the same date as is practicable. If the meter reader is unable to obtain a reading because a meter is non-functioning, it will be replaced and the amount of water consumed will be estimated. If the meter reader cannot gain entrance, he will leave a card upon which the User may record the meter reading and return it to the Sanitary Engineering Department. The Sanitary Engineering Department will base its current bill upon the reading sent in by the customer. If a card is not returned, the bill will be estimated based upon past consumption records. This will be done for not more than three (3) consecutive meter reading periods. Meters must be read at least once a year. For meters not read at least once in each twelve months, the County will have the service discontinued.
- E. The Sanitary Engineering Department shall make a charge for any service requiring a special trip to the property, such as temporary shut offs. Only an authorized agent of the Sanitary Engineering Department may turn on water to any premises.
- F. A list of all current charges, fees, and rates for the various water services performed are on file in the Sanitary Engineering Department office. These charges, fees and rates are subject to amendment by the County Commissioners of Clinton County, Ohio and are not to be construed as being fixed for an indefinite period of time.
- G. All meters must be accessible at all times. Failure to comply will be cause for discontinuing service, which will not be resumed until the trouble has been remedied.

5.2 Design Criteria for Water Mains

Adequate public water service shall be provided for all lots in conformance with the latest edition of the "Recommended Standards for Water Works" and the following criteria

- A. All water mains shall be ductile iron.
- B. All water mains and appurtenances shall be constructed in accordance with the rules, standards, and specifications of Clinton County and shall be approved by the County Sanitary Engineer prior to acceptance by the County Commissioners.
- C. Valved service connections shall be provided for each lot and shall be installed to the property line at the time the water main is installed.

- D. The standard minimum size of mains shall be 8 inches. Line sizes may need to be larger than the minimums to allow for future growth outside of the proposed development or to provide the needed fire hydrant flows. If larger line sizes are required for future growth, the County will anticipate in the cost of oversizing.
- E. Minimum cover shall be 48 inches.
- F. Wherever practical, water mains shall be laid within the public right-of-way between the edge of pavement and the sidewalk.
- G. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary sewer or force main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10-foot separation, the County may allow deviation on a case-by-case basis as approved by the County Sanitary Engineer, provided that the bottom of the water main is at least 18 inches above the top of the sewer.
- H. Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossings, one full length of water pipe should be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required. At crossings of sewers and other utilities, compacted granular material is required between the deeper and shallower pipe.
- I. Valves shall be placed outside of pavement wherever practical. In general, two valves shall be installed at every main line tee. The use of crosses will not be permitted. The maximum distance between main line valves shall be 1,000 feet.
- J. At high points in water mains 12 inches in diameter or larger where air can accumulate, provisions shall be made to remove the air by means of hydrants or manual air relief valves.
- K. All tees, bends, plugs, and hydrants shall be provided with reaction blocking, tie-rods, or joints designed to prevent movement. Tie-rods shall be coated with epoxy or two coats of bitumastic material equal to Inertol No. 49 Thick.
- L. Dead ends shall be minimized by looping of all mains on an individual basis subject to approval. Where dead-end mains are approved by special permission, they shall be provided with a fire hydrant for flushing purposes.
- M. All water mains and service lines shall have a continuous 14-gauge copper wire colored blue installed. The wire shall be installed in the bottom of the pipe trench. The wire shall be looped up to the top of valve boxes and around valves and other appurtenances in such a manner that there is no interference with the operation of the valve or appurtenance. Cast iron valve boxes or cast iron tracer wire access boxes shall be used to provide a connection point to tracer wires on long pipe runs every 1,000 feet. Splices to tracer wire shall be joined by twisting together then installing a silicon filled twist on connector.
- N. All water service lines and main line pipe shall have a detectable metallic marking tape installed 18" above the top of pipe or service line and labeled "water". At the end of each service location, the marking tape shall be extended into meter boxes. The tape shall be in addition to the tracer wire.

5.3 Water Meters

- A. No meter shall be set until final inspection of the water service and/or meter pit has been made and approved and an application for service filed. It is a violation of these rules and regulations for anyone to move into any structure until after County inspection, approval and acceptance for metering.
- B. Any meter violation shall be considered as tampering with the water system and shall carry the penalty as outlined in Section 2.
- C. Meters are owned and installed by the Sanitary Engineering Department. The installation charge will be reflected on the customer's first bill. A schedule of such charges is available at the Sanitary Engineering Department.
- D. Service lines shall be a minimum of one inch (1") diameter from the main to the meter. In copper service lines, maximum lengths must be used from main to curb stop and from curb stop to meter assembly. No couplings are permitted under pavement. (Exception: existing three-fourths inch (3/4") service stubs may be extended to the meter with three-fourths inch (3/4") copper type K to the meter assembly)
- E. It will be necessary to show water services including the existing main(s) and service line(s), size, curb stop and meter pit location or inside meter room on construction plans for commercial, industrial, multi-family developments and cul-de-sacs in single family residential developments.
- F. All new domestic water service material specifications and inspection up to and including shut-off or by-pass connection on the customer's side of meter shall conform to Sanitary Engineering Department's regulations
- G. A reduction of meter size one size smaller than the service line is permitted. The spread shall be the same size as the service piping size (i.e., if the service is a two inch (2") diameter size, which would allow a one and one-half inch (1 1/2") meter set; the meter spread shall be the two inch (2") service size). This is for one and one-half inch (1 1/2") diameter or greater services. When a meter size reduction is installed the contractor/plumber shall furnish and install the necessary reducers, piping gaskets, etc.
- H. Sewer and water services must have ten feet (10') minimum horizontal separation. If this is not attainable, a minimum twelve inch (12") vertical separation with the water service above the sewer service (shelved in the trench). Fire and domestic water service lines must have a minimum three-foot (3') horizontal separation. Service lines shall be a minimum of five feet (5') from existing or proposed side property lines.
- I. Water laterals are to be perpendicular to the main from the main to meter location where practical. All others will be reviewed on a case-by-case basis and must be shown on construction plans.
 - 1. The curb stop shall be located at the right-of-way or easement line and consistent throughout the development.
 - 2. Meter pit location shall be three feet (3') maximum from curb stop unless approved by the Sanitary Engineering Department at another location. No obstructions or landscaping shall be placed on the meter pit cover at any time. Meter pits are not to be located in open drainage swales and ditches, or in detention/retention basins.
 - 3. All piping, valves, meters, etc., must have eighteen inch (18") minimum clearance, except as approved or required by the Sanitary Engineering Department.

4. Meters (domestic, deduct and/or monitor meters) may be installed inside of structure provided the following requirements are met:
 - a. Domestic meters (if only domestic service) must be one and one-half inch (1 ½") minimum to be located inside a building and meet all other requirements. Exception: Meters smaller than one and one-half inch (1 ½") may be located inside a building only when there is a combination fire line/domestic service line with the detector check assembly is located inside the building (must still meet all other requirements).
 - b. The riser or first flange must be located next to the outside wall where their service line enters the building.
 - c. The centerline of the meter(s) cannot be located more than four foot six inches (4'-6") above the finished floor.
 - d. All domestic and deduct meters must be installed horizontally with the dial to the top. Monitor meters may be installed vertically as part of the double check-detector assembly.
 - e. All meters must be located within the same room inside the structure. The meter may not be placed in an unheated space, garage, vehicle area, etc. when there is a likelihood of the service line freezing.
 - f. The maximum distance allowed between the property line (right-of-way or easement line) and the meter(s) location is one hundred feet (100').
- J. All meter pits are to be located in non-traffic areas, wherever possible.
- K. Meters can only be relocated closer to a source of supply provided it reduces the amount of plumbing required.
- L. Recommended number of meters:

Service Size	Number of Services and Meters (same structure)
1"	Service = 2
1 ½"	Service = 3 or 4
2"	Service = 5

No more than five (5) meters are recommended on any one service branch, with each structure having its own service. Each meter must have a curb stop in addition to the main service line curb stop at easement or right-of-way line. If more than the recommended number of meters is proposed, the plumber must supply calculations to verify adequate flow.
- M. No private water lines shall be installed on any private property other than the one being served and cannot cross property lines.
- N. Each service with a one and one-half inch (1 ½") or larger meter shall be provided with an equal size by-pass; exception, one and one-half inch (1 ½") or two inch (2") service which uses "coppersettlers", may have a one inch (1") (min) bypass line. The by-pass must be valved so that it can be sealed to prevent its use by anyone except Sanitary Engineering Department personnel.
- O. When a service is installed to a meter, and the customer wishes to use a larger or

smaller service line to the building, the service shall be enlarged or reduced after (towards the structure) the meter assembly.

- P. No earthen materials shall be placed over the meter pit unless structural certification is submitted and approved.

5.4 Special Water Meters

- A. Water-only meters will be permitted for irrigation or other special situations as approved by the Sanitary Engineer.
- B. Customers who use large amounts of water for lawn sprinkling, air conditioning, etc., may realize considerable savings in sewer charges by having a separate meter installed to measure this water, since sanitary sewer charges are based upon the amount of water consumed. Water so used does not terminate in the sanitary sewer system, therefore, no sewer rental charges will be rendered on this special use of water. Water-only meters must be located at the site of the domestic meter unless authorized by the Sanitary Engineering Department. The owner must bear the full cost of such installation. The meter will be provided and installed by the Sanitary Engineering Department.
- C. For customers who have pre-existing deduct meter installations, no bill adjustments will be given for malfunctioning or improperly installed meters. Deduct meters remain the property of the customers. Replacement meters must be purchased from the Sanitary Engineering Department.
- D. Remote meter reading devices for non-domestic applications will be reviewed for approval on a case-by-case basis. The plumber shall install all necessary fittings and wiring.
- E. Water-only metered service applications will be reviewed for approval on a case-by-case basis.

5.5 Meter Testing

The Sanitary Engineering Department will test and correct any meter, which in its judgment is registered incorrectly, without the consent of any customer. Also, upon request, the Sanitary Engineering Department will test any of its meters and guarantee the accuracy against any overcharge within two percent (2%). Proper refund shall be made if the test shows the customer has been overcharged. In order to protect the Sanitary Engineering Department against unreasonable demands for this service, a charge shall be made if the test shows the meter to be registering properly.

5.6 Meter Repair

The Sanitary Engineering Department has the right to repair or replace any meter where, in its judgment, it is deemed necessary. The customer shall be notified in writing if adjacent piping needs repair prior to changing the meter and advised of a non-compliance shut-off date.

5.7 Miscellaneous Appurtenances

- A. Fire Hydrant Use
 - 1. If a fire hydrant is damaged by any person, he/she shall, upon demand by the Sanitary Engineering Department, pay all costs and expenses incurred in the repair of the fire hydrant. In case of fire or inspection, the fire department shall have the right to use any hydrant, hose, pipe, or other fixture. They shall notify in writing the

Sanitary Engineering Department of any use for maintenance purposes.

2. Water may be taken from a fire hydrant after obtaining the proper permit at the office of the Sanitary Engineering Department. The applicant becomes responsible and shall pay for all water consumed at the regular rates.
3. All fire flow test must be approved by the Sanitary Engineering Department five (5) days prior to the proposed test. The permit cost for each test shall be in accordance with the latest fee schedule approved by the County Commissioners.
4. Fire hydrants shall be connected only to water mains adequately sized to carry fire flows.
5. The face of all fire hydrants shall be located not less than two feet (2') and no more than five feet (5') back of curb, except by special permission.
6. Spacing between fire hydrants shall not exceed five hundred feet (500') in single-family residential developments and shall not exceed three hundred feet (300') in multi-family residential, industrial and commercial areas.
7. No domestic service shall be taken off a fire line or fire hydrant branch. Exception would be for a combination fire/domestic service line. A hydrant branch is defined as the piping between the watch valve and the fire hydrant. Service must be before the fire hydrant's watch valve, or the fire line double detector check assembly.

B. Valve, Air Relief, Meter and Blow-off Chambers

1. Air and sediment accumulations may be removed through a standard fire hydrant, and compressed air and pumping may be used for de-watering mains through hydrants.
2. Chambers or pits containing valves, blow-offs, meters or other such appurtenances to a distribution system, shall not be connected directly to any storm drain or sanitary sewer, nor shall blow-offs or air-relief valves be connected directly to any sewer.

5.8 Fire Line Policy

A. Application of Policy and Sanitary Engineering Department Specifications

1. The installation of fire protection service connections to supply water to private fire hydrants and fire sprinkler systems shall be permitted when an application and plans for such service have been approved by the Sanitary Engineering Department.
2. Sanitary Engineering Department construction specifications shall be in effect to and including all fire lines from the main line connection up to and including the outlet valve of the double detector check assembly.
3. Testing of fire lines required by other agencies that exceed Sanitary Engineering Department standards may be used to meet Sanitary Engineering Department requirements.
4. Failure to repair a leak in a fire line within the time specified in a written notice by the Sanitary Engineering Department shall be cause for discontinuance of fire line service. Forty-eight (48) hours prior to termination of fire service, the Local fire and police departments shall be notified so as to ensure public safety.

5. The Sanitary Engineering Department does not accept responsibility for ensuring proper fire hydrant connections to lines not under its control (beyond the double detector check assembly).
6. The application of the Sanitary Engineering Department policy and specifications does not ensure conformance to Underwriter's Laboratory approval, insurance company approval, nor approval of any other agency.
7. No person other than an authorized agent of the Sanitary Engineering Department, or permit applicant shall use any fire hydrant for any purpose. Permits issued for fire hydrant use shall be carried at all times by the permit applicant.

B. Double Detector Check Valves

1. Any fire sprinkler system line or any private fire hydrant line connected to the Sanitary Engineering Department water system shall be equipped with an OEPA approved double detector check valve assembly including a monitor meter with remote read register acceptable to the Sanitary Engineer.
2. The installation shall be in such a manner as to meter low flows into the fire system and positively prohibit the illegal use of water.
3. All private fire hydrants shall be served downstream of the double detector check valve assembly.
4. The double detector check valve assembly shall be the property of the customer. Purchase and repairs shall be made at his/her expense.
5. The double detector check valve shall be Underwriter's Laboratory Factory Mutual (ULFM) approved. Acceptable brands and models are as noted on the OEPA approved list (latest edition).

C. Monitor Meters

The monitor meter shall be installed a maximum of four feet six inches (4'-6") above floor in all cases regardless of how the double detector check is installed.

D. Double Detector Check Locations

1. The double detector check shall be located in a pit on all installations where the domestic service meter is located in a pit. Both pits shall be in the same general location (twenty feet (20') maximum apart at easement or property line). It is acceptable to replace the existing meter pit with a combination fire line/domestic service inside a building provided all requirements are met.
2. A structure exempted from a pit shall locate the double detector check assembly in the structure in the same general location as the domestic meter (same room and twenty feet (20') maximum separation).

E. Pit Specifications

1. When a pit is required, detailed drawings shall be submitted and the following specifications shall be met:
 - a. Shall be of masonry construction; either pre-cast or poured in place.

- b. Shall have a masonry floor and top.
- c. Shall have a six-foot (6') minimum working height.
- d. Shall have an opening of sufficient size to permit reading of monitor meter from above ground and allow for easy removal of fittings.
- e. Lid shall be metal and lockable.
- f. Shall have a two-foot (2') x two-foot (2') sump hole with permanent sump pump.
- g. Shall have permanent steps plastic (PS1-PF) twelve inches (12") on center.

- 2. Pit may also contain a domestic meter and water-only provided drawings show there is sufficient room and meet minimum pipe separation of eighteen inches (18").

F. Combination Fire/Domestic Service

Combination fire/domestic services will be permitted. A tee and valve for the domestic branch shall be installed ahead of the inlet valve of the double detector check valve.

G. Approval/Permit Issuance

- 1. Request for approval of fire line and combination fire/domestic installations shall be reviewed after submission of detailed plans.
 - a. All underground utilities shall be shown with notation of materials used.
 - b. Pit details, where applicable, shall be shown with dimensions on all fittings and proper separation of piping (eighteen inch (18") minimum).
- 2. Permits will be issued after:
 - a. Detailed plans are approved.
 - b. Payment is made for all applicable fees (inspection, flush test, monitor meter, etc.).
 - c. Permit applicant is properly bonded.

H. Service Charges

- 1. All private fire lines and private fire hydrants connected to the water system shall be subject to minimum charges.
- 2. The usage recorded on the monitor meter shall be charged at the normal rate. Such meters shall be subject to minimum charges.
- 3. There shall be no charge for water used in the extinguishment of a fire.
- 4. Failure to pay fire line or hydrant charges within the specified time shall be cause to terminate service.

I. Dry System and Anti-freeze

- 1. Dry systems or anti-freeze systems are required on all installations subject to freezing. Anti-freeze shall be food-grade acceptable by the Ohio EPA.
- 2. The use of anti-freeze requires the installation of an approved reduced pressure assembly on the anti-freeze leg or a reduced pressure detector assembly at the service connection. This will be reviewed on a case-by-case basis.

J. Extensions/Additions

1. Fire line extensions and/or additions of private outside hydrants, as well as fire sprinkler system additions, shall be reviewed as an entire system.
2. Plans for the entire private fire system shall be provided to show that all requirements of the fire line policy are met.
3. Expansion of systems with no existing detector check assembly shall be required to install a double detector check assembly in a location approved by the Sanitary Engineering Department.

5.9 Backflow Prevention

A positive means of backflow prevention must be provided to ensure there is no possibility of a backflow through the monitor meter.

5.10 Deviations

- A. Any deviation from this section shall be reviewed and considered on a case-by-case basis.
- B. Additional requirements may be imposed to ensure the health, safety, and interest of the Sanitary Engineering Department and General Public.

5.11 Billing Methods and Procedures

- A. Owners of property shall be held responsible for water used on their premises, but statements may be mailed to another designated person, such as a tenant or agent. If a tenant does not pay in accordance with the Rules and Regulations of the Sanitary Engineering Department, the owner shall be responsible for all delinquent charges, even if he was not the owner when they were charged. Delinquent accounts against property shall be just-cause for terminating water service. The water rate schedule is available upon request at the office of the Sanitary Engineering Department.
- B. As soon as practical, after reading the meter, a statement of the amount due shall be sent to the billing address on file in the Sanitary Engineering Department. If the bill is not paid by the date specified thereon for prompt payment, which date shall be no less than twenty-one (21) days from the date of rendition, a notice of service termination shall be sent. Such notice shall contain the date of service termination, which date shall be no less than forty-one (41) days from the date of bill rendition. If a bill remains unpaid on the date specified for service termination, the water will be turned off and not turned on again until all bills and charges are paid. A fee is paid on or before the dates set forth in this section if the payment is received by the county treasurer on or before the last day for payment of such fee, or if the payment is received after such date in an envelope that was postmarked by the United States postal service on or before the last day for payment of such fee. In the event there is more than one date of postmark on the envelope, the earliest date imprinted by the United States postal service shall be the date of payment. A private meter postmark on an envelope is not a valid postmark for purposes of establishing the date of payment of such fees.
- C. When water has been turned off for any violation of the Rules and Regulations or failure to pay charges, the owner or occupant of such premises shall pay a fee for turning the water on. If all charges are not paid within two (2) weeks from the date the water is shut off, the meter will be removed or locked off. If the Sanitary Engineering Department is unable to obtain the meter, a notice shall be delivered to the property stating that arrangements must be made for removal or lock off of the meter within the

next fourteen (14) days, and a duplicate copy of the notice shall be mailed to the address where the bill is regularly sent. All charges provided elsewhere in these Rules and Regulations shall be in full force and effect until the date the meter is removed or locked off and all charges, including a meter set charge, if the meter has been removed, shall be paid before service will be renewed.

- D. Should the Sanitary Engineering Department be unable to render monthly bills because of labor shortage or some other deficiency in the Sanitary Engineering Department, the bill may be rendered for a shorter or longer period but at the same quarterly rate.
- E. Estimated bills will be corrected if the customer makes request for correction before the net due date and presents satisfactory evidence to the Sanitary Engineering Department that the estimated bill differs from conditions prevailing during the period used as basis for the bill.
- F. Partial payments when approved by the Sanitary Engineering Department may be accepted, but bills must be paid in full before the service termination date.
- G. A late charge of ten percent (10%) shall be added on all water bills which are not paid by the date specified on the bill. The date shall not be less than seven (7) days from the date bills are rendered. A fee is paid on or before the dates set forth in this section if the payment is received by the county treasurer on or before the last day for payment of such fee, or if the payment is received after such date in an envelope that was postmarked by the United States postal service on or before the last day for payment of such fee. In the event there is more than one date of postmark on the envelope, the earliest date imprinted by the United States postal service shall be the date of payment. A private meter postmark on an envelope is not a valid postmark for purposes of establishing the date of payment of such fees.
- H. If it has been necessary to turn off the service at the corporation stop by digging down to the main, the turn-on charge shall cover all expenses incurred and shall be in addition to the fees enumerated in the schedule of charges.
- I. When more than one party is supplied with water from the same service pipes and one of the parties, so supplied, fails to pay the bills when due, or fails to comply with the Rules and Regulations of the Sanitary Engineering Department, the water shall be shut off from such service pipes without liability in damage to any of the other parties services by such pipes.

5.12 Repair and Maintenance

- A. The Sanitary Engineering Department shall maintain all water mains within public right-of-ways or within easements reserved or granted to Clinton County. No maintenance will be done on water mains that do not lie within easements or dedicated right-of-ways. These lines shall be maintained by the owner. Service shall be discontinued until repairs have been completed to the satisfaction of the Sanitary Engineering Department.
- B. If a break or leak occurs in any service line between the main line and the outlet side of the curb stop shutoff, the Sanitary Engineering Department will repair this at no expense to the owner of the property. The owner will be required to pay all costs of repair to a service line on his property (curb box shut-off to a structure). The Sanitary Engineering Department shall not be responsible for breakage of pipes or valves occurring during removal or installation of meters, or resulting from restoration of service where such breakage is due to old or faulty plumbing.
- C. All charges for repairs to damaged meters must be paid when the next bill comes due.

- D. Damage to water meters resulting from improper connections between boilers and furnaces or other appliances shall be the responsibility of the consumer and repairs will be charged to the owner.
- E. No extensions, alterations, or repairs shall be made to any water pipes or fixtures between meter and curb stop except by a licensed and bonded plumber and/or with the approval of the Sanitary Engineering Department.
- F. The Sanitary Engineering Department is responsible for the water main, and water services up to and including the curb stop and the curb box. Any water service from the curb stop to a structure is the customer's responsibility.
- G. The property owner is responsible for the meter pit. If the meter pit is buried or is inaccessible, they shall be notified to have the defect corrected. Meter pits must be accessible at all times.
- H. When a residential or commercial water meter (one inch (1") or less) is located inside a structure and a repair is required to the outside underground piping, the water meter shall be relocated to an outside meter pit. The customer shall be responsible for the associated costs.
- I. If a leak occurs on the customer's side of the curb stop, they shall be required to repair the service line within thirty (30) days of written notification, or the water shall be turned off until the repair is made. Service shall be discontinued until repairs have been completed to the satisfaction of the Sanitary Engineering Department.

5.13 Tampering With the System

- A. No person other than an authorized agent of the Sanitary Engineering Department may connect to any of its water lines without proper authorization. Tampering with or removal of any meter or parts thereof, or any seal, or insertion of a meter by-pass without permission of the Sanitary Engineering Department shall carry a penalty provided in Section 6103.29 of the Ohio Revised Code (O.R.C.). A tampering violation is also just-cause for having water service discontinued.
- B. If the Sanitary Engineering Department finds that a meter seal has been broken, a connection installed ahead of the meter, an unauthorized jumper bar is inserted in the meter spread, a bypass valve opened without its permission, or there is evidence that the meter has been tampered with, the water will be shut off and will not be turned on again until the customer or owner of the premises pays for the estimated quantity of water which has been used and not registered, and in addition, shall pay a fee for turning on the water and may be required to upgrade the water service to current specifications. The criminal laws of the State of Ohio provide severe penalties for tampering with water meters, meter seals, valves, and other devices in the water system. The penalties herein provided are in addition to the penalties provided by the criminal laws of the State of Ohio, and the payment of penalties herein mentioned will not in any way relieve any person from prosecution.
- C. No person shall unlawfully secure a supply of water through a corporation stop, curb stop, valve or other device after it has been closed for the violation of the Rules and Regulations of the Sanitary Engineering Department without first having secured the necessary permit from the Sanitary Engineering Department.
- D. When a water service is locked off by Clinton County and then the lock is removed or broken, by someone other than Clinton County personnel, the customer will be charged

in accordance with the Sanitary Engineering Department fee schedule and may be required to upgrade the water service to current specifications.

5.14 Guarantee of Supply

The Sanitary Engineering Department does not guarantee a fixed pressure or continuous supply of water, but will, in an emergency, endeavor to notify affected customers. Those using steam boilers, gas engines, or other equipment whose operation depends on a supply of water direct from the service line should have a storage tank of sufficient gallonage to have an ample supply for an emergency, as no claims will be considered for damage arising from such shortage.

5.15 Backflow Prevention and Cross Connection Control Policy

- A. As a condition for water service, the Sanitary Engineering Department Water Distribution system must be protected from backflow. The Sanitary Engineering Department requires all services connected to the distribution system to conform to the standards of the Sanitary Engineering Department up to and including the meter of fire line detector check valve or private fire hydrant. All plumbing installed after the meter shall conform to the State of Ohio Plumbing Code as described in Ohio Administrative Code Chapter 4101:2 or the latest revision thereof, or Local Plumbing Codes, whichever applies. Fire lines shall conform to the current NFPA Standard or the Sanitary Engineering Department Rules and Regulations, whichever controls.
- B. In addition to the above, all cross connections to auxiliary potable or non-potable or hazardous water systems as outlined in Ohio EPA regulations Chapter 3745-95 or latest revision thereof, must be protected from backflow by a method approved by the Sanitary Engineering Department. Backflow prevention devices must be listed on the Ohio Environmental Protection Agencies most current list of approved devices.
- C. Further, if in the judgment of the Sanitary Engineer or his representative, the customer's premise is deemed an actual or potential hazard to the safety of the water distribution system; such customer shall be ordered to protect the system from backflow in an approved manner. Notification shall be given with a compliance time by the Sanitary Engineering Department. If the hazard is deemed to be of a serious nature or the customer refuses to cooperate with the Sanitary Engineering Department, the service shall be shut off immediately and remain off until the customer's premises are in compliance.
- D. Backflow prevention devices shall be tested at the expense of the customer every twelve (12) months by a certified tester, and rebuilt on a schedule specified in Chapter 4101:2 of the Ohio Administrative Code. The customer shall be notified by the Sanitary Engineering Department of a date to test backflow prevention devices on the customer's premises and given thirty (30) days to comply. At the end of thirty (30) days if the customer does not submit proof that backflow prevention devices have been tested, a fine of an amount outlined in our ancillary fee schedule shall be assessed for each untested device. If the backflow prevention devices are not tested within thirty (30) days of notification and certified operational, the service shall be shut off and the service shall not be resumed until all devices are tested.
- E. Temporary connections to the County water distribution system shall be protected against backflow by means of an air gap or other means approved by the Sanitary Engineering Department.

SECTION 6 – WATER SERVICE

6.1 Contractor Registration

The conditions of Section 4.2, Contractor Registrations, shall apply to those intending to install or repair water service connections.

6.2 Water Connection Permit

- A. Connection to any water main or repair or removal thereof, shall not be performed without a permit from the Sanitary Engineer. The Contractor or the Owner shall make written application for each permit and fees will be charged for any such permit to cover the costs of issuance and inspection. The Contractor or the Owner shall also secure and provide a copy of a road opening permit from ODOT, the Clinton County Highway Engineer, or Township, whichever has roadway jurisdiction prior to Clinton County scheduling a water tap.
- B. Existing record and location information is not guaranteed by the Clinton County Sanitary Engineer. Contractor is cautioned to conduct field investigation to locate before digging.

6.3 Permit Revocation

- A. Application for a permit shall be made on the prescribed form and shall include legible plans and specifications for the work, showing location and character of the construction. Any misrepresentation in such application shall constitute sufficient grounds for revocation of the Contractor's registration and any permits issued.
- B. Permits shall be kept on the job at all times while work is in progress. The permit shall become void if the work is not completed and the meter set and approved within one hundred eighty (180) days of date of issuance. The permit fee shall not be refunded.
- C. For work that is incomplete after 180 days, Clinton County will turn off the curb box and remove the top curb box section. If in the future, the Owner pursues water service to the property, the Owner will be responsible to obtain a new permit and pay any adjustment in tap in fees.

6.4 Inspection

- A. All work performed shall be inspected by an authorized inspector representing the Sanitary Engineer. The Contractor shall notify the Sanitary Engineer of the need for an inspector, and for a meter set, at least three (3) working days prior to the initiation of construction, between the hours of 9:00 am and 4:00 pm weekdays, excluding holidays. The water connection shall not be covered with earth until inspected and approved. The actual tapping of a connection into the water main shall be completed by a representative of the Clinton County Sanitary Engineer.
- B. All materials and workmanship in the making of a water service connection shall comply with the Standard Specifications. The Sanitary Engineer shall be the final judge in determining that the quality of all materials and workmanship used in water service connections conform to the design criteria and specifications and shall have the right to inspect the same at all times.
- C. The Sanitary Engineer or his representative shall have free access to all buildings and fixtures therein connected with the water main and to inspect said fixtures. The Sanitary Engineer shall investigate the water piping system of the building to verify that no other

water supply such as a well, cistern, etc. is connected to the water supply of the County. The water contractor or property owner shall assist the representative in this investigation. The presence of a cross connection shall be reason for rejection of the entire building connection.

6.5 Contractor Responsibility

Contractors shall at all times abide by all parts of these Rules and Regulations. Failure, within a reasonable time after being notified by the Sanitary Engineer, to correct violations shall result in the Contractor being charged for all costs, such as may be incurred by the Sanitary Engineer, for correcting said violations. Contractor registration shall be revoked if said charges are not paid.

6.6 Individual Water Connections

- A. Each single family residential dwelling and each separate industrial or commercial establishment shall have a separate and individual water connection to the County maintained water supply system. It is the intent of this Regulation that each dwelling, industrial or commercial unit, will have maintenance responsibility for its own water connection whether or not the unit is located in the same structure with other units. The Sanitary Engineer may, on a case-by-case basis, authorize exceptions to this Regulation, when satisfied that the intent of the Regulation is not violated.
- B. The Clinton County Sanitary Engineer shall require the following relative to specific individual water connections:
 - 1. Single Family Residential - a plot plan showing topography, the location of the new house relative to the road right-of-way line, first floor elevation and the difference in elevation between the highest occupied floor level and the street pavement elevation.
 - 2. Condominiums, apartments, and any other type of multi-family residential construction shall submit plans including number of units, number of suites, type of building (two-story, three-story, two-story garden, etc.), set backs from existing or proposed water mains and any other information the County Sanitary Engineer may require to verify the service connection size and to determine the proper meter placement. Apartments shall have no less than one (1) meter per structure. The Sanitary Engineer may require more than one (1) connection and one (1) meter per structure depending on the size and configuration. The apartment owner is responsible for all aspects of water service to the premises. This includes payment of water bills, maintenance of the plumbing system, etc. Condominiums shall be treated as single-family units, receiving standard single-family connections for every unit. Facilities owned by the condominium association will get a separate connection and be billed to the condominium association (I.E. recreation rooms, swimming pools, etc.).
 - 3. Commercial and industrial buildings shall submit site plans with topographic information, building details and plumbing plans along with any other information the County Sanitary Engineer may require to verify the water demand, service connection size, determine meter placement or backflow device type.
 - 4. Where a connection is proposed to service more than one (1) customer, the Sanitary Engineer may consider the connection as a Water Main Extension. The waterline would then be sized for the service area and be required to be installed in an

easement provided to Clinton County for the purpose of maintenance of the water main extension

6.7 Local Water Construction Charge

Any building, located on any property which was not assessed when the water main was constructed by the County, or a private individual under contract with the County, shall pay a special local water main construction charge prior to the issuance of a water permit. The amount of the charge shall be fixed by the County Commissioners, and is to be based on the cost of constructing the water main to which the tap is made and the volume of water to be utilized. This local water main construction charge shall be in addition to any permit fees or any other fees or tap-in charges established for treatment, transmission facilities, storage, or other work performed by the county.

6.8 Incidental Work to the Installation of Water Connections

- A. All pavement replacement, maintenance, protection of structures, removal of structures, and all other work incidental to the installation of the water connection shall be accomplished by the Contractor in the manner specified in the Standard Specifications. It is the Contractor's responsibility to replace, reconstruct, repair and/or perform any other work necessary to complete the proposed project and restore the site to its original condition. The presence of or inspection by the Sanitary Engineer or his authorized inspector does not relieve the Contractor of this responsibility.
- B. In the event that Standard Specifications do not exist to cover a specific construction or restoration situation, the Contractor shall inform the Sanitary Engineer who will then specify how the work is to be accomplished.
- C. Should the project be of such magnitude or complexity that the Sanitary Engineer feels it is warranted, he may require that the proposed construction route be video-taped prior to construction to assure the adequacy of restoration. The Owner shall bear the cost of all video taping.

6.9 Contractor Safety/Liability

Contractors shall fill, cover or otherwise protect any excavations which he may make in the public streets, roads, or alleys, with sufficient barriers and shall maintain warning lights at night as required under the road authority's specifications. He shall take all necessary precautions to guard the public effectually against all accidents from the beginning and continuing until the completion of the work. The Contractor shall be held responsible and shall hold the County harmless for all damages that may result from his neglect from taking any or all reasonable precautions against any accident to persons, animals, vehicles, or property of any kind.

6.10 Water Connection Materials

Water service connection, prior to the meter, two inches (2") or less in nominal diameter shall be type K copper and joints must be flared or compression type (no solder joints). Connections larger than two inches (2") shall be of a heavy brass, type K copper, or ductile iron, all as specified in these Rules and Regulations. Connections after the meter may be of the aforementioned materials or ultra-high molecular weight polyethylene type 3406, with a rated capacity of 160 PSI. When tapped into ductile iron pipe, the tap, corporation stop and the first three feet (3') of copper pipe shall be spray coated with a tar coating.

6.11 Water Connection Locations and Depth

All water service connections shall be buried a minimum of forty-eight inches (48") below proposed finished grade and located a minimum of:

- A. Ten feet (10') from Gas Lines.
- B. Five feet (5') from lot lines.
- C. Ten feet (10') from sewer lines, unless the water line can be benched two feet (2') above sewer in same trench and two feet (2') horizontally from sewer.
- D. Taps on the main shall be made a minimum of three feet (3') from pipe bells and three feet (3') from other taps on the main.
- E. Curb boxes shall have forty-eight inches (48") cover to finish grade and be in good operating condition at the time the meter is set.

6.12 Abandoning Wells and Cisterns

When a water service connection is extended to an existing home or building from the Clinton County Water System, the existing water supply shall be completely separated from the County's water system. After the water service connection has been completed and inspected, the previous water supply system shall not be re-connected directly or indirectly to the County's water system. Wells or cisterns may be maintained for purposes such as, lawn sprinkling or other non-potable use provided complete segregation is maintained from the County's water system. No valve separating the two (2) systems will be allowed.

6.13 Curb Connection Installations

When it is necessary to install a tap on an existing water main, the tap shall be installed by the Sanitary Engineer, or his authorized representative, only upon payment of the applicable charges and fees.

6.14 Single Residence Connections

- A. The standard water service connection for a single family residence shall be constructed of one inch (1") copper pipe, type K, of one (1) continuous length. If a residence is set back from the main over 150 feet, or water pressure at the street is marginal, the Sanitary Engineer may require a larger size connection to overcome frictional losses and/or the installation of a meter vault to be installed at the street. The Sanitary Engineer may permit the use of a closure piece with a flared fitting or brass compression fitting when the connection is longer than the normal manufactured length of copper pipe.
- B. The service line must enter through the basement wall. No service is permitted under concrete basement floor. If slab home, service must go under footer and enter through the slab within required floor and wall offsets for meter yokes: six inch (6") minimum, three foot (3') maximum.

6.15 Commercial, Industrial, or Multi-Family Connections

Building connection(s) for commercial, industrial, or multi-family buildings shall be constructed of a size and type of material as approved by the Sanitary Engineer after an application for the same has been made and reviewed.

6.16 Testing Connections

- A. After the water service has been connected to the curb box and extended into the building, the water shall be turned on to enable the Sanitary Engineer to inspect the pipe and any fittings, under pressure, to determine if the connection is leaking. Any leaks which appear shall be cause for rejection of the work.
- B. The water supply shall only be turned on by a representative of the Sanitary Engineer.

6.17 Payment for Service Connections

The expense of installing the water connection, exclusive of the necessary excavation and restoration, shall be as determined by Commissioners Resolution and shall be collected by the Sanitary Engineer as a tap fee before making the installation.

SECTION 7 – SCHEDULE OF CHARGES

7.1 Charges

- A. Water service charges and sanitary sewer charges shall be billed for any building, enterprise or residence to which water or sewer service is provided, either directly or indirectly.
- B. All charges are those in accordance with the latest rate and fee schedules approved by the Commissioners of Clinton County.
- C. On an annual basis, or more frequently if necessary, the County Sanitary Engineer shall review the charges and determine whether any rate adjustments would be appropriate.
- D. Service charges shall be based upon the metered rate of water usage or upon a flat rate should water not be metered.
- E. All real property titled in the name of the Clinton County Land Bank shall be exempt from any and all charges and assessments for water and sewer under these regulations regardless whether said charges or assessment predate the passage of this ordinance.

7.2 Owner's Responsibility

- A. Owner of property shall be held responsible for water used and sanitary sewage discharged from their premises.
- B. To ensure proper billing and payment due to changes in property ownership, the vacating owner and new owner must notify the Clinton County Sewer District of such ownership changes. Vacating owner shall supply, in writing: name, address of property, and new billing address to ensure final charges are correctly billed and paid. The incoming/new owner of property must also supply the Clinton County Sewer District, in writing, with proper information: name of new owner, name of previous owner, address of property, billing address if different from service address, and copy of deed.

7.3 Billing Periods

- A. Meter readings will be taken monthly and as near the same date of the month as is practicable.
- B. Should the County be unable to render monthly bills because of a labor shortage or some other deficiency, the bills may be rendered for a shorter or longer period, but at the same monthly rate.

7.4 Billing and Payment

- A. Bills will be mailed or otherwise delivered by the County or its designee monthly to the address of the water and/or sewer customer as on file with the County. Failure to receive bills for service will not relieve the consumer from responsibility for prompt payment.
- B. The due date as stamped on the bill shall be approximately fourteen (14) calendar days from the date of billing and shall be the last date for receipt of payment in full without penalty.

- C. Bills shall be paid at the Clinton County Sewer District or its designee. The date payment is received at the office of the Clinton County Sewer District will be determinative of the time payment is received. A fee is paid on or before the dates set forth in this section if the payment is received by the county treasurer on or before the last day for payment of such fee, or if the payment is received after such date in an envelope that was postmarked by the United States postal service on or before the last day for payment of such fee. In the event there is more than one date of postmark on the envelope, the earliest date imprinted by the United States postal service shall be the date of payment. A private meter postmark on an envelope is not a valid postmark for purposes of establishing the date of payment of such fees.

7.5 Unpaid Sewers

- A. Any unpaid sewer fees or other charges, together with penalties and interest thereon, may be collected in the manner provided by state law. In addition, the County may require that the water supply be shut off to any property with respect to which any sewer charges imposed hereby are delinquent until all such charges, together with interest, are paid.

7.6 Vacant Premises, Changes in Occupancy, Etc.

- A. Credit, Refunds, Etc., Prior to Notice to Discontinue Service

No credit, refund or allowance shall be made for a nonuser of service prior to the date when notice is given to the County to discontinue service. The consumer or owner of record of the particular premises shall be liable to the county for minimum and excess charges until such notice is given.

- B. Right of County to Discontinue Service Until New Application for Service is Made

Upon receiving the completed county form for a change in occupancy of any premises, the County shall have the right to discontinue service until a new application has been made and approved and all charges paid to date.

Please note **Section 7.2-B: Owner's Responsibility** to supply notice of change in property ownership.

- C. Consumers Vacating Premises to Notify County

Consumers intending to leave the premises vacant for a substantial period of time should notify the County in writing, otherwise no credit shall be allowed.

- D. Credit not Allowed for Service Resumed within Ninety Days

No credit shall be allowed a consumer on the minimum charges where the same consumer requests the service to be again continued within a period of less than ninety (90) days.

- E. Connection to Demolished Building to be Sealed

When any structure presently connected to the sewer is demolished, the connection from such building to the sewer shall be removed and plugged with an approved seal to prevent the entry of water into the sewer. The watertight seal shall be inspected by the

County prior to backfilling. The County reserves the right to charge and command a fee for this inspection.

7.7 Water Supply and Waterworks Facilities

A. Construction

Plan Review Fee..... The higher of the two:
..... \$100 plus 0.15% times the approved engineer's estimate
OR
..... Actual cost borne by Clinton County's consultant review plus 10%

(Clinton County will make the determination upon plan submittal and notify the owner accordingly)

Regular work hour sewer main line inspection fee..... \$30/hour
Overtime sewer main line inspection fee..... \$40/hour
Holiday sewer main line inspection fee \$55/hour

B. Service Connection

1. Domestic Service Tap-In Charge – based on relative maximum safe operating capacity of the water meter. For the entire Clinton County Sewer District where domestic water usage is metered:

<u>Meter Size</u>	<u>Tap-In Fee</u>
5/8"	\$ To Be Determined
3/4"	
1"	
1 1/2"	
2"	
3"	
4"	

2. Equalization Charge - Certain County constructed water projects require that when a property abutting the sewerage is split or subdivided, each newly created lot or parcel pay the equivalent of the tentative assessment for the project in cash with the connection charge at the time of obtaining the tap-in permit, before making connection to the sewerage system. The equalization charge (if any) for a particular property may be obtained upon request from the Clinton County Sanitary Engineering Department.

3. Connection Charge

<u>Meter Size</u>	<u>Connection Charge</u>
5/8"	\$ To Be Determined
3/4"	
1"	
1 1/2"	
2"	

For any meters larger than two inches (2") and for special meters, the connection charge will be based on the cost of the meter plus labor costs for the installation.

4. Other Expenses - All other costs involved in a connection described in Items above, including the installation of the service line, service valves, meter yokes,

construction of meter pits, etc., shall be paid by the applicant directly to any person or business registered by the County to perform such service.

5. Operation

a. For the entire Clinton County Sewer District

<u>Meter Size</u>	<u>Monthly Minimum Charge</u>
	<u>0-2,000 Gallons</u>
5/8"	\$ To Be Determined
3/4"	
1"	
1 1/2"	
2"	
3"	
4"	
6"	
8"	
 <u>Wholesale Charge</u>	
Over, 2,000 gallons monthly\$ To Be Determined / 1,000 Gallons	

7.8 Sanitary Sewerage and Sewage Treatment Facilities

A. Construction

Plan Review Fee..... The higher of the two:
 \$100 plus 0.15% times the approved engineer's estimate
 OR
Actual cost borne by Clinton County's consultant review plus 10%

(Clinton County will make the determination upon plan submittal and notify the owner accordingly)

Regular work hour sewer main line inspection fee..... \$30/hour
 Overtime sewer main line inspection fee..... \$40/hour
 Holiday sewer main line inspection fee \$55/hour

A. Service Connection

1. Connection Charge

a. For the entire Clinton County Sewer District where domestic water usage is metered:

<u>Meter Size</u>	<u>Connection Charge</u>
5/8"	\$ To Be Determined
3/4"	
1"	
1 1/2"	
2"	
3"	
4"	
6"	
8"	

- b. Where water usage does not constitute the only discharge to the sanitary sewer and/or all water usage is not metered by Clinton County Sanitary Engineering Department or its approved agent, connection charges will be determined as follows.
 - i. The Sanitary Engineer shall estimate the peak flow to be contributed by the proposed connection, based upon the Ohio EPA "Sewage Flow Guide" from Water Supply, Sewerage and Sewage Treatment for Public Buildings in Ohio, (as amended)
 - ii. The Sanitary Engineer shall determine the water meter size necessary for that peak flow.
 - iii. Connection charges will then be established in accordance with Section B.1.a above.
 - c. Martinsville / Midland Service Area – Service connection charges shall be the actual cost borne by Clinton County plus ten percent (10%)
2. Equalization Charge - Certain County constructed sewerage projects require that when a property abutting the sewerage is split or subdivided, each newly created lot or parcel pay the equivalent of the tentative assessment for the project in cash with the connection charge at the time of obtaining the tap-in permit, before making connection to the sewerage system. The equalization charge (if any) for a particular property may be obtained upon request from the Clinton County Sanitary Engineering Department.
 3. Other Expenses - All other costs involved in a connection described in Item 7.8.B.1 above, particularly the construction of the service line from the County sewer to the house or building, shall be paid by the applicant directly to any person or business registered by the County to perform such service.

C. Service Rates

1. For the entire Clinton County Sewer District where water usage is metered by Clinton County Sanitary Engineering Department or its approved agent.

<u>Meter Size</u>	<u>Monthly Minimum Charge</u>
	<u>0-2,000 Gallons</u>
5/8"	\$ To Be Determined
3/4"	
1"	
1 1/2"	
2"	
3"	
4"	
6"	
8"	

Wholesale Charge

Over, 2,000 gallons monthly \$ To Be Determined / 1,000 gallons

2. Martinsville / Midland Service Area
Monthly service charges shall be based on the following classification of user:

Classification of Usage

Residential R1

R1 rates apply to single family unit connected to a dedicated sewer connection

Residential R2

R2 rates shall apply to duplex family units with no more than two (2) units having an adjacent wall, and connected to a single dedicated sewer connection.

Residential RM

RM rates shall apply to multiple family units with three (3) or more units having an adjacent wall, and connected to a single dedicated sewer connection.

Residential RGP

RGP rates shall apply to single family unit connected to the sewer system through a grinder pump to the forced main of sewer system.

Commercial C1

C1 rates shall apply to commercial and business units which are not required to operate under a State of Ohio or Clinton County Health Department permit or do not manufacture products from raw material. A sampling of these units include:

- Auto Repair and Sales
- Retail Shop
- Professional Offices
- Banks
- Savings and Loan
- Worship Centers

Commercial C2

C2 rates shall apply to commercial and business units which are required to operate under a State of Ohio or Clinton County Health Department permit but do not manufacture products from raw material. A sampling of these units include:

- Gas Stations
- Drive-Thru
- Restaurant
- Barber Shop
- Beauty Salon
- Nursery School
- Day Care Facilities

Industrial IND1

IND1 rates shall apply to industrial units which manufacture products from raw materials.

<u>Classification</u>	<u>Monthly Charge</u>
R1	\$48.00
R2	\$65.00
RM	\$100.00
RGP	\$45.00
C1	\$65.00
C2	\$100.00
IND1	\$ To Be Determined

D. Tap Fees

The following tap fees shall apply for all new connections

R1, R2, C1, RGP	\$6,000
RM, C2	\$7,500
IND1	\$ To be Determined

7.9 Miscellaneous Charges

- A. Regulations and Specifications \$20.00
- B. Bad Check Charge \$25.00

SECTION 8 – DEVELOPMENT PROCEDURES

8.1 Construction Plans

A minimum of three (3) sets of construction plans, a plan review application and fee, accompanied by the design computation sheets, shall be submitted for the approval of the County. Plans which are improperly prepared or accompanied by insufficient or inaccurate information may be rejected by the Sanitary Engineer, whereupon, revised plans or more sufficient data shall be required. Construction plans are to be signed, sealed, and dated by the Professional Engineer authorized to practice in the State of Ohio.

8.2 Physical Format

All construction plans submitted to the Sanitary Engineering Department must contain the following:

- A. Standard sheet: Class A 24" x 36".
- B. Media: Mylar and electronic copy (CD).
- C. Lettering: All lettering .125" or larger.
- D. Title Block: Lower right hand corner or right hand edge including; Sewer District, Plat Name, Section, Engineer's Name, Seal, Signature, Sheet Number, Number of Sheets, and Scale.
- E. Revision Block:
- F. Scale: Horizontal – 1" = 40'
Vertical – 1" = 10'
The scale shall also be represented graphically.
- G. Approval Block: Shall include signature lines and dates for:
 - 1. County Sanitary Engineer.
 - 2. County Engineer when a County Road is involved.
 - 3. The applicable City or Municipal Engineer when within corporation limits.
 - 4. Ohio EPA submittal and approval dates.
- H. Vicinity Map: Shall be provided to show the location of the construction.
- I. North Arrow: Each sheet shall have a readily readable North arrow oriented up and/or to the left or right.
- J. General Notes: The required general notes shall be shown on the plans. In addition, each set shall contain this note, "All sanitary sewers and/or waterlines and appurtenances shall be constructed in accordance with the Clinton County Sanitary Engineering Department specifications".
- K. Bench Mark: The Bench Mark used for water and sanitary installation shall be shown on each plan and profile sheet of the plans, NAVD 88 elevation datum.
- L. Profiles: Profiles for both water and sewer shall be shown on the same sheet as the plan. The profile shall be below the plan and be taken at the pipe centerline. The existing and proposed grade shall be shown on each profile view.
 - 1. All existing structures in the street or easement shall be shown in both plan and

profile. Sizes, location, dimensions and elevations shall be included. These structures include but are not limited to: Gas mains, Electric and telephone conduits, Storm sewers, sanitary sewer lines, Water lines, Telephone poles, Street lights, all above ground structures which may affect construction.

- M. Manholes shall be consecutively numbered from lowest to highest elevation and station numbers shall be noted. Manhole #1 shall be assigned Station No. 0+00 and shall be the manhole connected to the existing system. Both manhole and station numbers shall appear on both plan and profile. There shall be no duplication of manhole numbers within a particular development.
- N. Length, grade and size of each span of sewer shall appear on the profile.
- P. The type of pipe material, joints and strength shall be shown in the profile for both sewer and water, using the ASTM nomenclature.
- Q. The location of all special features such as concrete encasements, siphons, elevated sewers and special cross sections shall be shown.
- R. Details of all special appurtenances such as manholes, inspection chambers, siphons, regulators, metering devices, elevated sewers, etc., shall be shown.
- S. All subdivisions and Plat Book page shall be clearly marked including lot numbers. All properties abutting the improvement shall be shown for full width and depth.
- T. The ownership, including Deed Book, page and acreage, of all property not subdivided by a record plat shall be shown on the preliminary plans and cover sheet.
- U. All corporation lines with dimensions and other information that will fix the exact location shall be shown on the preliminary plan and cover sheet. Section, Township, Range and USGS Index Number shall be included.
- V. Private driveways, lanes and easements with appropriate dimensions shall be shown by dashed lines.
- W. The location, description and elevation of all benchmarks used in connection with the project shall appear on each appropriate sheet.
- X. Test borings shall be located when made.
- Y. Proposed lines shall be shown as solid dark lines. Existing lines shall be shown as dashed lines.
- Z. Existing or proposed streets and all streams or water surfaces shall be clearly shown. Contour lines at appropriate intervals shall be shown.

8.3 Easements

- A. All required easement deeds and/or easement plans shall be submitted to the Sanitary Engineering Department for acceptance and recording.

- B. All development utilizing non-public streets/roadways within the complex must have sufficient easements to encompass all paved areas plus five feet (5') on all sides. Exceptions will be reviewed and considered on a case-by-case basis.
- C. Sanitary sewer and water mains must be centered in a twenty-foot (20') wide minimum easement.
- D. Any utility constructed in an easement must have sufficient accessibility for the Sanitary Engineering Department cleaning equipment.

8.4 Sewage Pumping Stations

- A. Location Plan: A plan shall be submitted for projects involving construction or revision of pumping stations. This plan shall show the following:
 - 1. The location and extent of the tributary area.
 - 2. Any municipal boundaries within the tributary area.
 - 3. The location of the pumping station and force main and pertinent elevations.
 - 4. A Cubic Feet per Second (C.F.S.) study shall be submitted showing the present loading on the existing pumping station and all proposed additional loadings, including all gravity sewers and discharge sewers to a point determined by the Sanitary Engineering Department.
- B. Detailed plans shall be submitted showing the following, where applicable:
 - 1. Contour map of the property to be used.
 - 2. Existing pumping station.
 - 3. Proposed pumping station, including provisions for installation of future pumps or ejections.
 - 4. Elevation of high water at the site, and maximum elevation of sewage in the collection system upon occasion of power failure.
 - 5. Test borings and ground water elevations.
- C. Sanitary sewer force mains shall have a minimum of four feet (4') of cover over the top of the pipe.
- D. Final as-built, detailed plans with as-built elevations shall be required for all pumping stations prior to one hundred percent (100%) acceptance.

8.5 Specifications

- A. Complete technical specifications for the construction of all sewer lines, sewage pump stations and appurtenances, and all water lines, water pump stations and appurtenances shall accompany the plans. These specifications shall include all the technical construction information necessary to inform the contractor in detail of all design and construction requirements for installation of the job.
- B. Special construction notes with drawings shall be approved by the Sanitary Engineering Department.

8.6 Revisions to Approved Plans

Any deviation from approved plans and specifications affecting easements capacity, flow or operation of units or any other such basic design change shall be approved by the Sanitary Engineer before such changes are made. These revisions, not included on approved plans, shall be submitted well in advance of construction. Revised plans showing such changes shall be

submitted before construction is to continue.

8.7 Approval Period

Approved plans are in effect for one year from the date of approval from the Sanitary Engineering Department; after that they must be resubmitted for re-approval by the Sanitary Engineering Department with a revised cost estimate. Plan review fees will apply for review of expired plans.

8.8 As-Built Drawings

- A. As-built drawings must not have any objects, dimensions, elevations, grades, etc., crossed out; they must be erased from the drawing.
- B. All sanitary manholes and water valves must be located with a minimum of two (2) dimensions required on all locations. The two dimensions cannot be in a straight line to each other.
- C. All as-built dimensions are to be measured in feet and tenths of a foot and are not to exceed one hundred feet (100') in length.
- D. Measurements shall be on the horizontal unless noted under special conditions.

SECTION 9 – DELINQUENT BILLS, PENALTIES, BILLING DISPUTES, AND VIOLATIONS

9.1 General

Any person violating any provision of these regulations shall be served a written notice of violation (NOV) by the County Sanitary Engineer or his designee stating the nature of the violation(s) and providing an appropriate time for the satisfactory correction thereof. If more than one provision of these regulations is violated, each separate violation shall be considered a separate offense. The offender shall within the period of time stated in the notice permanently cease all violations. In the event of emergency situation or noncompliance with orders, the County Sanitary Engineer may take action necessary to stop the violation.

9.2 Delinquent Bills

- A. A bill remaining unpaid after the due date will be declared delinquent and a penalty of 10 percent will be imposed. Applicable payment dates are printed on the face of the bill. Thereafter, the total amount due for water services will include a penalty charge added to the initial usage charge. All subsequent rents or charges which accrue and remain unpaid will likewise be considered delinquent.
- B. Failure to submit payment with penalty charges within 40 days of original billing date may result in termination of water service and/or sewer to the premises. Separate shut-off notices regarding the date and time that water service will be terminated will be sent by mail to the property owner no later than 10 days prior to the shut-off date.

If there are delinquent charges owing for service at an apartment building or no owner occupied building, a shut-off notice will be sent by mail to the owner, tenant, and consumer when such names and/or addresses are known. If any such names are not known and the residence is a single-family tenant-occupied dwelling, the shut-off notice will be sent by mail to the service address in care of the current name of record. If any such names are not known and the residence is a multifamily tenant-occupied dwelling, the shut-off notice will be posted in the hallway of each floor of the dwelling. When there are no hallways, the notices will be posted on all entrances to the building and/or its separate units, if practical.

- C. Failure to submit payment for service and penalty within 40 days of original billing date may result in the commencement of an action at law against the property owner with liability to pay the charges. All actions at law shall seek judgment against the property owner.
- D. Failure to submit payment for service with penalty by the certification date may result in the certification of the charges with penalty to the County Auditor for placement upon the real property tax list and duplicate against the property served by the connection. The amount certified shall be a lien on the property from the date placed on the real property tax list and duplicate and shall be collected in the same manner as other taxes. The lien will be released upon payment in full of the certified amount to the County Treasurer. No certification for unpaid service rents will be made under this division unless the unpaid rent or charges have arisen pursuant to a service contract made directly with the owner. No partial payments will be accepted for unpaid rents or

charges after certification to the County Auditor.

- E. Commencement of an action at law shall not prevent a certification, nor shall a certification prevent or terminate the commencement of an action at law. Certification of the charges with penalty may occur prior to the certification date if a transfer of the real property is about to occur.
- F. Partial payments in the amount of \$10.00 or more may be made at any time prior to certification to the County Auditor. However, partial payments will not prevent either the commencement of an action at law or certification, nor shall partial payment prevent the termination of further service unless a payment schedule has been approved by the Fiscal Officer and all payments are made timely. Failure to submit a partial payment when due may result in the termination of further service.
- G. For the purpose of this division, the certification date will be the 110th day following the original billing date. A notice placed on a reminder sent approximately 40 days after the billing date and stating that failure to pay the charges with penalty by the certification date will result in the certification of the amount to the County Auditor for placement upon the real property tax list and duplicate against the property served by the connection. The certified amount shall constitute a lien on the property from the date placed on the list and duplicate, and that the amount will be collected in the same manner as other taxes. This will constitute as a notice to the property owner of the impending certification where the individual is the property owner.
- H. If a property owner disputes the amount of the bill, the amount of usage, the assessment or rents and/or charges, or the payment responsibility of such person, the individual must follow the procedures providing fair and reasonable opportunity for resolution of billing disputes as outlined in C below. Services to the premises will not be shut off or disconnected if a person has initiated the procedures providing fair and reasonable opportunities for resolution of billing disputes until after the matters have been fully determined under those procedures. An individual who is served a shut-off notice may request a meeting or hearing with the Fiscal Officer to explain why service should not be terminated. The rights of the individual and procedure for contesting service termination are also set forth in C below. Service will not be terminated when an individual requests a meeting or hearing until a decision of termination becomes final. Service will be restored to the premises upon payment of all delinquent charges, including the turn-on fees, upon the requests of the property owner for further service.

9.3 Resolution of Billing Disputes

- A. If a property owner disputes the amount of the bill, payment responsibility, or termination of service, the person shall contact the Customer Service Department of the Clinton County Sewer District within 10 days of the billing date as noted on the bill and request an opportunity to meet with the Fiscal Officer to discuss and to resolve the dispute. A request for the meeting or hearing shall be in writing, or if oral, shall be reduced to writing by the party requesting the meeting or hearing within 3 days after the oral request is made. The Fiscal Officer shall schedule the meeting or hearing within 3 business days. The complaining party shall be notified of the date, time, and place of the scheduled meeting or hearing.

The complaining party may appear with counsel and witnesses, and shall have the opportunity to present all matters in support of his position at the meeting or hearing. Based upon the meeting or hearing, the position of the complaining party and all matters submitted in support of the complaining party's position, the Fiscal Officer will render a written opinion which sets forth the reasons for the decision. A copy of the decision will be mailed to the complaining party. The Fiscal Officer may designate a person or persons to hear or conduct any meeting or hearing on his/her behalf which is provided under this section and to render a written decision on the same terms as provided herein. A decision of any designee shall be considered a decision of the Fiscal Officer and appealable as provided herein.

- B. The complaining party shall have the right to appeal the decision of the Fiscal Officer by requesting a hearing or meeting before the Sanitary Engineer. A written request or notice of appeal must be delivered to the Clinton County Sewer District within 5 days following the complaining party's receipt of the Fiscal Officer's decision. The written request or notice of appeal must set forth the basis of the objection to the Fiscal Officer's decision. The Sanitary Engineer will notify the complaining party of the hearing or meeting date, time, and place. The meeting or hearing date will occur within 5 days following receipt of the request or notice of appeal. The complaining party may appear with counsel and witnesses, and present any information in support of his position. Based upon the meeting or hearing, the position of the complaining party and all matters submitted for support as well as the written decision of the Fiscal Officer and any additional information provided by the Fiscal Officer in support of his position, the Sanitary Engineer will render a written opinion setting forth the decision and the reasons therefore. A copy of the decision will be mailed to the complaining party. The Sanitary Engineer may designate a person or persons to hear or conduct any meeting or hearing on his/her behalf which is provided under this section and to render a written decision on the same terms as provided herein. A decision of any designee shall be considered a decision of the Sanitary Engineer and appealable as provided herein.
- C. The complaining party shall have the right to appeal the decision of the Sanitary Engineer by requesting a hearing or meeting before the Clinton County Board of Commissioners. A written request or notice of appeal must be delivered to the Clerk of the Clinton County Board of Commissioners within 5 days following the complaining party's receipt of the Sanitary Engineer's decision. The written request or notice of appeal must set forth the basis of the objection to the Sanitary Engineer's decision. The Clerk of the Clinton County Board of Commissioners will notify the complaining party of the hearing or meeting date, time, and place. The meeting or hearing date will occur within 20 days following receipt of the request or notice of appeal. The complaining party may appear with counsel and witnesses, and present any information in support of his position. Based upon the meeting or hearing, the position of the complaining party and all matters submitted for support as well as the written decision of the Sanitary Engineer and any additional information provided by the Sanitary Engineer in support of his position, the Clinton County Board of Commissioners will render a written opinion setting forth its decision either upholding, reversing, or modifying the action of the Sanitary Engineer and the reasons therefore. A copy of the decision will be mailed to the complaining party. The decision of the Clinton County Board of Commissioners may be appealed as provided by law. The Clinton County Board of Commissioners may

designate a person or persons to hear or conduct any meeting or hearing or their behalf which is provided under this section and to render a written decision on the same terms as provided herein. A decision of any designee shall be considered a decision of the Clinton County Board of Commissioners and appealable as provided by law.

- D. The word "billing dispute" shall be defined to include any and all complaints concerning the assessment of rents and/or charges for service, responsibility for payment, or the amount of usage by the owner or tenant.

9.4 Landlord/Tenant Responsibilities

The owner of the property shall be responsible for payment of all service rents and other charges incurred by the tenant while at the owner's premises. The Clinton County Sewer District will not disconnect service to a tenant except by procedures established in Section 9.2.B.

9.5 Application of Payments

All payments received for water and sewer services shall first be applied to the delinquent and current balance owing for sewer service. Any amount remaining from a payment following application to the delinquent and current balance owing for sewer service will be applied to the delinquent and/or current amount owing for water service.

9.6 Water Emergency Violations

- A. Nonessential uses of water shall be prohibited or limited upon the declaration of a water emergency. Any person or other party who violates the declaration of a water emergency through the nonessential use of water shall be subject to the following action:
 - 1. First Violation: A letter warning that a water emergency prohibiting nonessential use of water has been declared and that failure to adhere to the declaration will result in additional consequences shall be forwarded to the water user.
 - 2. Second Violation: Any person or party who violates the declaration of a water emergency through the nonessential use of water following receipt of the warning letter shall be billed for all water use at the highest rate level then existing for actual water consumption during that billing cycle.
 - 3. Third Violation: In addition to the billing for water at the highest rate level, any person or party who violates the declaration of a water emergency through the nonessential use of water for a third time shall be billed for all water use at twice the highest rate level then existing for actual water consumption and sewer service based on total water usage during that billing cycle. No credit shall be given as otherwise permitted under these rules and regulations.
 - 4. Fourth Violation: Water service to the premises shall be terminated if a person or party violates the declaration of a water emergency for nonessential use of water for a fourth time.

Each determination of a violation of nonessential water use occurring more than 24 hours after the previous violation shall be deemed a new and separate violation.

- B. Any person desiring to apply for a specific exemption for nonessential water use may apply for an exemption in writing to the Office of the County Sanitary Engineer setting forth the identity of the applicant and his/her current address, the usage for which exemption is sought, the approximate water consumption anticipated, the time or times of day said usage is to take place, and any other pertinent information to enable the Sanitary Engineer to determine the basis and need for the requested exemption.

The Sanitary Engineer or his authorized representative shall review any exemption requests within 48 business hours (2 work days) of receipt and may make any further inquiry necessary to ensure adequate review of the application. Within 72 business hours (3 work days) of receipt, the Sanitary Engineer shall notify the applicant in writing of the rejection or approval of the exempted activity and may set forth any such terms or conditions as he may determine appropriate which shall become a party of the exemption. Service of such notification shall be made to the applicant or his designee in person, or by leaving a copy at the address of the person as set forth in the application.

- C. Any person dissatisfied with the determination of the Sanitary Engineer either as to the allowance or disallowance of an exemption, or any conditions imposed therein, may appeal the determination in writing to the Clinton County Board of Commissioners or their designated representative within 5 business days of receipt of the Sanitary Engineer's determination. The appeal shall state the basis for objection and shall include, as an exhibit, the written determination of the Sanitary Engineer. Upon receipt of the appeal, the Board or its representative shall notify the person of a hearing date to take place within 5 working days of receipt of the appeal notice, stating the time and location of the hearing. The person may appear at the hearing in person or by counsel or agent, and may provide any information relevant to the exemption application, including the presentation of witnesses.

The Board, its designated representative, or a hearing officer appointed by the Board shall hear and consider the evidence he deems reliable and credible, including any evidence the Sanitary Engineer or his authorized representative wishes to provide in support of the action taken, and shall render an opinion, at the conclusion of such hearing, after giving due deliberation to the evidence presented, upholding, reversing, or modifying the action of the Sanitary Engineer. The decision of the hearing officer so designated by the Board shall be final and binding among the parties.

9.7 Cease and Desist Order

In the event a violation may cause a public health problem or cause the District to violate its NPDES permit limits, the District may request the County Health Division to issue a cease and desist order or evacuation order.

9.8 Remedies for Noncompliance

If an industrial user does not comply with Orders issued by the Sanitary Engineer, the Sanitary Engineer shall have the authority to seek injunctive relief from the Clinton County Court of

Common Pleas and to terminate the water and sewer service to the offending user until compliance is effectuated.

9.9 Falsifying Information

Any person who knowingly makes any false statements, representations, or certifications in any application, record, report, plan, or other document filed or required to be maintained pursuant to these regulations; or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under these regulations, shall be prosecuted as allowed by law. Each false report shall constitute a separate violation.

9.10 Enforcement

The County prosecutor is hereby authorized, upon request of the County Sanitary Engineer or the County Commissioners, to go into any court of law or equity to enforce the provisions hereof.

The County Sanitary Engineer shall have a duty to inform the County Commissioners of enforcement activities. The County Commissioners' approval is not required before the County Sanitary Engineer initiates enforcement.

Administrative enforcement by the County Sanitary Engineer shall not preclude the County Sanitary Engineer from seeking judicial enforcement remedies, nor shall it relieve the user of liability under State or national administrative enforcement procedures or judicial remedies.

- A. Emergency Suspension. The County Sanitary Engineer may suspend the wastewater treatment service when such suspension is necessary, in the opinion of the County Sanitary Engineer, in order to stop an actual or threatened discharge which presents or may present an imminent or substantial endangerment to the health or welfare of persons or to the environment; which causes or may cause interference to the POTW; or which causes or may cause the District to violate any condition of its NPDES permit.
 - 1. Any person notified of a suspension of the wastewater treatment service shall immediately stop or eliminate the discharge. In the event of a failure of the person to comply voluntarily with the suspension order, the County Sanitary Engineer shall take such steps deemed necessary, including immediate severance of the sewer connection, to prevent or minimize damage to the POTW or its receiving stream or endangerment to any individuals.
 - 2. A detailed written statement submitted by the user describing the causes of the harmful discharge and the measures taken to prevent any future occurrence shall be submitted to the County Sanitary Engineer within 5 days of the date of the occurrence.
 - 3. The County Sanitary Engineer may reinstate the sewer service upon proof of the elimination of the noncomplying discharge or may at any time initiate proceedings to permanently revoke wastewater treatment service and/or the discharge permit.
- B. Revocation of Permit. Any user who violates the following conditions of this chapter or a

discharge permit issued by Ohio EPA, or applicable State and/or Federal regulation, is subject to having his permit revoked.

1. Failure of a user to factually report the wastewater constituents and characteristics of his discharge;
2. Failure of the user to report significant changes in operations or wastewater constituents and characteristics;
3. Refusal of reasonable access to the user's premises for the purposes of inspection or monitoring; or
4. Violation of conditions of his wastewater discharge permit.

The County Sanitary Engineer shall notify Ohio EPA whenever any of the above conditions occur and request that Ohio EPA commence enforcement proceedings.

C. Notification of Violation (NOV). Whenever the County Sanitary Engineer finds that any user has violated or is violating this chapter, his wastewater discharge permit, or any prohibition, limitation, or requirements contained in this chapter, the County Sanitary Engineer may serve upon such person a written notice stating the nature of the violation. Within 10 days of the date of the notice, a plan for the satisfactory correction thereof shall be submitted to the County Sanitary Engineer by the user. Submission of this plan in no way relieves the user of liability of any violation occurring before or after receipt of the NOV. If the NOV is for exceedance of an effluent limit, the user shall, within 10 days following receipt of the NOV, resample their discharge and submit the results to the County Sanitary Engineer.

D. Show Cause Hearing. The County Sanitary Engineer may order any user who causes or allows an unauthorized discharge to enter the POTW to show cause why a proposed enforcement action should not be taken. A notice shall be served on the user specifying the time and place of the hearing, the reasons why the action is to be taken, the proposed enforcement action, and directing the user to show cause why the proposed enforcement action should not be taken.

The notice of the hearing shall be served personally or by registered or certified mail, return receipt requested, at least 10 days before the hearing. Service may be made on any agent or officer of a corporation. Whether or not a duly notified user appears as noticed, immediate enforcement action may be pursued.

E. Consent Orders. The County Sanitary Engineer is hereby empowered to enter into consent orders, assurances of voluntary compliance, or other similar documents establishing an agreement with the user responsible for the noncompliance. Such orders will include specific action to be taken by the user to correct the noncompliance within a time period also specified by the order.

F. Compliance Order. When the County Sanitary Engineer finds that a user has violated or continues to violate this chapter or a permit or order issued hereunder, he may issue an order to the user responsible for the discharge, directing that following a specified time

period, sewer service shall be discontinued unless adequate treatment facilities, devices, or other related appurtenances have been installed and are properly operated. Orders may also contain such other requirements as might be reasonably necessary and appropriate to address the noncompliance, including the installation of pretreatment technology, additional self-monitoring, and management practices.

- G. **Cease and Desist Orders.** When the County Sanitary Engineer finds that a user has violated or continues to violate this chapter or any permit or order issued hereunder, the County Sanitary Engineer may issue an order to cease and desist all such violations and direct those persons in noncompliance to:
1. Comply forthwith.
 2. Take such appropriate remedial or preventive action as may be needed to properly address a continuing or threatened violation, including halting operations and terminating the discharge.
- H. **Administrative Fines.** Notwithstanding any other section of this chapter, any user who is found to have violated any provision of this chapter, or permits or orders issued hereunder, shall be fined in an amount of at least \$1,000 per violation. Each day on which noncompliance shall occur or continue shall be deemed a separate and distinct violation. Such assessments may be added to the user's next scheduled sewer service charge and the County Sanitary Engineer shall have such other collection remedies he has used to collect other service charges added. Unpaid charges, fines, and penalties shall constitute a lien against the individual user's property. Users desiring to dispute such fines must file a request for the County Sanitary Engineer to reconsider the fine within 10 days of being notified of the fine. Where the County Sanitary Engineer believes a request has merit, he shall convene a hearing on the matter within 15 days of receiving the request from the individual user.
- If any person discharges sewage, industrial wastes, or other wastes into the POTW contrary to the provisions of this chapter or any order or permit issued hereunder, the County Sanitary Engineer through the Clinton County Prosecuting Attorney, may commence an action for appropriate legal and/or equitable relief in the Common Pleas Court for Clinton County.
- I. **Civil Penalties.** Any user who has or continues to violate any provision of this chapter and the orders, rules, regulations, and permits issued hereunder shall be liable for a civil penalty of not less than \$100 nor more than \$1,000 plus damages incurred by the POTW for each offense. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense. Any user who has or continues to violate any provision of this chapter or the orders, rules, regulations, and permits issued hereunder shall be liable for all reasonable attorney fees, expert witness fees, consulting fees, court costs, court reporter fees, and other related expenses incurred by the POTW to enforce this chapter. The County may also recover special expenses including, but not limited to, equipment rental, chemicals, and labor necessary for the proper operation and maintenance of all wastewater facilities.
- J. **Criminal Penalties.**

1. General. Any user who willfully or knowingly violates any provision of this chapter or any orders or permits issued hereunder shall, upon conviction, be guilty of an unspecified crime, punishable by a fine not to exceed \$1,000 per violation or imprisonment for not more than 6 months or both. Each day on which the violation occurs or continues shall be deemed a separate offense. In the event of a second conviction, the user shall be punishable as a repeat offender under State law.
 2. Falsifying Information. Any person who knowingly makes any false statements, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to this chapter, or wastewater discharge permit, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under this chapter shall, upon conviction, be punished by a fine of not more than \$5,000 per violation or by imprisonment for not more than 6 months or by both. In the event of a second conviction, the user shall be punishable as a repeat offender under State law.
- K. Injunctive Relief. Whenever a user has violated or continues to violate the provisions of this chapter or a permit or order issued hereunder, the County Sanitary Engineer, through the County Prosecuting Attorney, may petition the Court for the issuance of a preliminary or permanent injunction or both (as may be appropriate) which restrains or compels the activities on the part of the user.

**PART B – GENERAL NOTES, SPECIFICATIONS, AND
STANDARD DRAWINGS**

STANDARD GENERAL NOTES

GENERAL NOTES

The following applicable General Notes shall be incorporated on the detail plans submitted for approval by the County Sanitary Engineer.

- A. The Clinton County requirements together with the latest edition of the Rules and Regulations of The Clinton County Sewer District (Including Part B-General Notes, Specifications, and Standard Details) shall govern all construction items that are a part of this plan, unless otherwise noted. All field testing shall be the responsibility of the Contractor (material composition, material compaction, concrete testing, etc.).
- B. Any modification to the specifications or changes to the work as shown on these drawings must have prior written approval of the County Sanitary Engineer.
- C. The Contractor and subcontractor shall be solely responsible for complying with all federal, state, and local safety requirements, together with exercising precautions at all times for the protection of persons (including employees) and property. It is also the sole responsibility of the Contractor and subcontractor to initiate, maintain, and supervise all safety requirements, precautions, and programs in connection with the work.
- D. The Contractor shall notify the Clinton County Sanitary Engineer at least 3 working days prior to the commencement of any construction.
- E. The Contractor/Owner shall obtain all necessary permits, prior to construction.
- F. Existing utilities shown are from best available records and field investigation, and are not necessarily complete or exact. The Contractor is responsible for the investigation, location, support, protection, and restoration of all existing utilities and appurtenances whether shown on these plans or not. The Contractor shall expose all utilities or structures prior to construction to verify the vertical and horizontal effect on the proposed construction, and shall make adjustments in elevations to provide sufficient clearance between the proposed and existing utilities. The Contractor shall call the Ohio Utilities Protection Service (1-800-362-2764) and Producers Underground Protection Service (1-614-587-0486) 3 working days prior to work in the vicinity of their underground lines.
- G. The following utilities and owners are located within the work limits of this project and do not subscribe to a registered underground utility service:

UTILITIES	OWNER	TELEPHONE
-----------	-------	-----------

- H. Any property corner pins or permanent survey markings disturbed during construction shall be reset by a registered surveyor at the Contractor's expense.
- I. The tracking or spillage of mud, dirt, or debris upon County roads is prohibited and any such occurrence shall be cleaned up immediately by the Contractor.

If the Contractor fails to keep the work area clean of debris, or fails to clean mud or dirt off of County streets, the County may take action and assess the applicant for the costs that are incurred.

- J. No nonrubber tire vehicle shall be moved on County roads; exceptions may be granted by the

County Sanitary Engineer where short distances and special circumstances are involved. Granting of exceptions must be in writing and any resulting damage must be repaired to the satisfaction of the County Sanitary Engineer.

- K. The Contractor shall be responsible for maintaining mail service in the construction area.
- L. All items of work called for on the plans for which no specific method of payment is provided shall be performed by the contractor and the cost of same shall be included in the price bid for the various related items.
- M. The Contractor shall exercise extreme caution when excavating in the vicinity of existing trees, taking all measures possible to protect and preserve them. The Contractor shall be governed by the provisions of his contract with the owner.
- N. All field tile broken during excavation shall be replaced to its original condition or connected to the storm sewer system as directed by the County Sanitary Engineer.
- O. Approval of these plans is contingent on all easements required for the construction of the work being secured and submitted to the County for recording prior to commencement of the work, and no work which requires an easement will be allowed to proceed until this has been done.
- P. All traffic control devices shall be furnished, erected, maintained, and removed by the Contractor in accordance with the latest edition of the Ohio Manual of Traffic Control Services for Construction and Maintenance Operations, copies of which are available from the Ohio Department of Transportation, Bureau of Traffic, 1980 W. Broad St., Columbus, Ohio 43223.
- Q. Steady-burning, Type "C" lights shall be required on all barricades, drums, and similar traffic devices in use at night. Cones are not permitted to be used for night work.
- R. All traffic lanes shall be fully open to traffic on _____ (street/drive) from 7:00 a.m to 9:00 a.m. and 4:00 p.m. To 6:00 p.m. One lane may be closed to traffic during working hours, and on _____(street/drive).
- S. All trenches shall be backfilled or securely plated during nonworking hours.
- T. Access to all adjoining properties shall be maintained at all times.
- U. The applicant/owner shall, prior to any construction operation, deposit with the County a retainer for inspection, supervision, and testing of materials in the amount of 5 percent of the estimated construction cost as approved by the County Sanitary Engineer.
- V. If the County Sheriff's Department determines proper provisions for traffic control are not being provided by the contractor, the County Sheriff's Department shall assign off-duty officers to the project at the Contractor's expense.
- W. All site clearing (tree removal) shall be performed by the applicant at his expense prior to construction of this project.
- X. All areas within the public right-of-way that are disturbed by this project shall be restored to original or better condition.
- Y. At all utility crossings where the existing utility is exposed in the trench, the backfill shall consist of compacted granular material between the deeper and shallower pipe. Where proposed

utilities or services cross proposed or existing pavement areas, backfill shall be compacted granular material extending at least 3 feet beyond the back of curb or edge of pavement. Cost is to be included in the price bid for related pipe.

- Z. Curb inlets, manholes, and catch basins shall be channeled as directed.
- AA. It shall be the responsibility of the Contractor to adequately barricade the street in the vicinity of all expansion joints until such time as the street is open to traffic.
- AB. The applicant shall enter into an agreement with the County prior to constructing any utility extensions.
- AC. Where necessary to disturb pavements or drives, the pavement shall be saw cut in neat, straight lines. The depth of saw cut shall be at least 2 inches.
- AD. If the Contractor refuses or fails to perform work of an immediate nature (such as the placement of barricades or replacement of signs or other devices) required by this contract in a reasonable time, the County will perform such work. The Contractor shall reimburse the County at the rate of 2.5 times the actual cost of labor, materials, and equipment necessary to perform such work. The County shall notify or attempt to notify the Contractor of the necessity to perform such work. Reasonable time for all streets involved on this contract is 1 hour from the time of notification by the County.
- AE. Erosion control measures in accordance with the requirements of the soil conservation handbook Water Management and Sediment Control for Urbanizing Areas are required. Straw bales at storm sewer inlets shall be maintained until the County determines that the straw bales are no longer necessary to protect the storm sewer system from siltation.

The Contractor shall provide sediment control at all points where water leaves the project, including waterways, overland sheet flow, and storm sewers.

Accepted methods of providing erosion/sediment control include but are not limited to: hay -or straw bales, sediment basins, silt filter fence, and temporary ground cover.

The Contractor shall provide adequate drainage of the work area at all times consistent with erosion control practices.

Disturbed areas that will remain unworked for 45 days or more shall be seeded. Other sediment controls that are installed shall be maintained until vegetation growth has been established. The Contractor shall be responsible for the removal of all temporary sediment devices at the conclusion of construction but not before growth of permanent ground cover.
- AF. A permit for construction activities that will disturb more than 1 acre of land must be obtained from the Ohio EPA to allow for the discharge of stormwater from the construction site. Permitting requirements shall be in accordance with National Pollutant Discharge Elimination System (NPDES) Permit No. OHR100000. It is the contractor's responsibility to comply with all requirements of this permit if the contractor's disturbed area will exceed 1 acre. In the terms of the permit, the contractor shall be considered the applicant of the stormwater. The cost for all work involved in complying with these requirements shall be included in the price bid for the various items of the contract.
- AG. The County Sanitary Engineer will not be responsible for means, methods, procedures, techniques, or sequences of construction that are not specified herein. The County Sanitary

Engineer will not be responsible for safety on the job site, or for failure by the Contractor to perform work according to contract documents.

- AH. Following completion of construction, a proof survey shall be provided to the County Sanitary Engineer which shall document as-built elevations, dimensions, slopes, and alignments of all elements of this project. The proof survey shall be prepared, signed, and submitted by an Ohio professional surveyor.
- AI. The Contractor shall restrict construction activity to public right-of-way and areas defined as permanent and/or temporary construction easements.
- AJ. The Contractor shall restore all disturbed areas to equal or better condition that existed before construction. Drainage ditches or water courses that are disturbed by construction shall be restored to the grades and cross sections that existed before construction.
- AK. The Contractor shall not dispose of excess excavation at locations not approved by the County Sanitary Engineer. Disposal outside project limits will not be allowed without submitting for review and approval to County Sanitary Engineer a signed, written agreement between the Contractor and the off-site land owner. An agreement should clearly state the purpose of the agreement, show the location of the disposal area including floodplain and floodway boundaries, display an estimate of volume of material to be disposed on the site, and indicate the permission of the land owner for such use. Disposal within floodplains may not be permitted without express written consent of the County Sanitary Engineer. No disposal will be permitted within 20 feet of floodway boundaries.
- AL. All signs, landscaping, structures, or other appurtenances disturbed or damaged during construction shall be replaced or repaired to the satisfaction of the County Sanitary Engineer. The cost of such work shall be paid for by the Contractor.
- AM. Sanitary sewer services may be bored and jacked across streets instead of open cut with prior approval of the County Sanitary Engineer. Permits to construct in the right-of-way of existing streets must be obtained from the County Sanitary Engineer before commencing construction. When open-cutting of existing pavement is permitted, controlled density backfill may be used in place of compacted granular backfill. Asphalt surfaces shall be heat-welded.
- AN. The Contractor shall submit to the County Sanitary Engineer his proposed design mix formula for all bituminous mixtures to be placed on the project for review and approval. A design mix formula shall be submitted for each mixture and each producer and shall provide gradation of all component aggregates, percentage of blending of aggregates, percentage of bitumen, any additives and application rate, names and addresses of aggregate suppliers, Marshall mix design data, and the theoretical laboratory density.
- AO. If allowed, the contractor must obtain a blasting permit from The local Township Fire Department before blasting for rock excavation may begin. The Contractor shall submit blasting reports upon completion of blasting to the County Sanitary Engineer, the owner, and the owner's engineer. Top of rock elevations shall be shown on as-built drawings.
- AP. Proposed utilities to be installed in embankment areas shall be placed after the embankment has been placed and compacted according to the specifications.
- AQ. When unknown or incorrectly located underground utilities are encountered during construction, the Contractor shall immediately notify the owner and the County Sanitary Engineer.

AR. Before relocating any mailboxes, the contractor shall contact the U.S. Postal Service and relocate mailboxes according to the requirements of the postal service.

AS. All benchmarks are based on United States Geological Survey (USGS) data.

GENERAL NOTES (SEWERS)

- A. Roof drains, foundation drains, and other clean water connections to the sanitary sewer system are prohibited on this project.
- B. All sewers constructed under this plan shall meet the County's specifications.
- C. The minimum requirements for sanitary sewer pipe shall be PVC plastic sewer pipe ASTM D-3034, SDR 35, or reinforced concrete pipe ASTM C76.
- D. The Contractor's specific attention is directed to the requirements of the leakage test. All sanitary sewers shall be tested for leakage in accordance with the specifications. This is an exfiltration water test. An air test is not permitted. An infiltration test may be required in areas of high groundwater. Leakage through joints shall not exceed 100 gallons per inch diameter per 24 hours per mile of length of the computed equivalent.
- E. Pipe for all 6-inch house services shall be PVC plastic sewer pipe, ASTM D-3034, SDR 35. All service extensions shall be laid at a minimum grade of one-quarter-inch per foot and shall be constructed at the time of construction of the main sewer.
- F. Approved y-poles made of 2" x 2" lumber shall be furnished and placed at all y-branches and at the end of extended service. The cost of this work to be included in the price bid for the sewer items.
- G. Service risers shall be installed where depths from wyes to the existing or proposed elevations exceed 12 feet with the tops of the risers 9 feet $\pm$ below the existing or proposed surface elevation, whichever is higher, provided that basement service can still be provided. The contractor shall verify the elevation of any house service at the wye pole to ensure that every effort is made to provide basement service to the existing structure. Where service risers are not installed, a minimum 5 foot length of lateral pipe of the same size as the wye opening shall be installed.
- H. All in-line wye and tee connections in concrete sewers, 18-inch-diameter and larger, shall be either Kor-n-Tee or Kor-n-Seal connections conforming to the manufacturer's recommendations.
- I. The wye locations shown on the plans are approximate and shall be field located during construction to serve the individual structures.
- J. Manhole covers for sanitary sewers shall conform to the standard drawings except they shall be stamped with "sanitary sewer." Manhole covers shall be vented except in pavement where they shall be solid, but in no case shall there be more than two consecutive solid covers.
- K. Manhole tops shall be built or subsequently adjusted to meet surface grades established for the development. Cost of this work is to be included in the price bid for the various sewer items.
- L. The Contractor shall install a temporary bulkhead where directed on the plans prior to construction of the proposed sewers and maintain same until said sewers are accepted by the County Sanitary Engineer.

- M. All sanitary sewer line installed on this project using PVC pipe shall be subject to deflection testing by pulling an approved mandrel equal in diameter to 95 percent of the pipe diameter through the pipe after pipe is backfilled, and an additional mandrel test shall be performed just prior to expiration of the 1-year guarantee. Rerounding of failed pipe may be performed only if less than 10 percent of the tested sewers fail the mandrel test. All failed pipe shall be rerounded or replaced and warranted an additional 2 years.
- N. The maximum trench width at the top of pipe barrel shall be not greater than outside diameter of pipe +16 inches, or 30 inches, whichever is greater.
- O. All sanitary sewers shall be videotaped in VHS format after construction prior to acceptance of the sewers by the County Sanitary Engineer. The videotape shall remain the property of the County. The videotape shall clearly identify the location of the camera within the sewer, date, and time of videotape, and be of sufficient quality to determine the condition of the sewers. Visible leaks or other defects observed during television inspection shall be repaired to the satisfaction of the County Sanitary Engineer.
- P. An electronically detectable identification tape shall be installed at a depth of approximately 3 feet in all sanitary sewer trenches (except service laterals), over nonmetallic sanitary sewer lines.
- Q. A tap-permit must be obtained from the County Sanitary Engineer with payment of associated fees to the County Sanitary Engineer before taps are made into the proposed sanitary sewer system. No sanitary sewer taps shall be sold until the sanitary sewers have passed the leakage test by the Contractor.

GENERAL NOTES - (WATER MAINS)

- A. All water mains shall be ductile iron pipe, Class 51 (3" through 12"), Class 52 (14" through 10") or Class 53 (30" and larger). All bends, joint deflections, and fittings shall be backed with concrete where and as directed. Where water mains or services cross proposed or existing streets, backfill shall be compacted granular material extending at least 3 feet beyond the back of curb or edge of pavement.
- B. All water line materials and installations shall be in accordance with the current rules and regulations of the County Sanitary Engineer.
- C. Water mains shall be laid with a minimum of 4'- 0" from the top of finished grade to the top of the water main.
- D. In case of conflict in grade between water mains and sewers, the water mains shall be lowered during construction.
- E. Minimum clearance between sanitary sewer and water lines shall be 10' horizontal or 1'- 6" vertical outside of each pipe.
- F. Water mains shall be deflected around structures without the use of special fittings and without exceeding the manufacturer's allowable deflection.
- G. If the top of the operating nut for any valve is more than 36 inches below the finished grade, an extension stem shall be provided to place the operating nut between 24 and 36 inches of the finished grade.

- H. The contractor shall thoroughly clean, flush, and test the water mains prior to being put in service and before acceptance by the County Sanitary Engineer.

The Contractor shall notify the County Sanitary Engineer at least 2 working days before tapping into existing water lines.

All water main stationing shall be based on street centerline stationing.

- I. All water mains shall be disinfected by the contractor in accordance with the specifications.
- J. All costs to plug and block the ends of water mains at location shown in plan shall be included in the price bid for pipe.
- K. A tap permit for each water service tap must be obtained from the County Sanitary Engineer with payment of associated fees to the County Sanitary Engineer before the taps are made into the water line. No water taps shall be sold until the water lines have been disinfected by the contractor.
- L. Water service boxes shall be located 4" from the edge of proposed sidewalks between the Sidewalk and the right-of-way unless otherwise authorized by the County Sanitary Engineer. Water service boxes shall be adjusted by the applicant or builder after final grading is completed for each individual lot.
- M. On dead end water mains in cul-de-sacs, two 3/4-inch taps shall be installed within 2 feet of the end of the main.
- O. Fire hydrants shall conform to AWWA C502 and shall be Mueller Company "Centurion" fire hydrants. The hydrants shall have a 6-inch mechanical joint inlet connection, a 5 1/2-inch main valve opening, two 2 1/2-inch hose nozzles, and one 4-inch pumper nozzle with coarse thread (4 per inch). All outlet nozzles shall have National Standard threads. Hydrants shall be furnished with a 5-foot bury depth unless otherwise shown on the plans. Hydrants shall be self-draining. A drainage sump 2 feet in diameter and 2 feet deep shall be excavated below each hydrant and filled with coarse gravel or stone, compacted in place, under and around the shoe of the hydrant and to a level of 6 inches above the waste opening. No drainage sump shall be connected to a sanitary sewer. The operating nut shall be 7/8 inch square. A hydrant wrench shall be furnished with each five hydrants or fewer furnished.

INDEX

Description

Division 1 - General Requirements

01650 Leakage Test and Disinfection

Division 2 - Site Work

02110 Clearing and Grubbing
02225 Trench Granular Backfill
02227 Excavation, Backfill, and Embankment
02271 Slope Protection
02510 Temporary Bituminous Pavement
02520 Roadways, Driveways, Parking Areas, and Walks
02570 Interference with Traffic
02610 Ductile Iron Mains
02620 Fittings, Ductile Iron
02625 Existing Utilities and Related Structures
02640 Buried Valves
02655 Manual Air Release Outlets
02656 Potable Water Service Connections
02657 Connections to Existing Mains
02705 Manholes and Inlets
02731 Concrete Sanitary Sewer Pipe
02733 Polyvinyl Chloride Sanitary Sewer Pipe
02735 Wye, Riser, and House Service
02755 Interceptions and Connections
02934 Temporary Seeding
02935 Sodding
02936 Grading and Seeding

Division 3 – Concrete

03300 Cast-in-Place Concrete

**SECTION 01650
LEAKAGE TEST AND DISINFECTION**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to provide the leakage tests and disinfection in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work to provide leakage tests and disinfection in compliance with applicable requirements of governing agencies having jurisdiction.
- B. **Witness.** All tests performed for each test section shall be witnessed and approved by the Engineer/Architect before acceptance. In the event the Contractor performs any test without witness by the Engineer/Architect, the Contractor will be required to test the section again in conformance with this specification at no cost to the Owner.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

- A. **Notification.** The Engineer/Architect will be notified at least 24 hours prior to any testing and/or disinfecting. The Owner will be notified at least 48 hours prior to any disinfecting.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

Not used.

PART 3 – EXECUTION

3.1 WATER LINE TESTING

- A. **Description.** The Contractor shall provide the leakage tests and disinfection as directed by the Engineer/Architect and as specified herein. Gauges for the tests shall be furnished by the Contractor or by the Owner at the Owner's option.
- B. **Test Section.** After the main has been installed and backfilled, all newly installed pipe and each valved section thereof shall be considered as a test section.
- C. **Witness.** All tests performed for each test section shall be witnessed and approved by the Engineer/Architect before acceptance. In the event the Contractor performs any test without witness by the Engineer/Architect, the Contractor will be required to test the section again in conformance with this specification at no cost to the Owner.
- D. **Leakage Allowance.** No main installation will be accepted until the leakage is not in excess of 11.6 gallons per inch diameter per mile of pipe per 24 hours unless otherwise noted on the plans or in the "Supplemental Specifications."
- E. **Test Procedure.** Each valved section of main shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the main in a manner satisfactory to the Engineer/Architect. Before applying the specified test pressure, all air shall be expelled from the main. The water pressure shall be brought to 150 pounds per square inch (psi), unless otherwise noted on the plans or in the "Supplemental Specifications," and maintained for at least 2 hours. Leakage will be determined by measuring the quantity of water to be supplied to maintain the specified test pressure. The Owner will furnish the necessary water for one test only. Any additional water required for testing or disinfection shall be furnished to the Contractor at current water rates.

3.2 **WATER LINE DISINFECTION.** Mains designed to carry water for domestic consumption shall be thoroughly cleaned, flushed, and disinfected before being put in service and before acceptance by the Owner. Disinfection shall be done by the addition of suitable amounts of chlorine in the form of liquid chlorine or high test hypochlorite of lime. The application shall be as approved by the Owner and in accordance with American Water Works Association (AWWA) C651. Tests for efficacy of disinfection will be made by the Owner and repeated disinfection and tests shall be carried out by the Contractor when required, at no cost to the Owner. Disposal of heavily chlorinated water shall be in accordance with AWWA C651, Appendix B, except that it shall not be disposed to a sanitary sewer.

3.3 **SANITARY SEWER TESTING**

- A. **Test Section.** A leakage test section for sanitary sewers shall be from the inlet end of the downstream manhole to the inlet end of the upstream manhole, including the upstream manhole and all house services.
- B. **Test Sequence.** As a demonstration of the workmanship and materials proposed to be used, the Contractor shall test the first section installed before proceeding with any construction further than four sections. After the first section passes the test, construction may resume. The testing operation shall be continuous throughout the construction of the project and at no time during construction shall there be more than four sections untested.
- C. **Leakage Allowance**
 - 1. **Sanitary Sewers.** The maximum leakage allowance for all sanitary sewers shall be 100 gallons per inch diameter per mile of pipe per 24 hours.

2. **Force Mains.** The maximum leakage allowance for all force mains is 25 gallons per inch diameter per mile of pipe per 24 hours unless otherwise noted.

D. Test Procedure

1. **Water Test.** The Contractor may elect to use either an infiltration water test or exfiltration water test for gravity sewers after backfilling is completed. All force main installations shall be subjected to an exfiltration water test.
 - a. **Infiltration.** The Contractor may elect to use an infiltration test when the height of the groundwater table is 2 feet or more above the top of the pipe barrel, including house services, at the highest point of the section being tested. The amount of infiltration may be measured by means of a weir located in the downstream manhole and shall not exceed the allowable leakage. The inlet end of the upstream manhole shall be securely sealed. The test head shall be maintained for a period of not less than 24 hours before the weir measurement is made.
 - b. **Exfiltration.** When the exfiltration test is selected, the inlet ends of the upstream and downstream manholes shall be closed with a watertight bulkhead, and the sewer along with the upstream manhole shall be filled with water until the elevation of the water in the upstream manhole is 2 feet higher than the top of the pipe barrel, including house services, in the section being tested, or 2 feet above the existing groundwater in the trench, whichever is the higher elevation. The entire length of section to be tested shall be filled and maintained full of water for a period of approximately 24 hours prior to the start of the test. If the water level in the upper manhole has dropped during this 24 hour period, the level shall be raised to the test elevation mark prior to measurement of leakage. The exfiltration will be determined by measuring the amount of water required to maintain the above stated water elevation for a period of 1 hour from the start of the test. The allowable leakage is based on a maximum difference in elevation of 8 feet between the level of water at the upper manhole and the invert of the pipe being tested in the lower manhole. If the difference in elevation exceeds 8 feet, the allowable leakage shall be increased 5 percent for each 1 foot in excess of 8 feet.
 - c. **Sanitary Force Mains.** The section of force main to be tested shall be backfilled prior to testing. Each valved section of force main shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the force main in a manner satisfactory to the Engineer/ Architect. Before applying the specified test pressure, all air shall be expelled from the force main. The water pressure shall be brought to 100 pounds per square inch unless otherwise noted on the plans and maintained for at least 2 hours. Leakage will be determined by measuring the quantity of water to be supplied to maintain the specified test pressure.

END OF SECTION

**SECTION 02110
CLEARING AND GRUBBING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** This section includes the clearing and grubbing of the area described and as follows:

1. Clearing of area.
2. Grubbing of stumps and roots.
3. Removal of all other vegetation.
4. Protection of designated trees.
5. Removing above and below grade structures.
6. Disposal off-site of all material generated by the clearing and grubbing operations.

1.3 QUALITY ASSURANCE

Not used.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

- A. **Infrastructure Interference.** Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.
- B. **Protection.** Provide protection necessary to prevent damage to existing improvements indicated to remain in place. Protect improvements on adjoining properties and on Owner's property.
- C. **Restoration.** Restore damaged improvements to their original condition, as acceptable to property owners.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

Not applicable.

PART 3 – EXECUTION

- 3.1 **LANDSCAPE REMOVAL.** Remove trees, shrubs, grass and other vegetation, improvements, or obstructions as required to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. "Removal" includes grubbing and off-site disposing of stumps and roots. Grubbing shall be carried to a depth of 6 inches below existing ground.
- 3.2 **PROTECTION OF EXISTING TREES AND VEGETATION.** Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials. Provide temporary guards to protect trees and vegetation to remain standing.
- 3.3 **SALVAGEABLE IMPROVEMENTS.** Carefully remove items indicated to be salvaged, and store on Owner's premises where indicated or directed.
- 3.4 **BURNING.** Burning is not permitted on the Owner's property.
- 3.5 **DISPOSAL.** All trees, shrubs, plants, and other materials removed shall become the property of the Contractor and shall be removed from the site.

END OF SECTION

**SECTION 02225
TRENCH GRANULAR BACKFILL**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and place the trench granular backfill in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required to furnish and place the granular backfill in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and materials certifications as required.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Granular Backfill.** Granular backfill material shall be gravel, crushed gravel, or crushed stone meeting the following grading requirements:

Sieve	Total Percent Passing
2 1/2 inch	100
1 inch	70-100
No. 4 (3/16 inch)	25-100
No. 40	10-50
No. 200	5-15

The fraction passing a No. 40 sieve shall have a liquid limit not greater than 30 and a plasticity index not greater than 6.

- B. **Backfill.** Backfill around PVC water line pipe shall not exceed a maximum size of 100 percent passing the 1 1/2 inch screen.
- C. **Trench Excavated Granular Material.** Excavated granular material meeting the material specification and as approved by the Engineer/Architect may be used as granular backfill.

PART 3 – EXECUTION

- 3.1 **INSTALLATION.** The trench shall be backfilled with granular material so placed and compacted as to make a satisfactory pavement subgrade and prevent further settlement. Granular material shall be placed in layers of approximately 6 inches in thickness and compacted with mechanical tampers.

END OF SECTION

SECTION 02227
EXCAVATION, BACKFILL, AND EMBANKMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawing and general provisions of the Contract, including General and Special Conditions and Division 1 specification sections apply to work specified in this section.
- B. **Miscellaneous.** Trench Granular Backfill in Section 02225.

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** The Contractor shall provide the excavation, backfill, and embankments necessary to construct the work as shown in the plans and specified herein. This includes the following:
 - 1. Preparation of subgrade for foundations, slabs, and pavements.
 - 2. Disposal of excess soil, rock, or any other type of materials.
 - 3. Supplying borrow materials from off-site or on-site locations.
 - 4. Excavation, backfill, and embankments for structures, roads, pavements, drainage, grading, electric or telephone lines, and mechanical or electrical facilities.
 - 5. Classification of excavated material for payment will be soil or rock.
 - 6. Excavation of any materials regardless of type, character, composition, moisture, or condition thereof, shall be classified as soil or rock.
- B. **Topsoil** that is available as a part of the excavated material shall be removed, stockpiled, and used in the areas to be seeded.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. **Requirements.** Compaction and optimum moisture content shall be in accordance with:
 - 1. American Society for Testing and Materials (ASTM) D698 Moisture Density Relations of Soils and Soil-Aggregate Mixtures.
 - 2. ASTM D1556 Density of Soil in Place by Sand Cone Method.
 - 3. ASTM D2922 Density of Soil and Soil Aggregate in Place by Nuclear Methods (shallow depth).
 - 4. The Contractor shall employ a soils testing laboratory, approved by the Engineer/Architect to determine the moisture density relationship of the materials to be compacted. The approved soils testing laboratory shall make field moisture and density tests to verify the degree of compaction being obtained. The soils testing laboratory shall determine the strength of subgrades for support of structures. Tests shall be made at locations scheduled by the Engineer/Architect.

1.4 SUBMITTALS

- A. **Transmittals.** Submit two copies of the following report to the Engineer/Architect from the testing laboratory with a copy to the Contractor:

1. Test results on borrow material.
2. Verification of each subgrade for compaction or strength.
3. Field density test report.
4. One optimum moisture-maximum density curve for each type of soil encountered.
5. Report of actual unconfined compression strength, and/or results of bearing tests for strength of each structure subgrade.

1.5 **JOB CONDITIONS**

- A. **Existing Utilities.** Locate existing underground utilities in area of work. If utilities are to remain in place, provide adequate protection during construction operations.
- B. **Unforeseen Utility Location.** Should a utility which is encountered during excavation be unrecorded or recorded incorrectly, consult the utility immediately for directions. Cooperate with the utility or Owner in keeping respective services or facilities in operation. Repairs shall be made to damaged utilities to the satisfaction of the utility Owner.
- C. **Interruption.** Do not interrupt existing utilities serving functions used by Owner or others except when permitted in writing by the Engineer/Architect. Acceptable temporary utility services shall be provided when required in writing by the Engineer/Architect.

Provide a minimum of 48 hours notice to utility company and Owner or Engineer/Architect and written notice to proceed before interrupting any utility.

- D. **Protection.** Protect existing structures, utilities, sidewalks, pavements, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created by construction operations.

1.6 **DELIVERY, STORAGE AND HANDLING**

Not used.

1.7 **SPECIAL WARRANTY**

Not used.

PART 2 – PRODUCTS

- 2.1 **MATERIALS.** All materials shall be satisfactory material free of elastic soil materials, debris, waste, frozen material, vegetation, organics, peats, or other deleterious material and shall be as classified below. Satisfactory soil material shall be free of aggregate or rock larger than 2 inches in any dimension.

A. **General Backfill and Embankments**

1. **Soil.** Earth materials which have resulted from natural processes such as weathering, decay, and chemical action. More than 35 percent weight of the grains or particles will pass a No. 200 sieve and have a plastic index of 4 or more.
2. **Granular Material.** Natural mineral aggregate such as gravel, crushed gravel, crushed rock, or sand. At least 65 percent by weight of the grains or particles will be retained on a No. 200 sieve.

3. **Shale.** Finely stratified, laminated bedrock material formed by consolidation in nature. Bedrock types such as mudstone, claystone, siltstone, and clay bedrock shall be considered shale. Shale shall be broken into predominantly fine particles which can be readily tested for compaction requirements as soil.
4. **Rock.** Sandstone, limestone, dolomite, glacial boulders, and old concrete which are crushed into pieces that can readily be incorporated into a specified lift thickness and compaction requirements for granular materials.

- B. **Granular Backfill.** Granular material meeting the following grading requirements of Section 02225:

Sieve	Total Percent Passing
2 1/2 inch	100
1 inch	70-100
No. 4 (3/16 inch)	25-100
No. 40	10-50
No. 200	5-15

- C. **Porous Backfill.** Porous backfill shall be granular material meeting the requirements of ASTM D448, No. 57, 67, or 78 size.
- D. **Mudmat.** If concrete, a mudmat shall consist of a 3 inch layer of Class C concrete. If granular material, a mudmat shall consist of a 4 inch layer of crushed aggregate meeting the requirements of porous backfill.
- E. **Subbase.** Subbase shall be crushed granular material meeting the following grading requirements:

Sieve	Total Percent Passing
2 inch	100
1 inch	70-100
3/4 inch	50-90
No. 4	30-60
No. 30	7-30
No. 200	0-13

- F. **Drainage Fill.** Drainage fill shall be granular material meeting the requirements of ASTM D448 Nos. 57, 67, or 78 size.

PART 3 – EXECUTION

3.1 EXCAVATION

- A. **Protection.** All excavations shall be protected by bracing, sheeting, piling, or other acceptable means. The Contractor shall be responsible for protection of the excavation at all times.
- B. **Dewatering.** All excavations shall be kept dewatered by pumping equipment and drained to prohibit saturation of the subgrade. Soft subgrade caused by inundation shall be dewatered or the soft material shall be removed to satisfactory bearing material and the area backfilled with Class C concrete or other approved material to bring the excavated

area back to design elevations at no cost to the Owner. Where a Stormwater Discharge Permit is required, any dewatering shall be noted on the permit application.

- C. **Mudmat.** Provide mudmat where shown on the plans or where site conditions require a mudmat to protect subgrade.
- D. **Unauthorized Excavation.** Unauthorized excavation below design elevations shall be backfilled with Class C concrete or other approved material to the design elevations at no cost to the Owner.
- E. **Unsuitable Bearing Materials.** Unsuitable bearing materials encountered at design elevations shall, upon written direction of the Engineer/Architect, be removed and the required bearing provided by the Contractor. All authorized excavation below design elevations and all authorized corrective work such as backfilling with Class C concrete, driving of piling, compacted foundation, or by other acceptable means, will be paid for as specified in the General Conditions.
- F. **Rock Excavation**
 - 1. **Definition.** Rock excavation, wherever used as the name in excavating material, shall mean boulders and solid masonry larger than 1/2 cubic yard (cy) in volume or solid bedrock and masonry which requires for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power operated hand tool. Any material which can be excavated using a hand pick and shovel, power operated excavator, power operated backhoe, or power operated shovel shall not be defined as rock excavation.
 - 2. **Blasting.** No blasting for rock excavation shall be done within 40 feet of pipes or structures without approval of the Engineer/Architect. Blasts shall be correctly designed, properly covered, and the pipe or structure properly protected. Warning shall be given to all people in the immediate vicinity. Blasting shall be at the risk of the Contractor who shall be liable for all damages to people or property. Necessary permits shall be secured and paid for by the Contractor.
 - 3. **Limits.** Unless otherwise noted, rock excavation shall be to the bottom of structures and to a minimum clear width of 6 inches around the outer limits of the structures. If a unit price bid item is included in the Bidding Forms, no rock excavation exterior to the limits of measurements or material which may fall into the excavation will be measured.
- G. **Storage Stockpile.** Store and stockpile satisfactory excavated materials where directed until required. Place, grade, or shape stockpile for proper drainage. This shall include topsoil for later placement on completed cuts, fills, or other surface grades.
- H. **Disposal.** All excavated material shall be disposed of as specified herein, unless otherwise shown.
 - 1. **Satisfactory Material.**
 - a. Excavated material which is satisfactory shall be used for backfill and embankments,

- b. Surplus excavated material which is satisfactory shall be disposed of offsite, unless shown or directed otherwise.

2. **Unsatisfactory Material.** Excavated material which is unsatisfactory for backfill and embankment material shall be disposed of offsite.

3.2 **BACKFILL AND EMBANKMENTS**

- A. **Borrow.** Should the excavated material be insufficient to provide all of the fill required, the Contractor shall supply satisfactory material from another source at no cost to the Owner.
- B. **Placement.** No material shall be placed covering other work until such work has been observed by the Engineer/Architect and approved. Where backfill, drainage fill, or embankment is required on both sides of a foundation or wall, the backfill, drainage fill, or embankment shall be placed simultaneously on each side. Backfill, drainage fill, or embankment against building walls shall not be placed until the first floor slab has been poured and set, unless otherwise approved by the Engineer/Architect. Backfill, drainage fill, or embankment against other work shall be in a manner and at such time as not to endanger the stability or damage the work. No material shall be placed against water bearing walls until they have been tested for watertightness. No material shall be placed over snow or frozen material.

3.3 **GRANULAR MATERIAL**

- A. **Placement.** Type of granular material shall be placed where shown on the drawings and as specified. Granular materials shall be placed after the subgrades have been leveled and cleared of all debris. The subgrade shall be shaped at all foundations, slabs and pavements so that the required thickness of the foundations, slabs, pavements, and granular material can be maintained.

3.4 **FIELD QUALITY CONTROL**

- A. **Testing**
 1. Allow testing services to inspect and approve subgrades, backfill, drainage fill, and embankment layers before further construction work is performed.
 2. Perform field density or strength tests as follows:
 - a. Footing Subgrade. Conduct at least one test to verify required design bearing for each strata of soil encountered,
 - b. Building Slab or Paved Areas. Make at least one field density test of subgrade for every 2,000 square feet, but in no case less than three,
 - c. Backfill, Drainage Fill, and Embankment. Field density tests shall be made at least once for every 250 CY, or fraction thereof, of compacted material,
 - d. Wall Backfill. Take at least two field density tests, per side, at locations directed.
 3. If, in the opinion of the Engineer/Architect, the subgrade, backfill, drainage fill, or embankment are below specified density provide additional compaction and testing

at no additional cost.

4. **Settling.** Where settling is measurable or observable during the general project warranty period, remove the surface (pavement, lawn, or other finish), add backfill, compact or replace surface at no cost to the Owner.

B. **Compaction.** All materials shall be compacted as specified herein, unless otherwise shown.

1. **General Backfill.** General backfill shall be placed in 6 inch loose layers and each layer compacted to not less than 95 percent of maximum dry density. The moisture content shall be not greater than 1 percentage point below optimum moisture content and not greater than 3 percentage points above optimum moisture content.
2. **Embankments.** Embankment material shall be placed in 6 inch loose layers and each layer compacted to not less than the percent of maximum dry density specified herein. The moisture content shall be not less than optimum moisture content and not greater than 3 percentage points above optimum moisture content. For material which displays pronounced elasticity or deformation under action of compaction equipment, the moisture content shall be reduced to optimum if necessary to secure stability.

Maximum Dry Density lbs/cf	Compaction Percent Maximum Dry Density
90-104.9	102
105-119.9	100
120 and more	98*

*100 if embankment supports a structure foundation.

3. **Subgrade.** All pavement subgrades shall be compacted to a depth of 12 inches. Subgrade soils with a maximum dry density of less than 100 pounds per cubic foot are considered unsuitable for use where subgrade compaction for a depth of 12 inches is required, and when encountered in the upper 12 inches of the subgrade shall be replaced with suitable soil or granular material. Soil subgrade with maximum dry density of 100 to 105 pounds per cubic foot shall be compacted to not less than 102 percent of maximum dry density. All other soil subgrade shall be compacted to not less than 100 percent of maximum dry density. The moisture content shall be not less than optimum moisture content and not greater than 3 percentage points above optimum moisture content.
4. **Granular Backfill.** Granular backfill shall be placed in not more than 6 inch loose layers, 4 inch loose layers when hand mechanical tampers are used, and each layer compacted to not less than 100 percent of maximum dry density. The moisture content shall be at or near optimum moisture content.
5. **Subbase.** Subbase shall be placed in not more than 6 inch compacted layers. When subbase is shown as more than 6 inches thick, place material in equal layers but no layer more than 6 inches compacted thickness. Compact each layer to not less than 98 percent maximum dry density. The moisture content shall be at or near optimum moisture content.

6. **Porous Backfill.** Porous backfill shall be placed in not more than 6 inch compacted layers. Compact each layer to not less than 95 percent maximum dry density unless supporting a structure. If porous backfill supports a structure, compact each layer to 100 percent maximum dry density.
7. **Mudmat.** A mudmat of granular material shall be compacted to not less than 100 percent maximum dry density.
8. **Drainage Fill.** Drainage fill shall be placed in not more than 6 inch compacted layers. When drainage fill course is shown as more than 6 inches thick, place material in equal layers but no layer more than 6 inches compacted thickness. Compact each layer to not less than 100 percent maximum dry density.

3.5 **GRADING FOR SEEDING**

- A. **Rough Grading.** All areas shall be trimmed and graded to within 4 inches of the finished grades. These areas are to be free from rock or other foreign material, 3 inches or greater in any dimension.
- B. **Finished Grading.** Topsoil shall be spread so as to conform to the finished grades.

END OF SECTION

**SECTION 02271
SLOPE PROTECTION**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to construct the slope protection in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work in the construction of slope protection in compliance with applicable requirements of governing agencies having jurisdiction.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

- A. **Excavation.** Filling and seeding required to establish elevations shown on the drawings are not specified in this section.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **General.** All material used for slope protection shall be of such a quality that it will not disintegrate under exposure to air, water, handling, and placing. All materials shall be hard, durable, clean, and free from earth, clay, refuse, and other foreign matter.
- B. **Riprap.** Riprap shall consist of flat stones, precast concrete blocks, or broken concrete, not less than 1/3 cubic feet in volume or less than 4 inches thick in any direction. Individual pieces shall weigh not less than 10 pounds or greater than 300 pounds.
- C. **Rock Fill.** Rock fill shall consist of stones, precast concrete blocks, or broken concrete. The material smaller than a 9 inch square opening should consist of rock spalls and be free of soil.

1. **Grade A.** Grade A shall consist of sizes such that 85 percent by weight of the total material shall be larger than a 9 inch but less than an 18 inch square opening.
2. **Grade B.** Grade B shall consist of sizes such that 85 percent by weight of the total material shall be larger than a 9 inch but smaller than a 30 inch square opening.

2.2 **SOUNDNESS**

- A. **Source.** The material shall be obtained from a source whose material has an acceptable time record of satisfactory durability and resistance to extreme weathering conditions.
- B. **Soundness.** The soundness shall meet the requirements of the American Association of State Highway and Transportation Officials (AASHTO) designation T103 and T104.

PART 3 – EXECUTION

3.1 **INSTALLATION**

- A. **Riprap.** Riprap may be placed by skip, clamshell, or hand and shall be seated and keyed together. All spaces between larger pieces shall be filled and chinked to form a dense, compact blanket of a fairly even surface, unless otherwise noted, of not less than 12 inches thick.
- B. **Rock Fill.** Rock fill shall be dumped to the thickness shown with larger pieces at the outer face and smaller pieces near the inner surface of the area to be protected. Spaces between the larger stones shall be filled and chinked to form a dense, compact blanket of fairly even surface. When dumping under water, filling and chinking will not be required.

3.2 **MAINTENANCE.**

The Contractor shall maintain the slope protection until accepted by the Engineer/Architect. Any material displaced by slippage or other causes shall be replaced by the Contractor.

END OF SECTION

**SECTION 02510
TEMPORARY BITUMINOUS PAVEMENT**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish, place, and remove all temporary bituminous pavement in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required for the temporary bituminous pavement in compliance with applicable requirements of governing agencies having jurisdiction.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and materials certifications as required.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Cold Mix.** The bituminous cold mix shall be in conformance with ODOT Item 405.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Description.** The Contractor shall furnish, place, and remove all temporary bituminous pavement as shown on the plans or where directed by the Engineer/Architect and as specified herein.

- B. **Installation.** All temporary bituminous pavement shall be a minimum of (2) inches thick or as shown on the plans and shall conform to the grade of the existing pavement, drive, or walk. All streets, drives, and walks shall be maintained in a safe and usable condition for public use during the construction period.

END OF SECTION

SECTION 02520
ROADWAYS, DRIVEWAYS, PARKING AREAS, AND WALKS

PART 1 – GENERAL

1.1 RELATED DRAWINGS

- A. **General.** Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to construct the driveways, parking areas, and walks in accordance with plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work in placement of driveways, parking areas, and walks in compliance with applicable requirements of governing agencies having jurisdiction.
- B. **Testing Laboratory.** Engage a testing laboratory acceptable to the Engineer/Architect to perform subgrade inspection tests.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish samples, manufacturer's product data, test reports, and materials certifications as required for materials and mix design.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIAL

- A. **Aggregate.** Aggregate shall meet the specifications of ODOT Item 304.
- B. **Prime Coat.** Prime coat shall be RT-2, RT-3, MC70, or MC250 in accordance with ODOT Item 702.
- C. **Tack Coat.** Tack coat shall be RC-250, RS-1, SS-1, or SS-1h in accordance with ODOT Item 702.

- D. **Asphalt Concrete.** Asphalt concrete shall be in accordance with ODOT Item 448.
- E. **Concrete with Portland Cement.** Concrete shall be in accordance with Section 03300 "Concrete" Class A or ODOT Item 452.
- F. **Expansion Joint.** Expansion joints shall be 1/2 inch thick premolded, nonextruding type.
- G. **Parking Blocks.** Parking blocks shall be precast concrete, standard curb type, 6" x 8" x 8' with tapered edges and predrilled for anchoring. Provide three 3/4" x 16" steel anchor pins per unit.

PART 3 - EXECUTION

3.1 GENERAL

- A. **Topsoil.** Topsoil shall be removed. See Section 02936, "Grading and Seeding."
- B. **Subgrade**
 - 1. **Compaction.** See Section 02227, "Excavation, Backfill, and Embankments."
 - 2. **Foreign Material.** All loose and foreign materials shall be removed and the subgrade shall be free of ruts and standing water when the base material is placed.
- C. **Slope.** Driveways, parking areas, and walks shall be sloped to drain away from buildings and structures. Driveways in open areas shall have a center crown. Cross slope for driveways and walks shall be 1/4 inch per foot.
- D. **Existing Pavement.** Driveways, parking areas, and walks shall conform to the grade of existing pavements or walks unless modifications are shown on the plans or required by the specification. Where it is necessary to disturb existing Portland cement concrete pavements or walks, the concrete shall be saw cut in neat, straight lines. The depth of saw cut shall be at least 2 inches. Where it is necessary to disturb existing asphalt concrete pavements or walks, the asphalt concrete shall be line cut with straight vertical edges by saw cutting. All cut bituminous surfaces shall be sealed with a bituminous material.

3.2 PAVEMENT

- A. **Pavement Replacement**
 - 1. Aggregate base course shall consist of two 3 inch compacted layers.
 - 2. Bituminous aggregate base course shall consist of two 3 1/2 inch compacted layers.
- B. **Drive Replacement**
 - 1. Aggregate base course shall consist of two 3 inch compacted layers.
 - 2. The aggregate drive shall consist of two 4 inch compacted layers.
- C. **Resurfacing**
 - 1. **Surface Preparation.** No material shall be placed until the existing surface areas have

been examined and all holes, broken edges, cracks, and damaged areas have been repaired.

2. Tack Coat. Tack coat shall be applied according to ODOT Item 407 at the rate of 0.10 gallon per square yard.
3. Wearing Surfaces. Existing areas shown on the plans shall be resurfaced with an asphalt concrete applied to a minimum thickness of 2 inches after compaction.

3.3 **ASPHALT WALKS**

- A. **Asphalt Concrete Walks.** Asphalt concrete walks shall be constructed as specified for asphalt concrete driveways and parking areas, except aggregate base shall be 4 inches and the wearing surface 2 inches.

3.4 **CONCRETE WALKS**

- A. **Concrete Walks.** Concrete walks shall be 4 inches thick, except on driveways which will be 6 inches set on a 4 inch compacted aggregate base.
- B. **Finish.** Concrete shall be float finished with a tooled joint every 4 feet and an expansion joint every 20 feet.

END OF SECTION

**SECTION 02570
INTERFERENCE WITH TRAFFIC**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to maintain traffic in accordance with the drawings and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work in the maintenance of traffic in compliance with applicable requirements of governing agencies having jurisdiction.
- B. **Maintenance of Traffic.** The maintenance of traffic shall be in accordance with the Manual of Uniform Traffic Control Devices.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

- A. **Owner Requirements.** If proper maintenance of traffic facilities and proper provision for traffic control are not being provided and the safety of the public is thus endangered, the Owner may take the necessary steps to place them in proper condition and the cost of such services will be deducted from any payment which may be due or become due the Contractor.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

Not applicable.

PART 3 – EXECUTION

- 3.1 **DESCRIPTION.** The Contractor shall furnish, erect, maintain, and remove lights, signs, barricades, temporary guardrails, other traffic control devices, and furnish watchmen and flagmen as may be necessary to maintain safe traffic conditions.

3.2 MAINTAINING TRAFFIC

- A. **Traffic Diversion.** Whenever it is necessary to divert traffic from its normal channel into another channel, such diversion shall be clearly marked by cones, drums, barricades, or temporary guardrail. If the markers are left in place at night, suitable lights shall be provided and maintained.
- B. **One Way Traffic.** Whenever one way traffic is established, at least two flagmen shall be used.

3.3 CLOSED TO TRAFFIC

- A. **Street Closing.** The Contractor may close the street to through traffic for minimum periods of time with proper notice to local occupants of all premises, police and fire protection authorities, and other public authorities as applicable. The Contractor shall so schedule his work that this time is a minimum and shall, whenever possible, make suitable provision for access by local residents, school buses, and mail delivery vehicles. The Contractor shall provide access for police, fire, and emergency vehicles at all times. Fire hydrants and other public utility valves shall be accessible at all times.
- B. **Detours.** When it is required that the street or road be closed to traffic, the Contractor shall furnish, erect, maintain, and remove barricades, suitable and sufficient red lights, and other lights or reflecting material at the limits of the project, where side streets intersect, and at other points of public access to the project. The Contractor shall furnish, erect, and maintain advance warning signs and barricades on side streets at the first street intersection beyond the one closed by construction indicating "Street Closed, One Block Ahead." The Contractor shall furnish, erect, maintain, and remove detour marking signs on temporary routes.

END OF SECTION

**SECTION 02610
DUCTILE IRON MAINS**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Fire Hydrants.** See Section 02645 "Fire Hydrants" for setting hydrants.
- C. **Trench Granular Backfill.** See Section 02225 "Trench Granular Backfill" for granular backfill and 02620 for "Fittings."

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the ductile iron mains in accordance with the plans and as specified herein. This shall include:
 - 1. Excavation for the water mains, preparation of the trench bottom, bedding, backfill, and restoration of the area.
 - 2. Disposal of all excess material.
 - 3. Dewatering, trench shoring, and bracing.
 - 4. Testing.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required to furnish and install water mains in compliance with applicable requirements of governing agencies having jurisdiction.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and materials certifications as required.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Ductile Iron Pipe.** Ductile iron pipe shall meet the requirements of American National Standards Institute/American Water Works Association (ANSI/AWWA) C151/A21.51.

1. **Material.** The chemical constituents shall meet the physical property recommendations of ASTM A536 to ensure that the iron is suitable for satisfactory drilling and cutting.
2. **Minimum Thickness.** Unless otherwise shown, the minimum thickness of the barrel of the pipe shall be:

Size	Thickness Class
3" - 12"	51
14" - 24"	52
30" and larger	53

- a. Unless otherwise shown, the minimum thickness of the barrel of restrained ball and socket joint pipe (river crossing) shall be:

Size	Thickness Class
4" - 6"	54
8" - 12"	55
14" - 24"	56
30" - 36"	57

3. **Coating and Lining.** The pipe shall be coated outside with a bituminous coating in accordance with ANSI/AWWA C151/A21.5 and lined inside with cement mortar and seal coated in accordance with ANSI/AWWA C104/A21.4.
4. **Fittings.** Fittings shall be ductile iron as specified in Section 02620 "Fittings."

B. **Pipe Joints**

1. **Push-on and Mechanical.** Push-on and mechanical joints including accessories shall conform to ANSI/AWWA C111/A21.11. Bolts shall be high strength cast iron tee head with hex nuts.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Safety.** For the security and safety of persons in and adjacent to trenches or construction operations, the safety regulations of the appropriate federal, state, and local agency shall be followed.
- B. **Handling.** Pipe, fittings, valves, hydrants, and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against other pipe.
- C. **Protection of Trees.** Special care shall be taken to avoid damage to trees and their root system. Machine excavation shall not be used when, in the opinion of the Engineer/Architect, it would endanger the tree. In general, where the line of trench falls within the limits of the limb spread, headers are required across the trench to protect the tree. The

operation of all equipment (particularly when employing booms), the storage of materials, and the deposition of excavation shall be conducted in the manner which will not injure trees, trunks, branches or their roots unless such trees are designated for removal.

- D. **Dewatering.** Should water be encountered, the Contractor shall furnish and operate suitable pumping equipment of such capacity adequate to dewater the trench. The trench shall be sufficiently dewatered so that the laying and joining of the pipe is made in the dry. The Contractor shall convey all trench water to a natural drainage channel or storm sewer without causing any property damage.
- E. **Construction Equipment.** Where mains are located in or adjacent to pavements, all backfilling and materials handling equipment shall have rubber tires. Crawler equipment shall be permitted when there is no danger of damaging pavement.
- F. **Excavation and Construction Materials.** All excavated material and all construction materials used in prosecution of the work shall be deposited so as not to endanger the work, create unnecessary annoyance to the public, or interfere with natural drainage courses. During the progress of the work, all material piles shall be kept trimmed up and maintained in a neat, workmanlike manner.
- G. **Trench Support.** Unsupported open cut for mains will not be permitted where trenching may cause unnecessary damage to street pavement, trees, structures, poles, utilities, or other private or public property. During the progress of the work, whenever and wherever it is necessary, the Contractor shall, at his expense, support the sides of the excavation by adequate and suitable sheeting, shoring, bracing, or other approved means. Such trench support material and equipment shall remain in place until backfilling operations have progressed to the point where the supports may be withdrawn without endangering property. In lieu of removing all the sheeting, the Contractor may cut off the sheeting 2 feet above the top of the pipe and remove the upper portion. If all the sheeting is to be removed, it shall be removed without causing damage to the pipe. No sheeting, shoring, or bracing will be paid for by the Owner unless remaining in place on written order of the Engineer/Architect. In this case, payment will be made in accordance with the Changes in Contract Price of the General Conditions.
- H. **Noise, Dust, and Odor Control.** The Contractor's construction activities shall be conducted so as to eliminate all unnecessary noise, dust, and odors. The use of oil or other material for dust control, which may cause tracking, shall not be permitted.
- I. **Leakage Test and Disinfection.** See Section 01650, "Leakage Test and disinfection."
- J. **Trench Excavation and Bottom Preparation**
 - 1. **Rock.** The word "rock" wherever used as the name of an excavated material, shall mean boulders and solid masonry larger than 1/2 cubic yard in volume, or solid ledge rock and masonry which requires for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power operated hand tool. Any material which can be excavated using a hand pick and shovel, power operated excavator, power operated backhoe or power operated shovel shall not be defined as rock.
 - 2. **Blasting Rock.** No blasting of rock shall be done within 40 feet of pipes or structures without specific permission from the Engineer/Architect. Blasts shall be properly covered and the pipe or structure properly protected. Warning shall be given to all persons in the immediate vicinity. Blasting shall be at the risk of the

Contractor who shall be liable for all damages to persons or property. Necessary permits shall be secured and paid for by the Contractor.

3. **Trench Width.** Widths of trenches shall be held to a minimum to accommodate the pipe and appurtenances. The trench width shall be measured at the top of the pipe barrel and shall conform to the following limits:

- a. **Pipe.**

Earth

Minimum	Outside diameter of the pipe barrel plus 8 inches, i.e., 4 inches each side.
Maximum	Nominal pipe diameter plus 24 inches.

Rock

	Nominal Pipe Diameter 24 inches or less	Larger than 24 inches
Minimum	Outside diameter of the pipe barrel plus 12 inches, i.e., 6 inches each side.	Outside diameter of the pipe barrel plus 18 inches, i.e., 9 inches each side.
Maximum	Nominal pipe diameter plus 24 inches.	

- b. **Structures.** The minimum excavation limits for structures shall be as excavated. In rock, the excavation limits shall not exceed 12 inches from the outside wall and 6 inches below the footer.

4. **Excessive Trench Width.** If for any reason the trench width exceeds the maximum trench width defined in paragraph J3 "Trench Width" the Contractor, (subject to approval of the Engineer/Architect), shall provide compacted stone bedding, additional strength pipe or concrete encasement, at no cost to the Owner, and subject to the approval of the Engineer/Architect.

5. **Trench Depth.**

- a. **Earth.** The trench shall be excavated to the depth required, so as to provide a uniform and continuous bearing and support for the pipe barrel on solid and undisturbed ground at every point between joints, except that it will be permissible to disturb the finished trench bottom over a maximum length of 18 inches near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle. When required, bell holes shall be provided. The finished trench bottom shall be accurately prepared by means of hand tools.
 - b. **Rock.** Where excavation is made in rock or boulders, the trench shall be excavated 6 inches below the pipe barrel for pipe 24 inches in diameter or less, and 9 inches for pipe larger than 24 inches in diameter. All loose material shall be removed from the trench bottom. After preparation of the trench bottom, a pipe bed shall be prepared using crushed stone or crushed gravel meeting the following requirements:

Nominal Pipe Size	AASHTO M43 Size
Less than 16"	67, 7, or 8
16" - 30"	6 or 67
Greater than 30"	57 or 67

The bedding material shall be spread the full width of the trench bottom.

6. **Foundation.** The mains are to be built on a good foundation. If, in the Engineer/Architect's opinion, the material forming the trench bottom is not suitable for a good foundation, a further depth shall be excavated and the same filled with suitable material. Authorized excavation and the restoration of the foundation below the trench bottom shall be paid for in accordance with the Changes in Contract Price of the General Conditions. Unauthorized excavation below the trench bottom shall be filled with compacted crushed stone at no cost to the Owner.

K. **Pipe and Valve Installation**

1. **Pipe Laying.** Pipe shall be laid with bell ends facing in the direction of laying, unless otherwise directed by the Engineer/Architect. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home. All pipe shall be laid with ends abutting and true to line and grade. Deflection of pipe joints in excess of the manufacturer's recommendations will not be permitted. A watertight pipe plug or bulkhead shall be provided and used to prevent the entrance of foreign material whenever pipe laying operations are not in progress. The Contractor shall inspect cast metal pipe and fittings for cracks by ringing with a light hammer while suspended.
2. **Pipe Cutting.** The cutting of pipe for installing valves, fittings, or hydrants shall be done in a neat and workmanlike manner without damage to the pipe or lining. The end shall be smooth and at right angles to the axis of the pipe. Flame cutting of metal pipe by means of an oxyacetylene torch shall not be permitted. All pipe cutting shall be at the Contractor's expense.
3. **Push-on Joints.** The surfaces with which the rubber gasket comes in contact shall be thoroughly cleaned just prior to assembly. The gasket shall then be inserted into the groove in the bell. Before starting joint assembly, a liberal coating of special lubricant shall be applied to the spigot end. With the spigot end centered in the bell, the spigot end is pushed home.
4. **Mechanical Joints.** Mechanical joints for metal pipe require that the spigot be centrally located in the bell. The surface with which the rubber gasket comes in contact shall be thoroughly cleaned just prior to assembly. These clean surfaces shall then be brushed with a special lubricant just prior to slipping the gasket over the spigot end and into the bell. The lubricant shall also be brushed over the gasket prior to installation to remove the loose dirt and lubricate the gasket as it is forced into its retaining space.
 - a. **Bolt Torque.** The normal range of bolt torques to be applied to standard cast iron bolts in a joint are:

Size	Range of Torque in foot-pounds
-------------	---

5/8"	40- 60
3/4"	60- 90
1"	70-100
1 1/4"	90 – 120

5. **Restrained Joints.**

- a. **Ball and Socket.** Assemble and install the ball and socket joint according to the manufacturer's recommendations. The joint shall be thoroughly cleaned and lubricated. Check the retainer ring fastener.
- b. **Push-on.** Assemble and install the push-on joint according to the manufacturer's recommendations. The joint shall be thoroughly cleaned and lubricated. Check the retainer ring fastener.

6. **Setting Valves.** Valves shall be set on a firm foundation so that no load will be transferred to the connecting pipe. Valves in water mains shall, where possible, be located on the street property lines extended, unless otherwise shown on the plans. A valve box shall be provided for every valve. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the operating nut of the valve. The box cover shall be set flush with the surface of the finished pavement unless otherwise shown.

7. **Anchoring.** All plugs, caps, tees, and bends shall be provided with a concrete backing. If shown or specified, movement shall be prevented by attaching suitable metal rods, clamps, or restrained fittings.

- a. **Concrete Backing.** Concrete backing shall be 4,000 pounds per square inch concrete as specified in Section 03300 "Concrete. " Backing shall be placed between undisturbed ground and the fitting to be anchored. The area of bearing on the fitting and on the ground in each instance shall be that shown herein. The backing shall, unless otherwise shown, be so placed that the pipe and fitting joints will be accessible for repair.
- b. **Tie Rods.** Steel tie rods or clamps, where permitted, shall be of adequate strength to prevent movement. Steel tie rods or clamps shall be painted with three coats of an approved bituminous paint or coal tar enamel.
- c. **Restrained Fittings.** Restrained fittings, where permitted, shall be subject to the approval of the Engineer/ Architect.

L. **Trench Backfill**

1. **Backfill to Centerline of Pipe Barrel.** All trench excavations shall be backfilled immediately after pipe is laid. Compacted selected trench material shall be used to backfill the trench from the bottom of the pipe barrel to the centerline of the pipe barrel. The selected material shall be placed in uniform 6 inch loose layers and each layer compacted so as to eliminate the possibility of settlement, pipe misalignment, or damage to joints. Selected trench material shall be free from cinders, refuse, organic material, boulders, rocks, or other material which in the opinion of the Engineer/ Architect is unsuitable. No backfill shall be made with frozen material.

2. **Backfill to 12 Inches Over Pipe Barrel.** From the centerline of the pipe barrel to a level of 12 inches over the top of the pipe barrel, selected excavated trench material shall be used as backfill material. Care shall be taken to avoid injuring or moving the pipe. Selected trench material shall be free from cinders, refuse, organic material, boulders, rocks or other material which in the opinion of the Engineer/Architect is unsuitable. No backfill shall be made with frozen material.
 3. **Remaining Trench Backfill.** From 12 inches above the pipe barrel to the surface, excavated trench material may be used as backfill material. No material shall be used for backfill that contains frozen earth, debris, or earth with an exceptionally high void content. The Contractor may use mechanical equipment to place the backfill. This shall be done in such a manner that the material does not free fall, but shall be so placed that it will flow onto the previously placed material. The Contractor shall consolidate the backfill in such a manner as will ensure the minimum possible settlement and the least interference with traffic. No compacting of the backfill with mechanical equipment, such as wheeled vehicles, will be permitted unless sufficient cover is provided over the pipe to prevent damage to the pipe.
 4. **Granular Backfill.** When backfilling under pavements, driveways, or as directed by the Engineer/Architect, granular material as specified in Section 02225 "Trench Granular Backfill" shall be used in place of the excavated material specified in paragraphs 3.01, LI, 2, and 3.
 5. **Bulkheads.** When granular bedding is provided in rock or when granular backfill is required, the Contractor shall place bulkheads of clay soil across the trench at 100 foot intervals to resist the movement of groundwater through the granular material. Such bulkheads shall be carefully compacted and shall extend approximately 3 feet in a direction parallel to the pipe and shall extend from the bottom of the trench to a height of 6 inches above the top of the pipe barrel.
 6. **Surface Conditions.** The trench surface shall be periodically attended to during the course of the contract. The trench surface shall be maintained in a safe condition and shall not interfere with natural drainage.
- M. **Cleanup.** After a section of main is tested and accepted, the ground surface shall be cleaned of all surplus material including stone, broken pipe, construction material, and all other debris, to the satisfaction of the Engineer/Architect.
- N. **Trench Maintenance.** The Contractor shall be responsible for the condition of the trenches for a period of 1 year from the date of the final estimate.

3.2 RIVER CROSSING

- A. **General.** It is the intent of the plans and specifications to install the crossing in such a manner as to protect the pipe from erosion and to restore, as much as practicable, the riverbanks and bottom to their original condition.
- B. **Pipe Protection.** The pipe will be protected from erosion either by concrete encasement around the pipe or by a sufficient depth of compacted backfill as shown on the plans.
- C. **Riverbank Restoration and Protection.** The riverbanks will be restored by backfilling the trench with mechanically compacted earth to the original ground surface. The limits of compaction shall extend as shown on the detailed plans. Following completion of the river

crossing, straw bales shall be placed along the riverbank on each side within 2 feet of the edge of water and of sufficient length to extend beyond the limits of the excavated trench width. Straw bales shall remain in place until after the riverbanks have been fine graded, fertilized and seeded, and until such time as the seeding has sufficiently grown to protect the riverbanks from erosion.

D. **River Bottom Restoration.** The river bottom trench will be backfilled with mechanically compacted earth.

E. **Construction Procedure.** The Contractor shall use either of the following methods to install the river crossing.

1. **Option 1.** The Contractor shall construct an earth embankment from the riverbank to a point beyond the centerline of the river. The slopes of the earth embankment shall be protected from erosion by covering them with 6 mil polyethylene sheeting. The sheeting shall extend from the river bottom to an elevation 2 feet above the water level. The main shall then be installed in a trench excavated through the embankment. The embankment and material and any excess trench excavation shall be removed to an off-site disposal area. The same procedure shall be used to install the remainder of the river crossing.
2. **Option 2.** The Contractor shall construct a cofferdam of sandbags or inflatable bags from the riverbank to a point beyond the centerline of the river. The main shall then be installed in a trench within the cofferdam. Any excess trench excavation shall be removed to an off-site disposal area. The cofferdam shall then be removed. The same procedure shall be used to install the remainder of the river crossing.

END OF SECTION

**SECTION 02620
FITTINGS, DUCTILE IRON**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section,

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install fittings in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

A. **Standards**

1. **ANSI/AWWA** - American National Standards Institute/American Water Works Association.
 - a. ANSI/AWWA C104/A21.4, Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water,
 - b. ANSI/AWWA C105/A21.5, Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids,
 - c. ANSI/AWWA C110/A21.10, Ductile Iron and Gray Iron Fittings, 3 Inches through 48 Inches, for Water and Other Liquids,
 - d. ANSI/AWWA C111/A21.11, Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.

1.4 SUBMITTALS

- A. **Shop Drawings.** Submit detailed drawings and data on fittings, gaskets, and appurtenances in conjunction with shop drawings required under Section 02610.
- B. **Certification.** Submit certificates of compliance with the reference standards.

1.5 JOB CONDITIONS

- A. **Single Manufacturer.** Obtain each type of fitting from the same manufacturer as the pipe.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section 02610, Ductile Iron Mains.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Ductile Iron Fittings.** Ductile iron standard and special fittings shall conform to ANSI/AWWA C110/A21.10.

1. **Working Pressures.** Fittings shall be suitable for the following working pressures unless otherwise noted:

Sizes	Pressure Pounds per Square Inch	
	Gray Iron	Ductile Iron
2" - 12"	250	
14" - 48"	150	
3" - 24"		350
30" - 48"		250

2. **Coating and Lining.** The fittings shall be coated outside with a bituminous coating in accordance with ANSI/AWWA C110/A21.10 and lined inside with cement mortar and seal coated in accordance with ANSI/AWWA C104/A21.4.

B. Joints

1. **Push-on and Mechanical.** Push-on and mechanical joints including accessories shall conform to ANSI/AWWA C111/A21.11. Bolts shall be high strength cast iron tee head with hex nuts.
2. **Restrained.**
- a. **Ball and Socket.** Ball and socket joints (river crossing) shall be restrained, boltless, and capable of deflecting up to 15 degrees. The bell, ball, and retainer shall be cast of ductile iron. The gasket shall be of high quality rubber.
- b. **Push-on.** Restrained push-on joints shall conform to ANSI/AWWA C111/A21.11. When bolts and nuts are required, they shall be corrosion resistant high strength steel.
- C. **Polyethylene Encasement.** Where noted, the fittings shall be encased with polyethylene film conforming to ANSI/AWWA C105/A21.5.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Fittings.** All fittings shall be installed in conformance with Section 02610 "Ductile Iron Mains."
- B. **Concrete Backing.** All concrete backing shall be in accordance with the details shown in W-2, W-3, and W-4.

END OF SECTION

**SECTION 02625
EXISTING UTILITIES AND RELATED STRUCTURES**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** The Contractor shall provide the labor, tools, equipment, and materials necessary to relocate existing utilities and related structures in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

Not used.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

- A. **Notifications.** Prior to the start of construction, the Contractor shall notify all privately owned and public utilities located at or adjacent to the work site.
- B. **Scheduled Shutdowns.** The Contractor shall cooperate with the Owner in scheduling any shutdown of any utility owned by the Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

Not applicable.

PART 3 – EXECUTION

- 3.1 **DESCRIPTION.** Where existing utilities and related structures are indicated as being in the line of the proposed improvement, the Contractor shall expose them. This work is to be done sufficiently in advance of the construction operations to permit adjustments in line or grade, if required and as directed by the Engineer/Architect, to eliminate interferences. Existing pipes or conduits crossing the trench, or otherwise exposed, shall be adequately braced and supported to prevent trench settlement from disrupting the line or grade of the existing pipe or conduit, all in

accordance with the directions of the Engineer/Architect. Utility services broken or damaged shall be repaired at once to avoid inconvenience to customers and utility owners. Temporary arrangements, as approved by the Engineer/Architect, may be used until any damaged items can be permanently repaired. All items damaged or destroyed by construction and subsequently repaired must be properly maintained by the Contractor.

- 3.2 **RELOCATION.** Where it is necessary to relocate an existing utility or structure, the work shall be done in such a manner as is necessary to restore it to a condition equal to that of the original facility. No such relocation shall be done until approval is received from the authority responsible for the utility or structure being relocated.
- 3.3 **INTERFERENCE.** If interference is encountered at grade with utilities or structures not shown on the plans or otherwise indicated, the authorized elimination of the interference shall be paid for in accordance with the Changes in Contract Price of the General Conditions.

END OF SECTION

**SECTION 02640
BURIED VALVES**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. See Section 02610, "Ductile Iron Mains."

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the buried valves in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required to furnish and install the buried valves in compliance with applicable requirements of governing agencies having jurisdiction.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and materials certifications as required.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Gate Valves.** Gate valves shall conform to American Water Works Association (AWWA) C500 and shall be iron body, double disc, parallel seats, bronze mounted, nonrising stem with rubber "O" ring packing seals. The valves shall open by turning counterclockwise. All valves shall have openings through the body of the same circular area as that of the pipe to which they are attached. Valves shall have mechanical joint ends unless otherwise shown on the plans or directed by the Engineer/Architect. All valves shall be designed for a working pressure of 150 pounds per square inch (psi) unless otherwise noted on the plans or in the "Supplemental Specifications." An extension stem shall be furnished, if required, to bring the operating nut within 3 1/2 feet of finished grade. Extension stems

shall be securely fastened to the valve stem. The Contractor shall make all valves tight under their working pressures after they have been placed and before the main is placed in operation.

- B. **Butterfly Valves.** Butterfly valves shall conform to AWWA C504, except as modified herein.
1. **Body.** The valves shall be AWWA Class 150B designed for tight shutoff against a differential pressure of 150 psi. Valve bodies shall be constructed of cast iron, American Society for Testing and Materials (ASTM) A126, Class B. Two trunnions for shaft bearings shall be integral with the valve body. The valves and all appurtenances shall be suitable for buried service.
 2. **Ends.** Valves shall have mechanical joint ends and shall be furnished with high strength cast iron tee head bolts and hex nuts, cast iron glands, and rubber gaskets for each mechanical joint end.
 3. **Discs.** Valve discs of cast steel, fabricated steel, or cast bronze are not acceptable.
 4. **Seats.** Seats bonded on the discs are not acceptable.
 5. **Shaft Seals.** If stuffing boxes are utilized for shaft seals they shall be constructed of cast iron, ASTM A126. Gland assemblies shall be of cast bronze, ASTM B132. The packing gland shall be housed in a solid walled cast iron, ASTM A48, Class 40 one piece structure or equal.
 6. **Operators.** The valve operating mechanisms shall be for counter-clockwise opening. There shall be no external moving parts on valve or operator except the operator input shaft. Input shaft is to be operated by a 2 inch square operating nut. Maximum required input force on the operator shaft to open and close the valve shall be 40 pounds. The total number of turns applied to the operating nut required to completely open the valve from a completely closed position shall be not less than twice the nominal valve diameter. An extension stem shall be furnished if required to bring the operating nut within 3 1/2 feet of finished grade. Extension stems shall be securely fastened to the valve stem. A stainless steel collar, 6 inches high, shall be welded to the operating gear box housing centered on the operating nut to hold the valve box in place and seal it against dirt. The diameter of the collar shall be such that it will accept the valve box.
- C. **Tapping Sleeves and Valves.** Tapping sleeves and valves shall be designed for a working pressure of 150 psi. The tapping sleeve together with the tapping valve shall be tested at 150 psi for visible leakage before the main is tapped.
1. **Tapping Sleeves.** Tapping sleeves shall be two pieces with either caulk type or mechanical joint type ends, and be so designed as to assure uniform gasket pressure and permit centering of the sleeve on the pipe.
 2. **Tapping Valves.** Tapping valves shall have a flange on one end for bolting to the tapping sleeve and a mechanical joint type end connection on the outlet with slotted standard flange or other adapters for connection to the tapping machine. The valves shall open by turning counterclockwise. Tapping valves shall conform to AWWA C500 except that the seat rings shall be oversized to permit entry of the tapping machine cutter.

- D. **Valve Boxes.** All valves shall be provided with valve boxes. Valve boxes shall be of standard, adjustable, heavy pattern, cast iron extension type, three piece, 5 1/4 inch shaft, screw type, and of such length as necessary to extend from valve to finished grade. Tops shall be set at established grade, and the valve box cover marked "WATER."

Valve Size

Base

4" and smaller
6" and 8"
10" through 16"

round, 8" in height, 10 7/8" diameter at bottom
round, 11" in height, 14 3/8" diameter at bottom
oval 9 1/2" in height, 21" by 12 1/2" diameter at
bottom

18" and 20"
24"

oval, 10" in height, 25 1/2" by 16" diameter at bottom
dome, 5" in height, 15" diameter, and 17" square
flange at bottom

- E. **Valve Wrench.** A valve wrench of sufficient length shall be provided for each five valves or less furnished.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **General.** All valve settings shall be in conformance with Section 02610, "Ductile Iron Mains."

END OF SECTION

**SECTION 02645
FIRE HYDRANTS**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the fire hydrants in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work to furnish and install the fire hydrants in compliance with applicable requirements of governing agencies having jurisdiction.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and materials certifications as required.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Fire Hydrants.** Fire hydrants shall conform to American Water Works Association (AWWA) C502 and shall be "Centurion" fire hydrants as manufactured by the Mueller Co., or equal. The hydrants shall have a 6 inch mechanical joint inlet connection, a 5 1/4 inch main valve opening, two 2 1/2 inch hose nozzles and one 4 inch pumper nozzle. All outlet nozzles shall have National Standard threads. Hydrants shall be furnished with a 5 foot bury length.
- B. **Hydrant Wrench.** A hydrant wrench shall be provided with each five fire hydrants or less furnished.

PART 3 – EXECUTION

3.1 **INSTALLATION**

- A. **Setting Hydrants.** Hydrants shall be located as shown on the plans or as directed by the Engineer/Architect. The location shall provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians. When placed behind the curb, the hydrant barrel shall be set so that no portion of the pumper or hose nozzle cap will be less than 12 inches from the gutter face of the curb. All hydrants shall stand plumb with the pumper nozzle facing the curb. Hydrants having two hose nozzles 90 degrees apart shall be set with each nozzle facing the curb at an angle of 45 degrees. Hydrants shall be set to the established grade, with nozzles at 12 inches above the ground as shown or as directed by the Engineer/Architect. Unless otherwise shown, each hydrant shall be connected to the main with a 6 inch branch connection controlled by an independent 6 inch gate valve.

A drainage sump 2 feet in diameter and 2 feet deep shall be excavated below each hydrant and filled with coarse gravel or stone, compacted in place, under and around the shoe of the hydrant and to a level of 6 inches above the waste opening. No drainage sump shall be connected to a sanitary sewer.

- B. See "Mains" specifications for laying, backfill, and anchoring.

END OF SECTION

**SECTION 02655
MANUAL AIR RELEASE OUTLETS**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the air release outlets in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required to furnish and install the manual air release outlets in compliance with applicable requirements of governing agencies having jurisdiction.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer product data, test reports, and material certifications as required.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

A. **Corporation Stops**

1. **Copper Tubing.** Corporation stops for use with copper tubing shall have a Mueller Thread (AWWA Thread) inlet with a copper service outlet and shall be Mueller H-15000, Hays 5200, or equal.

- B. **Service Clamps.** Service clamps shall be designed for use with PVC main and have corporation stop threads. The clamps shall be equipped with an "O" ring seal cemented to the body of the clamp, be clearly marked with the size range on the saddle of the clamp, and shall be equal to the following:

- C. **Tapping Tee Valve.** Tapping tee valves shall be manufactured from PE plastic material conforming to American Society for Testing and Materials (ASTM) D1248, Grade PE3406. The tee shall contain an "O" ring valve insert and closure cap. The tee shall be thermally joined to the PE pipe and tubing.
- D. **Curb Stops**
 - 1. **Copper Tubing.** Curb stops shall have copper inlets and outlets and shall be Hays 4304 or equal.
 - 2. **PE Tubing.** Curb stops shall have Mueller Insta-tite PE inlets and outlets and shall be Mueller H-15215 or equal.
- E. **Tubing.** Tubing shall be Type K copper or PE conforming to ASTM D2737, Grade PE3406.
- F. **Service Boxes.** Service boxes shall be buffalo pattern with 2 1/2 inch shaft. The boxes shall be adjustable in height from 42 inches to 60 inches and for potable water only shall have the word "WATER" cast neatly and legibly on the lid which shall be held in place by a bronze or brass standard bolt. Curb boxes shall be standard weight, Size 94E, and shall be Mueller H-10350 or equal. Service boxes for sanitary force mains shall have a plain lid.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **General.** Air release outlets shall be of the size as shown on the plans. B. Connection to Main
 - 1. **Gray or Ductile Iron.** The connection to a gray or ductile iron main shall be a corporation stop installed by drilling and tapping the main.

END OF SECTION

SECTION 02656
POTABLE WATER SERVICE CONNECTIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the potable water services in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required to furnish and install the potable water services in compliance with applicable requirements of governing agencies having jurisdiction.
- B. **Testing.** The service will be tested before backfilling.

1.4 SUBMITTALS

- A. **Transmitting.** Furnish samples, manufacturer's product data, test reports, and materials certifications as required.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **General.** The water service shall be 3/4 inch through 2 inch copper.
- B. **Connection to Main**
1. **Ductile Iron Pipe (DIP).** The connection to a DIP main shall be a corporation stop installed by drilling and tapping the main or by installing a service clamp and corporation stop. Drilling and tapping shall be limited to combinations of main size, main thickness, and corporation stop size which will result in a minimum of two full

threads in contact. Corporation stops shall not be installed in the top one quarter of the water main.

C. **Corporation Stops**

1. **Copper Tubing.** Corporation stops for use with copper tubing shall have an AWWA thread inlet with a copper service outlet and shall be Mueller H-15000, Hays 5200, or equal.

D. **Service Clamps.** Service clamps shall be designed for use with the specific type of main and have AWWA corporation stop threads. Service clamps for 3 inch and larger mains shall be double strap. The clamps shall be equipped with an "O" ring seal cemented to the body of the clamp, marked with the size range on the saddle of the clamp, and shall be as manufactured by Mueller Co., Ford Meter Box Co., Clow Corporation, or equal.

E. **Curb Stops**

1. **Copper Tubing.** Curb stops shall have copper inlets and outlets and shall be Hays 4304, Ford B22, or equal. Curb stops shall be placed 1 foot inside the right-of-way.

F. **Tubing**

1. **Copper Tubing.** Copper tubing shall be Type K, soft annealed tubing, conforming to ASTM B88, and rated at 175 pounds per square inch (psi) minimum working pressure.

G. **Valve Boxes.** Valve boxes shall be buffalo pattern with 2 1/2 inch shaft. The boxes shall be adjustable in height from 42 inches to 60 inches, and shall have the word "WATER" cast neatly and legibly on the lid which shall be held in place by a bronze or brass standard bolt. The boxes shall be standard weight, size 94E, and shall be Mueller H-10350, Tyler Pipe Industries 6500, or equal. Valve boxes shall be placed 1 foot inside the right-of-way.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Installation.** The water service shall be installed in a flat bottom trench with a minimum depth of 4 feet.
- B. **Testing.** After a water service has been connected to the main and before it is backfilled, the water service shall be tested by filling it with water under normal operating pressure of the main. The water service shall be observed and any leakage shall be eliminated prior to backfilling.
- C. **Backfilling.** The water service trench shall be backfilled by hand with fine loose earth free from large clods or stones. Backfill shall be tamped on both sides of the pipe until the fill covers the pipe to a depth of 6 inches. The remainder of the fill may be completed using mechanical equipment or other usual methods, except that within the limits of pavement, backfill shall be compacted granular material.

END OF SECTION

SECTION 02657
CONNECTIONS TO EXISTING MAINS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to accomplish connections to mains in service in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work for connecting to existing mains in compliance with applicable requirements of governing agencies having jurisdiction.
- B. **Testing.** The connection will be tested before backfilling.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

- A. **Notification.** The Contractor shall notify the Owner at least 48 hours in advance and all affected users at least 24 hours in advance of shutoffs. The notification shall include planned starting time and duration of interruption in service. The time and duration of interruption of service must be approved by the Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Materials for this section** will be described elsewhere in these specifications.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Description.** The Contractor shall provide all labor, tools, materials, and equipment

required to accomplish connections to mains in service as shown on the plans and as specified herein.

B. General

1. The Contractor shall complete as much work as possible before making connections. New mains must be blocked, tested, sterilized, and approved prior to connecting to existing mains.
2. The Contractor shall coordinate the work so that all labor, materials, tools, and equipment are on the site at the start of the work.
3. The Contractor shall work continuously (24 hours per day, 7 days per week) until service is restored.
4. The Contractor shall schedule the work to correspond with minimum flows, such as nights and weekends to minimize inconvenience to customers.

C. Dewatering. The Contractor shall be responsible for dewatering the affected main including disposal of the water in a manner acceptable to local authorities.

D. Disinfection. The Contractor shall disinfect contaminated mains in accordance with Section 01650, "Leakage Test and Disinfection."

E. Testing. The connection shall be tested before backfilling.

F. Refilling. The Contractor shall refill the main from the system and evacuate all air through hydrants and air releases.

END OF SECTION

**SECTION 02705
MANHOLES AND INLETS**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the manholes and inlets in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required to furnish and install the manholes and inlets in compliance with applicable requirements of governing agencies having jurisdiction.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish samples, manufacturer's product data, test reports, and materials certifications as required.
- B. **Approvals Drawings.** Shop drawings shall be submitted to the Engineer/Architect for approval. Shop drawings shall show detail drawings, sketches, and specifications as may be required to establish that the proposed manholes and inlets conform to the requirements of the plans and specifications. Fabrication and installation shall be in accordance with the approved shop drawings.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS, GENERAL

- A. **Concrete.** Portland cement concrete used in the construction of manholes and inlets shall be of the class shown herein and as specified in Section 03300, "Concrete." No mortar or concrete shall be placed in water, and no water shall be allowed to flow over or against the concrete before it has set for a period of time deemed sufficient by the Engineer/Architect to prevent damage to the structure.

- B. **Concrete Reinforcement.** Reinforcement used in the construction of manholes and inlets shall be as shown herein and as specified in Section 03300, "Concrete."

2.2 MATERIALS, SANITARY SEWER MANHOLES

- A. **Manholes.** Manholes shall be watertight structures made of cast-in-place concrete or precast sections.
- B. **Precast Reinforced Concrete Manhole Sections.** Manhole sections shall conform to the requirements of ASTM C478, except that the minimum wall thickness shall be equal to the requirements of ASTM C76 Wall B. Joints of the manhole sections shall be formed entirely of concrete employing a round rubber gasket conforming to ASTM C443, and when assembled, shall be self-centering and make a uniform watertight joint. Lift holes, if provided, shall be made watertight.
- C. **Connections.** The sewer pipe to manhole connections on all sanitary sewers shall be flexible and watertight. The sewer pipe barrel at the springline shall not extend more than 1 inch beyond the inside face of the manhole. To maintain flexibility in the connection, a 1 inch space shall be left between the end of the pipe inside the manhole and the concrete channel; this space shall be filled with a waterproof flexible joint filler. All stub connections shall be pipe with the same joint, strength, and specification as the sewer pipe. The stub shall be plugged and blocked with a stopper compatible with the sewer pipe joint and as approved by the Engineer/Architect. Any metal that is used shall be Type 300 series stainless steel. The connection may be any of the following types:
1. **Rubber Sleeve with Stainless Steel Banding.**
 - a. KOR-N-SEAL as manufactured by National Pollution Control Systems, Inc.,
 - b. Lock Joint Flexible Manhole Sleeve as manufactured by Interpace Corporation,
 - c. Or equal.
 2. **Rubber Gasket Compression.**
 - a. Press Wedge II as manufactured by Press-Seal Gasket Corporation.
 - b. Dura Seal III as manufactured by Dura Tech Inc.
 - c. Link-Seal as manufactured by Thunderline Corp.
 - d. Or equal.
- D. **Manhole Steps.** Manhole steps shall conform to the requirements of ASTM C478 except that the steps shall be as noted on the plans. The distance between the top of casting and the first step shall not exceed 24 inches.
- E. **Grade Adjustment.** Precast reinforced concrete manhole sections may be used in any combination to obtain the desired depth. Manholes shall be constructed in such a manner that the total depth from invert to top of casting will allow a minimum of three precast concrete adjusting rings below the top of casting. All joints shall be smooth and completely filled with mortar which shall be composed of Portland cement and sand approved by the Engineer, mixed in the proportions of one bag of cement to 2 cubic feet of sand. The sand shall be measured loose in a bucket or in some other suitable measure of known volume. The cement and sand shall be mixed thoroughly and uniformly dry and then wet with water to make a stiff paste which will be plastic under the trowel, but not so soft as to run after being placed and shall be used before it has begun to stiffen. Mortar that has once set shall not be mixed and used. Precast concrete adjusting rings shall

conform to ASTM C478.

- F. **Frames and Covers.** Manhole frames and covers shall be gray iron castings of the heavy duty pattern as noted on the plans. The cover and seat shall have machined bearing surfaces to prevent rocking and rattling. All covers shall have the words "SANITARY SEWER" cast on them. Covers shall be vented unless noted otherwise on the plans. In addition, where shown on the plans, the manhole frames and covers shall be of the heavy duty watertight type with gasket seal and bolted lid.
- G. **Drop Manhole Connections.** Drop manhole connections shall be provided for sanitary sewers when called for on the plans or as directed by the Engineer/Architect. Pipe and fittings shall meet the requirements of ASTM C700 with ASTM C425 joints.
- H. **Precast Reinforced Concrete Manhole Tees.** For sewers 48 inches in diameter and larger, precast concrete manhole tees may be used in lieu of precast or cast in place concrete manhole bases when called for on the plans and as detailed.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

- A. **Foundation.** When a precast concrete manhole base is used, the Contractor shall provide gravel bedding for the base foundation. The pad shall extend a minimum of 4 inches beyond the outside wall of the manhole base and shall be 6 inches thick with a +1 inch tolerance.
- B. **Cold Weather.** If the work is carried on in cold weather, the Contractor shall, at his own expense, provide the necessary means for heating concrete, brick, and mortar and for complying with all the requirements of the Engineer/Architect to thoroughly protect the masonry and concrete work during and after construction from damage by frost. No work shall be done on any masonry or backfilling during such days as, in the opinion of the Engineer, are unsuitable for good workmanship.
- C. **Completion.** All sewers, manholes, and inlets, upon their completion, are to be clean and free from rubbish and kept so until the acceptance of the work. Repairs or alterations made to the manholes after performing the leakage test may be justification for a retest of the section of sewer involved; see Section 01650 for the leakage test.
- D. **Inverts.** Where there are changes in the direction of the sewer or entering branches to the manhole or inlet, the centerline of the invert shall have a true curve of as large a radius as the size of the manhole or inlet will permit.

END OF SECTION

**SECTION 02731
CONCRETE SANITARY SEWER PIPE**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Testing.** Testing of the sanitary sewer will be required, see Section 01650. C. Installation. See Section 02770 "Sewer Pipe Installation."

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the concrete sanitary sewer pipe in accordance with the plans and as specified herein which includes:
 - 1. Excavation for the sewer, preparation of the trench bottom, bedding, backfill, and restoration of the area.
 - 2. Disposal of all excess material.
 - 3. Dewatering and trench support.
 - 4. Testing.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required to furnish and install the sanitary sewer pipe in compliance with applicable requirements of governing agencies having jurisdiction.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and materials certifications as required.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Concrete Pipe.** Concrete sewer pipe and fittings shall meet the requirements of ASTM

C76, Wall B, or Wall C. Elliptical cage circumferential reinforcement will not be accepted.

1. **Factory Testing.** Testing of concrete sewer pipe, when so directed by the Engineer/Architect, shall be made in accordance with ASTM C497. All equipment necessary to conduct the pipe test shall be provided by the Contractor. Hydrostatic testing of the pipe barrel shall be as specified under the pipe joints.
2. **Site Observation.** Pipe and fittings will be observed by the Engineer/Architect or his authorized representative prior to installation and all rejected or damaged pieces must be completely removed from the project. Pipe acceptable to the Engineer/Architect shall be substituted for rejected or damaged pieces at the Contractor's expense.

2.2 PIPE JOINTS.

Concrete sewer pipe joints shall be flexible, watertight joints conforming to ASTM C443. The Contractor shall furnish evidence of satisfactory performance of the joint for previous installations.

- A. **Factory Testing.** Testing of concrete sewer pipe joints when so directed by the Engineer/Architect shall be made in accordance with ASTM C443 with modifications as specified below. All equipment necessary to conduct the pipe joint tests shall be provided by the Contractor.
 1. **Test Specimens.** The Engineer/Architect or his authorized representative may initially and periodically select random sewer pipe for test purposes. The tests shall be performed on not less than two specimens and not more than 1 percent of the total pipe length of each size and class of pipe required for the project.
 2. **Test Modification.** Two sections of pipe shall be assembled with outer ends bulkheaded and hydrostatically tested to 20 feet of water (8.6 pounds per square inch pressure [psi]) for a period of 2 hours. With the assembled pipe under pressure, the pipe shall be deflected to the maximum amount. Continuing the hydrostatic pressure, a shear load of 150 pounds per inch of diameter shall be applied to the unsupported spigot end of the pipe immediately adjacent to the joint. During the entire testing period, there shall be no visible leakage at the joint. The pipe barrel shall not show excessive leakage during the entire testing period. Moisture appearing on the surface of the pipe in the form of patches or beads adhering to the surface shall not be considered as excessive leakage.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Safety.** For the security and safety of persons in and adjacent to trenches or construction operations, the safety regulations of the appropriate federal, state, and local agency shall be followed.
- B. **Handling.** Pipe, fittings, manhole sections, and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against other pipe.

- C. **Protection of Trees.** Special care shall be taken to avoid damage to trees and their root systems. Machine excavation shall not be used when, in the opinion of the Engineer/Architect, it would endanger the tree. In general, where the line of trench falls within the limits of the limb spread, headers are required across the trench to protect the tree. The operation of all equipment (particularly when employing booms), the storage of materials, and the deposition of excavation shall be conducted in the manner which will not injure trees, trunks, branches, or their roots unless such trees are designated for removal.
- D. **Dewatering.** Should water be encountered, the Contractor shall furnish and operate suitable equipment to dewater the trench. The trench shall be sufficiently dewatered so that the laying and joining of the pipe is made in the dry. The Contractor shall convey all trench water to a natural drainage channel or storm sewer without causing any property damage.
- E. **Construction Equipment.** Where sewers are located in or adjacent to pavements, all backfilling and materials handling equipment shall have rubber tires. Crawler equipment shall be permitted when there is no danger of damaging pavement.
- F. **Excavation and Construction Materials.** All excavated material and all construction materials used in prosecution of the work shall be deposited so as not to endanger the work, create unnecessary annoyance to the public or interfere with natural drainage courses. During the progress of the work, all material piles shall be kept trimmed up and maintained in a neat, workmanlike manner.
- G. **Trench Support.** Unsupported open cut for sewers will not be permitted where trenching may cause unnecessary damage to street pavement, trees, structures, poles, utilities, or other private or public property. During the progress of the work, whenever and wherever necessary, the Contractor shall, at his expense, support the sides of the excavation by adequate and suitable sheeting, shoring, bracing, trench box, or other approved means. Such trench support material and equipment shall remain in place until backfilling operations have progressed to the point where the supports may be withdrawn without endangering property. If approved by the Engineer/Architect, the Contractor may cut off the sheeting 2 feet above the top of the pipe and remove the upper portion. If all the sheeting is to be removed, it shall be removed without causing damage to the pipe. No sheeting, shoring, or bracing will be paid for by the Owner unless ordered to remain in place by the Engineer/Architect. The Owner will pay the Contractor for sheeting, shoring, or bracing ordered to be left in place. This payment will be in accordance with the changes in Contract Price of the General Conditions.
- H. **Noise, Dust, and Odor Control.** The Contractor's construction activities shall be conducted so as to eliminate all unnecessary noise, dust, and odors. The use of oil or other material for dust control, which may cause tracking, shall not be permitted.
- I. **Leakage Test.** See Section 01650 "Leakage Test." Note that only four sections of sewer shall be permitted to remain untested at any time.
- J. **Alignment and Grade**
1. **Laser Beam.** The Contractor shall use a laser beam for horizontal and vertical control of the sewer. Line and grade stakes shall be placed at 25 feet and 50 feet from the downstream manhole and then placed at every 50 foot station to the next manhole. The laser unit shall be set up in such a manner that the alignment of the beam is through the pipe directly on the centerline of the pipe or outside the pipe

directly above and parallel to the centerline of the pipe. If the laser unit is set up on the centerline of the pipe, a blower shall be used to provide positive continuous air circulation within the pipe. A target shall be established on line and grade to provide a method of checking the setting of the laser beam as construction progresses. The Contractor shall provide means to ensure the grade pole is plumb when checking pipe grade. The grade pole shall be set on the invert of the pipe when checking alignment and grade.

K. Trench Excavation and Bottom Preparation

1. **Rock.** Rock excavation, wherever used as the name in excavating material, shall mean boulders and solid masonry larger than 1/2 cubic yard (cy) in volume, or solid bedrock and masonry which requires for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power operated hand tool. Any material which can be excavated using a hand pick and shovel, power operated excavator, power operated backhoe, or power operated shovel shall not be defined as rock excavation.
2. **Blasting.** No blasting for rock excavation shall be done within 40 feet of pipes or structures without specific permission from the Engineer/Architect. Blasts shall be properly covered and the pipe or structure properly protected. Warning shall be given to all persons in the immediate vicinity. Blasting shall be at the risk of the Contractor who shall be liable for all damages to persons or property. Necessary permits shall be secured and paid for by the Contractor.
3. **Trench Width.** Widths of trenches shall be held to a minimum to accommodate the pipe and appurtenances. The trench width shall be measured at the top of the pipe barrel and shall conform to the following limits:

a. Pipe

	Earth	Rock
Minimum	Outside diameter of the pipe barrel plus 8 inches, i.e., 4 inches each side	Outside diameter of the pipe barrel plus 12 inches, i.e., 30 inches or the
Maximum	30 inches or the outside diameter of the pipe barrel plus 16 inches, whichever is greater	30 inches or the outside diameter of the pipe barrel plus 16 inches, whichever is greater

- b. **Structures.** The minimum excavation limits for structures shall be as excavated. In rock, the excavation limits shall not exceed 12 inches from the outside wall and 6 inches below the footer.
4. **Excessive Trench Width.** If for any reason the trench width exceeds the maximum trench width defined in paragraph 3.1, K3, the Contractor shall provide additional bedding or backfill. Subject to approval of the Engineer/Architect, the Contractor shall provide additional strength pipe or concrete encasement at no cost to the Owner.

5. **Trench Depth.** The trench shall be excavated to a point not less than one-fourth the nominal pipe diameter, and in no case less than 4 inches or more than 12 inches below the barrel of the pipe. All loose material shall be removed from the trench bottom.
6. **Foundation.** The sewers are to be built on a good foundation. If, in the Engineer/Architect's opinion, the material forming the trench bottom is not suitable for a good foundation, a further depth shall be excavated and the same filled with suitable material. Authorized excavation and the restoration of the foundation below the trench bottom shall be paid for in accordance with the changes in Contract Price of the General Conditions. Unauthorized excavation below the trench bottom shall be filled with compacted crushed stone at no cost to the Owner.

L. Pipe Bedding and Installation

1. **Pipe Bedding.** After preparation of the trench bottom, a pipe bed shall be prepared using crushed stone or crushed gravel meeting the following requirements:

Nominal Pipe Size	AASHTO M43 Size
Less than 15"	67, 7, or 8
15" to 30"	6 or 67
Greater than 30"	57 or 67

The bedding material shall be spread the full width of the trench bottom. The bottom man or pipe layer shall carefully prepare the bed for the pipe both from a line and grade standpoint. After the pipe is laid, aligned, and graded, the bedding material shall then be brought up halfway on the pipe for the full width of the trench. The bedding material shall be shoveled and tamped to fill all voids around the pipe. The voids include the zones in the trench before and after moving the trench box or removing trench support material.

2. **Pipe Laying.** The laying of the pipe on the prepared bed shall commence from the lowest point, with the spigot ends pointing in the direction of flow. All pipe shall be laid with ends abutting and true to line and grade. They shall be carefully centered so that when laid, they will form a sewer with a uniform invert. A pipe plug or bulkhead shall be provided and used to prevent the entrance of foreign material whenever pipe laying operations are not in progress.
3. **Pipe Joints.** Preparatory to making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, primers, adhesives, or other jointing materials shall be used as recommended by the pipe or joint manufacturer's specifications. The pipe shall then be placed, fitted, joined and adjusted in such a workmanlike manner as to obtain the degree of watertightness required. In the event that pipe previously laid is disturbed, due to any cause, it shall be removed and relaid.

M. Trench Backfill

1. **Backfill to 12 Inches Over Pipe Barrel.** All trench excavations shall be backfilled immediately after pipe is laid. Granular material meeting the requirements of paragraph 3.1, LI shall be used to backfill the trench from the bedding to a level of 12 inches over the top of the pipe barrel. In lieu of the above described method, the Contractor may use compacted selected trench material. Selected trench material

shall be free from cinders, refuse, organic material, boulders, rocks, or other material which, in the opinion of the Engineer/Architect, is unsuitable. No backfill shall be made with frozen material. The selected material shall be placed in uniform 6 inch loose layers and each layer compacted so as to eliminate the possibility of settlement, pipe misalignment, or damage to joints. In lieu of the above described methods, the Contractor may use compacted granular backfill as specified in Section 02225 "Granular Backfill."

2. **Remaining Trench Backfill.** From 12 inches above the pipe barrel to the surface, excavated trench material may be used as backfill material. No material shall be used for backfill that contains frozen earth, debris, or earth with an exceptionally high void content. The Contractor may use mechanical equipment to place the backfill. This shall be done in such a manner that the material does not free fall, but shall be so placed that it will flow onto the previously placed material. The Contractor shall consolidate the backfill in such a manner as will ensure the minimum possible settlement and the least interference with traffic. No compacting of the backfill with mechanical equipment such as wheeled vehicles will be permitted unless sufficient cover is provided over the pipe to prevent damage to the pipe.
 3. **Granular Backfill.** When backfilling under pavements, driveways, or as directed by the Engineer/Architect, granular material as specified in Section 02225, "Trench Granular Backfill" shall be used in place of the excavated material specified in paragraphs 3.1, M1 and M2.
 4. **Bulkheads.** The Contractor shall place bulkheads of clay soil across the trench at 100 foot intervals to resist the movement of groundwater through the granular material. Such bulkheads shall be carefully compacted and shall extend approximately 3 feet in a direction parallel to the pipe and shall extend from the bottom of the trench to a height of 12 inches above the top of the pipe barrel.
 5. **Surface Conditions.** The trench surface shall be periodically attended to during the course of the contract. The trench surface shall be maintained in a safe condition and shall not interfere with natural drainage.
- N. **Cleanup.** After a section of sewer is tested and accepted, the ground surface shall be cleaned of all surplus material including stone, broken pipe, construction material, and all other debris to the satisfaction of the Engineer/Architect.
- O. **Trench Maintenance.** The Contractor shall be responsible for the condition of the trenches for a period of 1 year from the date of the final estimate.

3.2 RIVER CROSSING

- A. **General.** It is the intent of the drawings and specifications to install the crossing in such a manner as to protect the sewer from erosion and to restore, as much as practicable, the riverbanks and bottom to their original condition.
- B. **Sewer Protection.** The sewer will be protected from erosion either by concrete encasement around the pipe or by a sufficient depth of compacted backfill as shown on the plans.
- C. **Riverbank Restoration and Protection.** The riverbanks will be restored by backfilling the trench with mechanically compacted earth to the original ground surface. The limits of

compaction shall extend as shown on the detailed plans. Following completion of the river crossing, straw bales shall be placed along the riverbank on each side within 2 feet of the edge of water and of sufficient length to extend beyond the limits of the excavated trench width. Straw bales shall remain in place until after the riverbanks have been fine graded, fertilized and seeded, and until such time as the seeding has sufficiently grown to protect the riverbanks from erosion.

- D. **River Bottom Restoration.** The river bottom trench will be backfilled with mechanically compacted earth.
- E. **Construction Procedure.** The Contractor shall use either of the following methods to install the river crossing.
 - 1. **Option 1.** The Contractor shall construct an earth embankment from the riverbank to a point beyond the centerline of the river. The slopes of the earth embankment shall be protected from erosion by covering them with 6 mil polyethylene sheeting. The sheeting shall extend from the river bottom to an elevation 2 feet above the water level. The sewer shall then be installed in a trench excavated through the embankment. The embankment and material and any excess trench excavation shall be removed to an offsite disposal area. The same procedure shall be used to install the remainder of the river crossing.
 - 2. **Option 2.** The Contractor shall construct a cofferdam of sandbags or inflatable bags from the riverbank to a point beyond the centerline of the river. The sewer shall then be installed in a trench within the cofferdam. Any excess trench excavation shall be removed to an offsite disposal area. The cofferdam shall then be removed. The same procedure shall be used to install the remainder of the river crossing.

END OF SECTION

**SECTION 02733
POLYVINYL CHLORIDE SANITARY SEWER PIPE**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Testing.** Testing of the sanitary sewer will be required, see Section 01650. C. Installation. See Section 02770, "Sewer Pipe Installation."

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the polyvinyl chloride sanitary sewer pipe in accordance with the plans and as specified herein "which includes:
 - 1. Excavation for the sewer, preparation of the trench bottom, bedding, backfill, and restoration of the area.
 - 2. Disposal of all excess material.
 - 3. Dewatering, trench shoring, and bracing.
 - 4. Testing.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required to furnish and install the sanitary sewer pipe in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and materials certifications as required.
- B. **Certificate.** A manufacturer's certificate that the polyvinyl chloride (PVC) material and pipe was manufactured and tested in accordance with the appropriate ASTM specification shall be furnished to the Engineer/Architect prior to installation of the pipe.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **PVC Pipe.** PVC sewer pipe and fittings shall conform to American Society for Testing Materials (ASTM) D3034.
1. **Dimensions.** Unless otherwise shown, the minimum thickness of the barrel of the pipe shall be Dimension Ratio (DR) 35.
 2. **Home Mark.** All pipe spigots shall have a "home" mark to facilitate joint closure.
 3. **Fittings.** PVC fittings shall be factory made and provided with joints of proper design to connect to the pipe or approved adapters shall be furnished to connect the pipe to the fittings. Adapters shall be provided for connection to pipes of different materials. All joints and fittings shall be formed to provide as nearly as practical a leak free and easily assembled system.
 4. **Straightness.** Pipe intended to be straight shall have a maximum deviation from Straightness of 1/16 inch per lineal foot when measured in accordance with ASTM D2122.
 5. **Site Observation.** Pipe and fittings may be reviewed by the Engineer/Architect or his authorized representative prior to installation and all rejected pieces must be completely removed from the project. Pipe acceptable to the Engineer/Architect shall be substituted for rejected pieces at the Contractor's expense. No repairs of pipe or fittings will be allowed; undamaged lengths of straight pipe may be salvaged by neatly sawing off the damaged portion of the pipe.
- B. **Pipe Joints.** PVC sewer pipe joints shall be elastomerically gasketed conforming to ASTM D3212 push-on type. The Contractor shall furnish evidence of satisfactory performance of the joint for previous installations.
1. **Factory Testing.** Testing of PVC sewer pipe joints, when so directed by the Engineer/Architect, shall be made in accordance with ASTM D3212 for gasketed joints, with modification as specified below. All equipment necessary to conduct the pipe joint test shall be provided by the Contractor.
 - a. **Test Specimens.** The Engineer/Architect or his authorized representative may initially and periodically select random sewer pipe for test purposes. The tests shall be performed on not less than two specimens and not more than 1 percent of the total pipe length of each size and joint type required for the project.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Safety.** For the security and safety of persons in and adjacent to trenches or construction operations, the Contractor shall follow the safety regulations of the appropriate federal, state, and local agencies.
- B. **Handling.** Pipe, fittings, manhole sections, and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled

against other pipe.

- C. **Protection of Trees.** Special care shall be taken to avoid damage to trees and their root systems. Machine excavation shall not be used when, in the opinion of the Engineer/Architect, it would endanger the tree. In general, where the line of trench falls within the limits of the limb spread, headers are required across the trench to protect the tree. The operation of all equipment (particularly when employing booms), the storage of materials, and the deposition of excavation shall be conducted in the manner which will not injure trees, trunks, branches, or their roots unless such trees are designated for removal.
- D. **De-watering.** Should water be encountered, the Contractor shall furnish and operate suitable pumping equipment of such capacity adequate to dewater the trench. The trench shall be sufficiently dewatered so that the trench bottom is adequately stabilized and the laying and joining of the pipe is made in the dry. The Contractor shall convey all trench water to a natural drainage channel or storm sewer without causing any property damage.
- E. **Construction Equipment.** Where sewers are located in or adjacent to pavements, all backfilling and materials handling equipment shall have rubber tires. Crawler equipment shall be permitted when there is no danger of damaging pavement.
- F. **Excavation and Construction Materials.** All excavated material and all construction materials used in prosecution of the work shall be deposited so as not to endanger the work, create unnecessary annoyance to the public or interfere with natural drainage courses. During the progress of the work, all material piles shall be kept trimmed up and maintained in a neat, workmanlike manner.
- G. **Trench Support.** Trench support shall be in accordance with OSHA regulations. The Contractor shall provide trench support where trenching may cause undermining or damage to street pavement, trees, structures, poles, utilities, or other private or public property. During the progress of the work, whenever and wherever it is necessary, the Contractor shall, at his expense, support the sides of the excavation by adequate and suitable sheeting, shoring, bracing, or other approved means. Such trench support material and equipment shall remain in place until backfilling operations have progressed to the point where the supports may be withdrawn without endangering property. If approved by the Engineer/Architect, the Contractor may cut off the sheeting 2 feet above the top of the pipe and remove the upper portion. If all the sheeting is to be removed, it shall be removed without causing damage to the pipe. No sheeting, shoring, or bracing will be paid for by the Owner unless ordered to remain in place by the Engineer/Architect. The Owner will pay the Contractor for sheeting, shoring, or bracing ordered to be left in place. This payment will be in accordance with the changes in Contract Price of the General Conditions.
- H. **Noise, Dust, and Odor Control.** The Contractor's construction activities shall be conducted so as to eliminate all unnecessary noise, dust, and odors. The use of oil or other material for dust control, which may cause tracking, shall not be permitted.
- I. **Leakage Test.** See Section 01650, "Leakage Test." Note that only four sections of sewer shall be permitted to remain untested at any time.
- J. **Alignment and Grade**
 - 1. **Laser Beam.** The Contractor shall use a laser beam for horizontal and vertical control of the sewer. Line and grade stakes shall be placed at 25 feet and 50 feet

from the downstream manhole and then placed at every 50 foot station to the next manhole. The laser unit shall be set up in such a manner that the alignment of the beam is through the pipe directly on the centerline of the pipe or outside the pipe directly above and parallel to the centerline of the pipe. If the laser unit is set up on the centerline of the pipe, a blower shall be used to provide positive continuous air circulation within the pipe. A target shall be established on line and grade to provide a method of checking the setting of the laser beam as construction progresses. The Contractor shall provide means to ensure the grade pole is plumb when checking pipe grade. The grade, pole shall be set on the invert of the pipe when checking alignment and grade.

K. Trench Excavation and Bottom Preparation

1. **Rock.** The word "rock" wherever used as the name of an excavated material, shall mean boulders and solid masonry larger than 1/2 cubic yard (cy) in volume, or solid ledge rock and masonry which requires for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power operated hand tool. Any material which can be excavated using a hand pick and shovel, power operated excavator, power operated backhoe, or power operated shovel shall not be defined as rock.
2. **Blasting Rock.** No blasting of rock shall be done within 40 feet of pipes or structures without specific permission from the Engineer/Architect. Blasts shall be properly covered and the pipe or structure properly protected. Warning shall be given to all persons in the immediate vicinity. Blasting shall be at the risk of the Contractor who shall be liable for all damages to persons or property. Necessary permits shall be secured and paid for by the Contractor.
3. **Trench Width.** The trench width shall be measured at the top of the pipe barrel and shall conform to the following limits unless shown otherwise on the plans.
 - a. Pipe.

	Rock	Earth
Minimum	3 times the nominal diameter of the pipe i.e., 6 inches each side	Outside diameter of the pipe barrel plus 12 inches,
Maximum	5 times the nominal diameter of the pipe	30 inches or the outside diameter of the pipe barrel plus 16 inches, whichever is greater

- b. The minimum excavation limits for structures shall be as excavated. In rock, the excavation limits shall not exceed 12 inches from the outside wall and 6 inches below the footer.
4. **Excessive Trench Width.** If for any reason the trench width exceeds the maximum trench width defined in paragraph 3.1, K3, the Contractor shall provide additional bedding and backfill at no cost to the Owner.

5. **Trench Depth.** The trench shall be excavated to a point not less than one-fourth the nominal pipe diameter, and in no case less than 4 inches or more than 12 inches below the barrel of the pipe. All loose material shall be removed from the trench bottom.
6. **Foundation.** The sewers are to be built on a good foundation. If, in the Engineer/Architect's opinion, and after appropriate dewatering, the material forming the trench bottom is not suitable for a good foundation, a further depth shall be excavated and the same filled with suitable material. Authorized excavation and the restoration of the foundation below the trench bottom shall be paid for in accordance with the changes in Contract Price of the General Conditions. Unauthorized excavation below the trench bottom shall be filled with compacted crushed stone at no cost to the Owner.

L. Pipe Bedding and Installation

1. **Pipe Bedding.** After preparation of the trench bottom, a pipe bed shall be prepared using crushed stone or crushed gravel meeting the following requirements:

Nominal Pipe Size	AASHTO M43 Size
Less than 15"	67, 7, or 8
15" to 30"	6 or 67
Greater than 30"	57 or 67

The bedding material shall be spread the full width of the trench bottom. The bottom man or pipe layer shall carefully prepare the bed for the pipe both from a line and grade standpoint. After the pipe is laid, aligned, and graded, the bedding material shall then be brought up halfway on the pipe for the full width of the trench. The bedding material shall be so placed as to fill the space under the lower part of the pipe by slicing under the haunches with a shovel.

2. **Pipe Laying.** The laying of the pipe on the prepared bed shall commence from the lowest point, with the spigot ends pointing in the direction of flow. All pipe shall be laid with ends abutting and true to line and grade. They shall be carefully centered so that when laid, they will form a sewer with a uniform invert. A pipe plug or bulkhead shall be provided and used to prevent the entrance of foreign material whenever pipe laying operations are not in progress.
3. **Pipe Joints.** Preparatory to making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, primers, adhesives, or other jointing materials shall be used as recommended by the pipe or joint manufacturer's specifications. The pipe shall then be placed, fitted, joined and adjusted in such a workmanlike manner as to obtain the degree of watertightness required. In the event that pipe previously laid is disturbed, due to any cause, it shall be removed and relaid.

M. Trench Backfill

1. **Backfill to 12 Inches Over Pipe Barrel.** All trench excavations shall be backfilled immediately after pipe is laid. Granular material meeting the requirements of paragraph 3.1, LI shall be used to backfill the trench from the bedding to a level of 12 inches over the top of the pipe barrel.

2. **Remaining Trench Backfill.** From 12 inches above the pipe barrel to the surface, excavated trench material may be used as backfill material. No material shall be used for backfill that contains frozen earth, debris, or earth with an exceptionally high void content. The Contractor may use mechanical equipment to place the backfill. This shall be done in such a manner that the material does not free fall, but shall be so placed that it will flow onto the previously placed material. The Contractor shall consolidate the backfill in such a manner as will ensure the minimum possible settlement and the least interference with traffic. No compacting of the backfill with mechanical equipment such as wheeled vehicles will be permitted unless sufficient cover is provided over the pipe to prevent damage to the pipe.
 3. **Granular Backfill.** When backfilling under pavements, driveways, or as directed by the Engineer/Architect, granular material as specified in Section 02225 "Trench Granular Backfill" shall be used in place of the excavated material specified in paragraph 3.1, MI.
 4. **Bulkheads.** The Contractor shall place bulkheads of clay soil across the trench at 100 foot intervals to resist the movement of groundwater through the granular material. Such bulkheads shall be carefully compacted and shall extend approximately 3 feet in a direction parallel to the pipe and shall extend from the bottom of the trench to a height of 12 inches above the top of the pipe barrel.
 5. **Surface Conditions.** The trench surface shall be periodically attended to during the course of the contract. The trench surface shall be maintained in a safe condition and shall not interfere with natural drainage.
- N. **Cleanup.** After a section of sewer is tested and accepted, the ground surface shall be cleaned of all surplus material including stone, broken pipe, construction material, and all other debris to the satisfaction of the Engineer/Architect.
- O. **Trench Maintenance.** The Contractor shall be responsible for the condition of the trenches for a period of 1 year from the date of the final estimate.
- P. **Pipe Storage.** Cover shall be taken to protect PVC from excessive exposure to heat or sunlight (ultraviolet rays). This storage procedure shall be in accordance with the manufacturer's recommendations.
- Q. **Connections.** Connections to pipe of different materials shall be made with the proper adapters.
- R. **Deflection Test.** Deflection of the pipe diameter shall not exceed 5 percent. All installed pipe shall be tested for deflection 30 days or more after the trench has been backfilled to finish grade. The method of testing shall be subject to the approval of the Engineer/Architect. If rigid balls or mandrels are used to test the pipe deflection, no mechanical pulling devices shall be used.
- S. **Installation Instruction.** The manufacturer of the PVC pipe furnished shall provide installation instruction and literature to the Contractor so that he will be aware of the manufacturer's recommended procedure and practice of installing pipe and fittings. This instruction shall be included at no cost to the Owner.
- T. **All pipes and manholes** shall be cleaned by the Contractor and inspected prior to final

acceptance.

3.2 RIVER CROSSING

- A. **General.** It is the intent of the drawings and specifications to install the crossing in such a manner as to protect the sewer from erosion and to restore, as much as practicable, the riverbanks and bottom to their original condition.
- B. **Sewer Protection.** The sewer will be protected from erosion either by concrete encasement around the pipe or by a sufficient depth of compacted backfill as shown on the plans.
- C. **Riverbank Restoration and Protection.** The riverbanks will be restored by backfilling the trench with mechanically compacted earth to the original ground surface. The limits of compaction shall extend as shown on the detailed plans. Following completion of the river crossing, straw bales shall be placed along the riverbank on each side within 2 feet of the edge of water and of sufficient length to extend beyond the limits of the excavated trench width. Straw bales shall remain in place until after the riverbanks have been fine graded, fertilized and seeded, and until such time as the seeding has sufficiently grown to protect the riverbanks from erosion.
- D. **River Bottom Restoration.** The river bottom trench will be backfilled with mechanically compacted earth.
- E. **Construction Procedure.** The Contractor shall use either of the following methods to install the river crossing.
 - 1. **Option 1.** The Contractor shall construct an earth embankment from the riverbank to a point beyond the centerline of the river. The slopes of the earth embankment shall be protected from erosion by covering them with 6 mil polyethylene sheeting. The sheeting shall extend from the river bottom to an elevation 2 feet above the water level. The sewer shall then be installed in a trench excavated through the embankment. The embankment and material and any excess trench excavation shall be removed to an offsite disposal area. The same procedure shall be used to install the remainder of the river crossing.
 - 2. **Option 2.** The Contractor shall construct a cofferdam of sandbags or inflatable bags from the riverbank to a point beyond the centerline of the river. The sewer shall then be installed in a trench within the cofferdam. Any excess trench excavation shall be removed to an offsite disposal area. The cofferdam shall then be removed. The same procedure shall be used to install the remainder of the river crossing.

END OF SECTION

**SECTION 02735
WYE, RISER, AND HOUSE SERVICE**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the wyes, risers, and house services in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required to furnish and install the wyes, risers, and house services in compliance with applicable requirements of governing agencies having jurisdiction.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and materials certifications.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Service Material.** The house service pipe, riser pipe, and connection to the main sewer shall be of the same material, strength, and joint as the main sewer, unless otherwise shown or approved by the Engineer/Architect. Specifications for sewer pipe and joints are applicable for all house services.
- B. **Wye Poles.** Wye poles shall be of hardwood, not less than 2" x 2" in cross section. The material used for wye poles shall be in good condition and shall be straight, sound, and free from large or loose knots.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Description.** The Contractor shall furnish and install the wye (or tee) branches, riser pipe, house services, and incidentals where shown on the plans or where directed by the Engineer/Architect and as specified herein.
- B. **Wye Branches.** Wye branches shall be of the proper size.
 - 1. **Location.** In general, wye branches shall be placed in the main sewer opposite each lot or property to which a house service may be extended.
 - 2. **Existing Sewers.** Where a wye branch is to be installed in an existing sewer, the Contractor will be permitted to tap the sewer pipe and install the wye branch as directed by the Engineer/Architect.
- C. **Riser Pipe.** Where the cover on the wye branch is in excess of 12 feet below average ground surface, a 45 degree bend and sufficient riser pipe shall be added to terminate (to the nearest even length of riser pipe) at a depth of 10 feet below the ground surface, provided the property being served will not require additional depth.
- D. **House Services.** House services to be extended from main sewers over 10 feet deep, where the property being served does not require the full depth, may be brought up to grade in the manner described for riser pipe with payment for all pipe as house service only. House services from main sewers with less than 10 feet depth will be extended on a straight uniform grade from the main to the point of terminus. Depths of house services at the point of termination will be supplied by the Engineer/Architect, but in general will be held to a minimum of 8 feet when the depth of the main sewer permits.
 - 1. **Installation.** Specifications for sewer pipe installation are applicable for all house services. Unless otherwise shown on the plans or directed by the Engineer/Architect, all house services shall be installed in a trench with a maximum width at the top of the pipe barrel of 24 inches.
 - 2. **Encasement Pipe.** At the location shown on the plans or as required by the Engineer/Architect, house services shall be installed in an encasement pipe as shown on the plans. A sufficiently large boring pit shall be excavated to allow for proper alignment of the drilling equipment and to allow the house service pipe to be pushed through the encasement pipe. The horizontal alignment of the encasement pipe shall not vary more than 2 feet at the upstream end of the house service from a line drawn at right angles to the sanitary sewer at the wye branch or riser.
- E. **Closures.** The outlet of each wye branch, riser, or house service shall be securely sealed with a watertight closure that can be later removed without damage to the outlet. This closure shall be capable of withstanding the test pressures specified for the main sewer and house services.
 - 1. **PVC.** All closures at the ends of PVC wye branches, risers, or house services shall be made by installing a length of PVC pipe to the wye branch, riser or house service and installing a PVC cap or plug to the end. A sufficient length of pipe should be installed to permit removal of the closure and extending the line in the future. All closures shall have elastomeric gasket joints.

- F. **Wye Poles.** A wye pole shall be placed at the end of each wye branch, riser, or house service, as the case may be, extending to a point 6 inches below finished grade. The wye pole shall be braced in such a manner as to hold it firmly in position during backfilling. If the wye pole is pulled out, bent, or broken, the Contractor shall, at no cost to the Owner, replace or straighten the pole. The wye pole shall be adjacent to the end of the pipe, but not in it. The location of each wye pole shall be recorded by the Contractor and presented to the Engineer/ Architect for use by the Owner.

END OF SECTION

**SECTION 02755
INTERCEPTIONS AND CONNECTIONS**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to provide for intercepting existing sewers and connecting new sewers to existing manholes in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work required for the interceptions and connections in compliance with applicable requirements of governing agencies \ having jurisdiction.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and materials certifications as required.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Requirements.** Where new materials are required, they shall be of the same material, strength, and joint as the main sewer, or as shown or approved by the Engineer/Architect.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Description.** The Contractor shall provide for intercepting existing sewers and connecting new sewers to existing manholes where shown on the plans or where directed by the Engineer/Architect and as specified herein.

- B. **General.** This work shall include: neatly cutting out existing sewers within new manholes; abandoning sewers within new and existing manholes and plugging with concrete; connecting into and reshaping inverts within existing manholes to accommodate new sewers; and temporarily plugging new sewers within existing manholes. All plugs and connections shall be made watertight.

END OF SECTION

**SECTION 02934
TEMPORARY SEEDING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to provide temporary seeding in accordance with the drawings and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work to provide temporary seeding in compliance with applicable requirements of governing agencies having jurisdiction and according to the drawings and as specified herein,

1.4 SUBMITTALS

- A. **Transmittals.** Furnish samples, manufacturer's product data, test reports, and materials certifications as required for materials and mix design.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIAL

- A. **Fertilizer.** Fertilizer shall be 10-10-10.
- B. **Seed.** Seed shall be oats or rye.

PART 3 – EXECUTION

3.1 INSTALLATION.

The preparation of a seedbed and mulching is not required.

- A. **Fertilizing.** Fertilizer shall be uniformly applied to all areas to be seeded at a rate of 7

pounds per 1,000 square feet.

- B. **Seeding.** All disturbed areas to be seeded which will be subject to further disturbance before the project is completed, shall be seeded with a temporary seed mix. Seed and fertilizer shall be covered to a depth of 1/4 inch. A disk, harrow, or other suitable equipment shall be used to cover the seed and fertilizer. Seed shall be applied according to the following schedule:

Dates From - To (Inclusive)	Kind of Seed	Rate of Seeding Bushel/acre	Minimum Germination	Minimum Purity
March 1 - August 15	Oats	3	80%	97.5%
August 16 - February 28	Rye	3	85%	97.0%

END OF SECTION

**SECTION 02935
SODDING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish or place the sod where shown and in accordance with the plans and as specified herein.
- B. **Excavation, filling, and grading** required to establish elevations shown on the drawings are not specified in this section. Refer to Earthwork section.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work in placement of the sod in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

- A. **Progress.** Proceed with or complete the sod installation rapidly as portions of the site become available, working within seasonal limitations.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Sod.** Sod shall be nursery grown and be at least 60 percent Blended Mix Bluegrass, 30 percent Creeping Red Fescue, and 10 percent Italian Ryegrass. It shall have a well developed root system and be free of weeds. It shall be mowed to a height of 3 inches before lifting and shall be of uniform thickness with not more than 1 1/2 inches or less than 1 inch of soil. In sandy areas the sod bed shall be made with 4 inches of topsoil.
- B. **Fertilizer.** Fertilizer shall be 12-12-12.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Sod Bed.** The Contractor shall grade, trim, and bring soil to a friable condition by harrowing or otherwise loosening the soil to a depth of 4 inches and hand rake the surface. All sticks, stones, and other debris shall be removed. The bed shall be smooth and uniform. The tops and bottoms of all slopes shall be rounded to blend into the natural ground. In sandy areas, the sod bed shall be made with 4 inches of topsoil.
- B. **Fertilizing.** Fertilizer shall be applied uniformly to all areas to be sodded at the rate of 20 pounds per 1,000 square feet. The fertilizer shall be disked, harrowed, or raked into the soil to a depth of 2 inches.
- C. **Laying Sod.** The sod shall be moist and shall be placed on a moist earth bed. Sod shall be laid within 24 hours after cutting and shall be kept moist until placed. The sod shall be placed in rows at right angles to slopes, commencing at the bottom of the slope and working upward. Pitchforks shall not be used and dumping will not be permitted. Where sod butts up against areas to be graded and seeded, the sod shall be turned into the ground and covered with a 2 inch layer of topsoil, which shall be compacted to conduct the surface water over the edge of the sod. The end joints shall be staggered and the sod laid to produce tight joints. The sod shall be compacted by rolling or tamping immediately after it is placed. No sod shall be placed when temperature is below 32 degrees Fahrenheit.
- D. **Sod Stabilization.** On slopes steeper than 1 vertical to 3 horizontal, the sod shall be pegged with wooden pegs which are not less than 12 inches in length and have a cross sectional area of not less than 3/4 square inch. The pegs shall be spaced not over 2 feet apart in any direction and shall be driven flush with the surface of the sod.

- 3.2 **MAINTENANCE.** Sodded areas shall be maintained by the Contractor. Settled areas shall be filled, graded, and resodded. Sodding will not be accepted unless it is alive and healthy.

END OF SECTION

**SECTION 02936
GRADING AND SEEDING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the grading and seeding, where shown on the plans or where directed by the Engineer/Architect and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Certificate of Inspection.** Ship all seeds with certificate of inspection required by governing authorities. All bags of seed or fertilizer to be labeled with waterproof tag bearing legible designation or shown on the bag.

1.4 SUBMITTALS

- A. **Transmittals.** Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

1.5 JOB CONDITIONS

- A. **General.** Proceed with or complete grading and seeding rapidly as portions of the site become available, working within seasonal limitations.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 – PRODUCTS

2.1 MATERIAL

- A. **Topsoil.** Topsoil shall not contain more than 40 percent clay in that portion passing a No. 10 sieve and shall contain not less than 5 percent nor more than 20 percent organic matter as determined by loss on ignition of samples oven dried at 212 degrees Fahrenheit (° F.) to a constant weight.
- B. **Fertilizer.** Fertilizer shall contain the specified percentages of total nitrogen, available phosphoric acid, and water soluble potash. The weight, name of plant nutrients, and guaranteed percentages shall be marked on the sealed fertilizer containers.

1. 12-12-12. This fertilizer shall be used with Seed Mixes 1, 2, and 3.
 2. 5-10-10. This fertilizer shall be used with Seed Mix 4 (Crownvetch).
- C. **Inoculant.** Seed Mix 4 (Crownvetch) shall be treated with inoculant culture of nitrogen fixing bacteria not more than 1 year old.
- D. **Seed.** Percentages are by weight.

	Minimum Germination	Minimum Purity
1. Seed Mix		
40 percent Kentucky Bluegrass (Poa pratensis)	75%	85%
40 percent Creeping Red Fescue (Festuca rubra)	85%	98%
20 percent annual Ryegrass (Lolium multiflorum)	85%	95%

E. **Mulch**

1. **Straw.** Straw mulch shall be baled wheat or oat straw free of weed seed, sticks, or other foreign material.
2. **Wood Cellulose Fiber.** Wood cellulose fiber mulch shall be dyed green and shall not inhibit the growth or germination of the seed.

- F. **Asphalt Emulsion.** Emulsion shall conform to American Association of State Highway and Transportation Officials (AASHTO) M140 or AASHTO M208.

PART 3 – EXECUTION

3.1 TOPSOIL PLACEMENT AND GRADING

- A. **General.** Topsoil will be removed during the earthwork operations and stored for later use in location(s) indicated on the drawings.
- B. **The topsoil** will be hauled from the stockpiles and placed on the complete cuts or fills in accordance with the plans. The final grading will then be carried out to the elevations as shown on the plans.

3.2 SEEDING

A. **Preparation of Seed Bed**

1. **Topsoil.** Topsoil that is available as part of the excavated material shall be removed, stockpiled, and used to backfill the areas to be seeded. All grass, weeds, roots, sticks, stones and other debris are to be removed and the seed bed carefully finished by handraking.
2. **Non-Topsoil.** If there is a deficiency of topsoil as part of the excavated materials, the Contractor shall provide topsoil from another source at no cost to the Owner.

3. **Seedbed.** The seedbed shall be 4 inches of topsoil.

B. **Dry Seeding.** When a seed mix is sown dry, the materials shall be applied as follows:

1. **Fertilizing.** Fertilizer shall be applied uniformly to all areas to be seeded at the rate of 10 pounds per 1,000 square feet in topsoil or 20 pounds per 1,000 square feet in nontopsoil. The fertilizer shall be disked, harrowed, or raked into the seedbed to a depth of 2 inches. The contract shall provide a smooth seedbed prior to seeding.
2. **Seeding.** The seed shall be mixed thoroughly and sown uniformly over the prepared areas. After sowing, the area shall be raked, dragged, or otherwise treated to cover the seed with soil to a depth of 1/4 inch.
3. **Water.** The Contractor shall water the seeded areas at the completion of the sowing and weekly thereafter unless a natural rainfall of 1/2 inch has occurred within the same time span.
4. **Mulching.** Straw mulching material shall be placed evenly over all seeded areas within 48 hours of seeding at a rate of 2 tons per acre between March 15 and October 15 and at a rate of 3 tons per acre between October 16 and March 14. Straw mulching material shall be secured with asphalt emulsion applied at a rate of 60 gallons per ton of mulch or by other approved methods. Mulching which is displaced shall be replaced and the area reseeded; other work damaged as a result of mulch displacement shall be repaired.

C. **Hydraulic Seeding.** When seed is applied hydraulically, a combined slurry of fertilizer, inoculant when required, seed, and wood cellulose fiber mulch shall be applied in one operation. Wood cellulose fiber shall be mixed at a rate of 1,500 pounds per acre. Fertilizer and seed shall be mixed at the rate specified for dry seeding.

3.3 MAINTENANCE

A. **General.** Seeded areas shall be maintained by the Contractor. Settled and eroded areas shall be filled, graded, and reseeded. Seeding will not be accepted unless it is alive and healthy.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment and materials necessary to furnish and install the cast-in-place concrete in accordance with the plans and as specified herein.
1. This section specifies cast-in-place concrete, including formwork, reinforcing, mix design, placement procedures, finishes, and supports for equipment and piping.
 2. Concrete paving and walks are specified in Division 2.
 3. Precast concrete is specified in other Division 3 sections.
 4. Mechanical finishes and concrete floor toppings are specified in other Division 3 sections.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
1. American Concrete Institute (ACI) 214 "Recommended Practice for Evaluation of Strength Test Results of Concrete."
 2. ACI 301 "Specifications for Structural Concrete for Buildings."
 3. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete."
 4. ACI 305 "Hot Weather Concreting."
 5. ACI 306 "Cold Weather Concreting."
 6. ACI 308 "Standard Practice for Curing Concrete."
 7. ACI 309 "Standard Practice for Consolidation of Concrete."
 8. ACI 315 "Details and Detailing of Concrete Reinforcements."
 9. ACI 318 "Building Code Requirements for Reinforced Concrete."
 10. ACI 347 "Recommended Practice for Concrete Formwork."
 11. ACI 350 "Environmental Engineering Concrete Structures."
 12. ACI SP-15 Field Reference Manual. A copy of this publication must be kept in the field office at all times during concrete construction.
 13. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
 14. CRSI "Reinforcing Bar Detailing."
 15. CRSI "Placing Reinforcing Bars."
- B. **Concrete Testing Service.** Engage a testing laboratory acceptable to Engineer/Architect to perform material evaluation tests and to design concrete mixes.
- C. **Testing.** Materials and installed work may require testing and retesting at any time during progress of work. Retesting of rejected materials for installed work, shall be done at Contractor's expense.

- D. **Preconstruction Conference.** Conduct conference at project site to comply with requirements of Division 1 section "Project Meetings" and the following.

1. At least 35 days prior to submittal of design mixes, conduct a meeting to review detailed requirements for preparing concrete design mixes and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Request that representatives of each entity directly concerned with cast-in-place concrete attend conference, including, but not limited to the following:
 - a. Contractor's superintendent.
 - b. Laboratory responsible for concrete design mixes.
 - c. Laboratory responsible for field quality control.
 - d. Ready-Mix concrete producer.
 - e. Concrete subcontractor.
 - f. Primary admixture manufacturers.
 - g. Engineer/Architect or Owner's Representative.

- E. **Field Constructed Mock-Up for Textured Finished Concrete.** Prior to installation of textured finish concrete, construct sample wall to further verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of work:

1. Locate mock-ups on-site in locations indicated or, if not indicated, as directed by Engineer/Architect.
2. Build mock-ups for textured finish concrete of approximately 4 feet long by 4 feet high by full thickness.
3. Where textured finish concrete is to match existing, construct panels parallel to existing surface.
4. Notify Engineer/Architect 1 week in advance of the dates and times when mock-ups from the elements with weather resistance membrane.
5. Protect mock-ups from the elements with weather resistant membrane.
6. Retain and maintain mock-ups during construction in undisturbed condition as standard for judging completed textured finish concrete construction.
 - a. When directed, demolish and remove mock-ups from project site.

1.4 SUBMITTALS

- A. **General.** Submit the following in accordance with Conditions of Contract and Division 1 specification sections.
- B. **Product data** for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Engineer/Architect.
- C. **Shop drawings** for reinforcement for fabrication, bending, and placement of concrete reinforcement. Comply with ACI SP-66 (88) "ACT Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

- D. **Shop drawings** for formwork for fabrication and erection of forms for specialty finished concrete surfaces. Show form construction including jointing, special form joint or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually.
 - 1. Areas of specialty finish are as follows:
 - 2. Engineer/Architect's review is for general architectural applications and features only. Design of formwork for structural stability and efficiency is contractor's responsibility.
- E. **Samples of materials** as requested by Engineer/Architect, including names, sources, and descriptions, as follows:
 - 1. Normal weight aggregates.
 - 2. Reglets.
 - 3. Waterstops.
 - 4. Vapor retarder.
- F. **Laboratory test reports** for concrete materials and mix design test.
- G. **Materials certificates** in lieu of materials laboratory test reports when permitted by Engineer/Architect. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
- H. **Minutes of preconstruction conference.**
- I. **Batch Ticket.** Submit batch ticket for each load of concrete used on the job.

1.5 **JOB CONDITIONS**

Not used.

1.6 **DELIVERY, STORAGE, AND HANDLING**

Not used.

1.7 **SPECIAL WARRANTY**

Not used.

PART 2 – PRODUCTS

2.1 **FORM MATERIALS**

- A. **Forms for Exposed Finish Concrete.** Plywood, metal, metal framed plywood faced, or other acceptable panel type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
 - 1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.
- B. **Forms for Unexposed Finish Concrete.** Plywood, lumber, metal, or other

acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

- C. **Form Coatings.** Provide commercial formulation form coating compounds with a maximum volatile organic compound (VOC) of 350 milligrams per liter (mg/l) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. **Form Ties.** Factory fabricated, adjustable length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1 1/2. inches to exposed surface.
 - 1. Provide ties that, when removed, will leave holes not larger than 1 inch diameter in concrete surface.

2.2 REINFORCING MATERIALS

- A. **Reinforcing Bars.** American Society for Testing and Materials (ASTM) A 615, A 616, or A617; Grade 60, deformed.
- B. **Galvanized Reinforcing Bars.** ASTM A 767, Class II (2.0 oz. zinc psf) hot dip galvanized, after fabrication and bending.
- C. **Epoxy Coated Reinforcing Bars.** ASTM A 775.
- D. **Steel Wire.** ASTM A 82, plain, cold drawn steel.
- E. **Welded Wire Fabric.** ASTM A 185, welded steel wire fabric, provided in flat sheets.
- F. **Welded Deformed Steel Wire Fabric.** ASTM A 497.
- G. **Supports for Reinforcement.** Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications.
 - 1. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. **Portland Cement.** ASTM C 150, Type I.
 - 1. Use one brand of cement throughout project unless otherwise acceptable to Engineer/Architect.
- B. **Fly Ash.** ASTM C 618, Type C or Type F including supplementary optional physical requirements, except loss ignition shall not exceed 3 percent.
- C. **Normal Weight Aggregates.** ASTM C 33 and as herein specified.
 - 1. For exposed concrete, provide aggregates from a single source.

2. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling causing deleterious substances.
3. Fine Aggregate. Fine aggregate shall consist of natural sand or manufactured sand.
4. Coarse Aggregate. Coarse aggregate shall consist of crushed rock, gravel, or crushed gravel.
 - a. **Grading.** The coarse aggregate shall conform to requirements for Size 57, unless otherwise approved by the Engineer/Architect.
 - b. **Deleterious Substances:**

Test	Percent by Weight
1) Removed by decantation	1
2) Shale	1
3) Coal and lignite	1
4) Clay lumps	1/4
5) Soft fragments	3
6) Other deleterious substances which will readily disintegrate	1

Total of (2) to (6) inclusive, not more than 5 percent by weight.

- D. **Lightweight Aggregates.** ASTM C 330.
- E. **Water.** Potable.
- F. **Admixtures, General.** Provide admixtures for concrete that contain not more than 0.1 percent chloride ions. Certificate from admixture manufacturer will be required prior to mix design review.
- G. **Air Entraining Admixture.** ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
 1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Air-Tite," Cormix.
 - b. "Air-Mix" or "Perma-Air," Euclid Chemical Co.
 - c. "Darex AEA" or "Daravair," W.R. Grace & Co.
 - d. "MB-VR" or "Micro-Air," Master Builders, Inc.
 - e. "Sealtight AEA," W.R. Meadows, Inc.
 - f. "Sika AER," Sika Corp.
- H. **Water Reducing Admixture.** ASTM C 494, Type A.
 1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 2. **Products.** Subject to compliance with requirements, provide one of the following:
 - a. "Chemtard," ChemMasters Corp.
 - b. "PSIN," Cormix.

- c. "Eucon WR-75," Euclid Chemical Co.
- d. "WRDA," W.R. Grace & Co.
- e. "Pozzolith Normal" or "Polyheed," Master Builders, Inc.
- f. "Prokrete-N," Prokrete Industries.
- g. "Plastocrete 161," Sika Corp.

I. **High Range Water Reducing Admixture (Super Plasticizer).** ASTM C 494, Type F or Type G.

- 1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

- a. "Super P," Anti-Hydro Co., Inc.
- b. "PSI Super," Cormix.
- c. "Eucon 37," Euclid Chemical Co.
- d. "WRDA 19" or "Daracem," W.R. Grace & Co.
- e. "Rheobuild," Master Builders, Inc.
- f. "PSP," Prokrete Industries.
- g. "Sikament 300," Sika Corp.

J. **Water Reducing, Accelerating Admixture.** ASTM C 494, Type E.

- 1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

- a. "Q-Set," Conspec Marketing & Manufacturing Co.
- b. "Gilco Accelerator," Cormix.
- c. "Accelguard 80," Euclid Chemical Co.
- d. "Daraset," W.R. Grace & Co.
- e. "Pozzutec 20," Master Builders, Inc.

K. **Water Reducing, Retarding Admixture.** ASTM C 494, Type D.

- 1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

- a. "PSI-R Plus," Cormix.
- b. "Eucon Retarder 75," Euclid Chemical Co.
- c. "Daratar-17," W.R. Grace & Co.
- d. "Pozzolith R," Master Builders, Inc.
- e. "Protard," Prokrete Industries.
- f. "Plastiment," Sika Corporation.

2.4 RELATED MATERIALS

- A. **Reglets.** Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217 inch thick (26 gauge) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- B. **Water Stops.** Provide flat, dumbbell type or center bulb type water stops at construction joints and other joints as indicated. Water stops for construction joints shall be serrated type without center bulb and at least 3/8 inch thick and 6

inches wide. Water stop for expansion joints shall be serrated type with center bulb and at least 3/8 inch thick and 9 inches wide. Provide bitumen water stop at joints between existing and new concrete.

- C. **Poly vinyl Chloride Water Stops.** Corps of Engineers CRD-C 572.
 - 1. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - a. The Burke Co.
 - b. Greenstreak Plastic Products Co.
 - c. W.R. Meadows, Inc.
 - d. Progress Unlimited.
 - e. Schlegel Corp.
 - f. Vinylex Corp.
 - g. Paul Murphy Plastics Co.
- D. **Bitumen Water Stops.** Provide a single component self-sealing plastic adhesive type water stop which is nonoxidizing, nonevaporating, nonexpanding, nonshrinking, and is resistant to water, chemicals, and saturated hydrogen sulfide.
 - 1. **Available Manufacturers.** Subject to compliance with requirement, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - a. Synko-Flex Products.
- E. **Sand Cushion.** Clean, manufactured or natural sand.
- F. **Vapor Retarder.** Provide vapor retarder cover over prepared base material where indicated below slabs on grade. Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154, as follows:
 - 1. Polyethylene sheet not less than 8 mils thick.
- G. **Chemical Hardener.** Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 pounds of fluosilicates per gallon.
 - 1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Surfhard"; Euclid Chemical Co.
 - b. "Lapidolith"; Sonneborn-Rexnord.
 - c. "Saniseal"; Master Builders.
 - d. "Burk-O-Lith"; The Burke Co.
 - e. "Fluohard"; L&M Construction Chemical, Inc.
- H. **Absorptive Cover.** Burlap cloth made from jute or kenaf, weighing approximately 9 ounces per square yard, complying with AASHTO M 182, Class 2.
- I. **Moisture Retaining Cover.** One of the following complying with ASTM 5171.
 - 1. Waterproof paper.

2. Polyethylene film.
 3. Polyethylene coated burlap.
- J. **Liquid Membrane Forming Compound:** The compound shall be a clear styrene acrylate type, 30 percent solids cement minimum, and have test data from an independent testing laboratory indicating a maximum moisture loss of 0.030 grams per square centimeter when applied at a coverage rate of 300 square feet per gallon.
1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Super Rez Seal"; The Euclid Chemical Co.
 - b. "Masturekure"; Master Builders.
- K. **Dissipating Resin Curing Compound.** The compound shall be a dissipating resin type compound, conforming to ASTM C309, Type I. The film must chemically break down in a 4 to 6 week period.
1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Kurez DR"; The Euclid Chemical Co.
- L. **Evaporation Control Compound.** Monomolecular film forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Aquafilm," Conspec Marketing and Mfg. Co.
 - b. "Eucobar," Euclid Chemical Co.
 - c. "E-Con," L&M Construction Chemicals, Inc.
 - d. "Confilm," Master Builders, Inc.
- M. **Bonding Compound.** Poly vinyl acetate or acrylic base.
1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. **Poly vinyl Acetate** (Interior Only).
 - 1) "Superior Concrete Bonder," Dayton Superior Corp.
 - 2) "Euco Weld," Euclid Chemical Co.
 - 3) "Weld-Crete," Larsen Products Corp.
 - 4) "Everweld," L&M Construction Chemicals, Inc.
 - b. **Acrylic or Styrene Butadiene.**
 - 1) "Acrylic Bondcrete," The Burke Co.
 - 2) "Strongbond," Conspec Marketing and Mfg. Co.

- 3) "Day-Chem Ad Bond," Dayton Superior Corp.
- 4) "SBR Latex," Euclid Chemical Co.
- 5) "Daraweld C," W.R. Grace & Co.
- 6) "Hornweld," A.C. Horn, Inc.
- 7) "Everbond," L & M Construction Chemicals, Inc.
- 8) "Acryl-Set," Master Builders, Inc.
- 9) "Intralok," W.R. Meadows, Inc.
- 10) "Sonocrete," Sonneborn-Rexnord.
- 11) "StonlockLB2," Stonhard, Inc.

N. **Epoxy Adhesive.** ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," and "Class" to suit project requirements.

1. **Available Products.** Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

- a. "Burke Epoxy M.V.," The Burke Co.
- b. "Spec-Bond 100," Conspec Marketing and Mfg. Co.
- c. "Euco Epoxy System #452 or #620," Euclid Chemical Co.
- d. "Epoxite Binder 2390," A.C. Horn, Inc.
- e. "Epabond," L&M Construction Chemicals, Inc.
- f. "Concresive 1001," Master Builders, Inc.
- g. "Sikadur 32 Hi-Mod," Sika Corp.

O. **Expansion Joint and Isolation Joint Material.** Self-expanding cork conforming to ASTM D 1752, Type III.

2.5 PROPORTIONING AND DESIGN OF MIXES

A. **General.** Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, retain an independent testing facility acceptable to Engineer/Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

1. Submit written reports to Engineer/Architect of each proposed mix for each class of concrete at least 15 days prior to start of work.
2. Do not begin concrete production until proposed mix designs have been reviewed by Engineer/Architect.
3. Limit use of fly ash to not exceed 33 percent of cement content by weight.

B. **Design Mixes.** To provide normal weight concrete with the following properties, unless otherwise indicated on drawings and schedules. Tolerance for air content shall be $\pm 1 \frac{1}{2}$ percent.

1. **Class A.** 4,000 psi, 28 day compressive strength. 4
 - a. w/c ratio, 0.45 maximum; minimum cement, 6.5 bags per cubic yard (cy).
 - b. 6 percent air.
2. **Class B.** 3,500 psi, 28 day compressive strength. 4
 - a. w/c ratio, 0.45 maximum; minimum cement, 5.75 bags per cy.

- b. 6 percent air.
- 3. **Class C.** 2,000 psi, 28 day compressive strength. 4
 - a. w/c ratio, 0.6 maximum; minimum cement, 4.0 bags per cy.
 - b. 6 percent air.
- 4. **Class D.** 2,000 psi, 28 day compressive strength. 5
 - a. w/c ratio, 0.45 maximum; minimum cement, 9.0 bags per cy.
 - b. Fine aggregate to cement ratio shall not exceed 3.0 by weight,
 - c. 71/2 percent air.
- C. **Slump Limits.** Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. Ramps and sloping surfaces. Not more than 3 inches.
 - 2. Reinforced foundation systems. Not less than 1 inch and not more than 3 inches.
 - 3. Concrete containing HRWR admixture (Superplasticizer). Not more than 8 inches after addition of HRWR to site verified 2 inch to 3 inch slump concrete without HRWR.
 - 4. Other concrete. Not more than 4 inches.
- D. **Lightweight Concrete.** Proportion mix as specified. Design mix to produce strength and modulus of elasticity as noted on drawings, with a splitting tensile strength factor (Fct) of not less than 5.5 for 3,000 psi concrete and a dry weight of not less than 95 pounds or more than 110 pounds after 28 days. Limit shrinkage to 0.03 percent at 28 days.
- E. **Controlled Density Fill.** The fine aggregates shall be fine enough to stay in suspension in the mixture to the extent required for proper flow. Provide controlled density fill with the following properties, unless otherwise indicated:
 - 1. 100 psi, 28 day compressive strength.
 - a. Cement, 100 pounds.
 - b. Fly Ash, 250 pounds.
 - c. Fine Aggregate, Saturated Surface Dry, 2,800 pounds.
 - d. Water, 500 pounds maximum.
- F. **Dry Pack Mortar.** Mix dry pack, consisting of one part Portland cement to 2 1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
- G. **Adjustment to Concrete and Controlled Density Fill Mixes.** Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Engineer/Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer/Architect before using in work.
 - 1. For controlled density fill, it is necessary for bleed water to appear on the surface immediately after the fill is struck off. A delay in bleeding indicates there are too many fines in the mixture, so the fly ash quantity shall be reduced in increments of 50 pounds until mixture is bleeding freely. Approximately 60 pounds of sand shall be added to replace each 50 pound

increment of fly ash to maintain the original yield.

2.6 ADMIXTURES

A. Use of Admixtures

1. Use water reducing admixture or high range water reducing admixture (Superplasticizer) in concrete as required for placement and workability.
2. Use high range water reducing admixture (HRWR) in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.
3. Use nonchloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees Fahrenheit (° F.) (10 degrees Celsius [° C.]).
4. Use air entraining admixture where required above. Add air entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content as indicated above.
5. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.

2.7 CONCRETE MIXING

A. Ready Mix Concrete. Comply with requirements of ASTM C 94, and as specified.

1. When air temperature is between 85° F. (30° C.) and 90° F. (32° C.), mixing and delivery time shall not exceed 75 minutes, and when air temperature is above 90° F. (32° C.), mixing and delivery time shall not exceed 60 minutes.

PART 3 – EXECUTION

3.1 GENERAL

- #### A. Coordination.
- Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.2 FORMS

- #### A. General.
- Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Maintain formwork construction tolerances complying with ACI 347.
- #### B. Forms.
- Construct forms to sizes, shapes, lines, position, elevation and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
- #### C. Fabrication of Forms.
- Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

- D. **Openings.** Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. **Chamfer exposed corners** and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- F. **Provisions for Other Trades.** Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- G. **Cleaning and Tightening.** Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.
- H. **Form Ties.** For concrete exposed in the finished construction, form ties must be of type that break off or are removed within the concrete no less than 1 inch back from the concrete surface.

3.3 VAPOR RETARDER INSTALLATION

- A. **General.** Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour.
- B. **Lap joints 6 inches** and seal vapor barrier joints with manufacturers' recommended mastic and pressure sensitive tape.
- C. **Protection.** After placement of vapor retarder, cover with sand cushion and compact to depth as shown on drawings.

3.4 PLACING REINFORCEMENT

- A. **General.** Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.
 - 1. Avoiding cutting or puncturing vapor retarder barrier during reinforcement placement and concreting operations.
- B. **Cleaning.** Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. **Installation**
 - 1. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Engineer/Architect.
 - 2. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties

- so ends are directed into concrete, not toward exposed concrete surfaces.
3. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh plus 2 inches or 8 inches and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

- A. **Construction Joints.** Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Engineer/Architect.
 1. Provide keyways at least 1 1/2 inches deep in construction joints in walls and slabs and between walls and footings. Accepted bulkheads designed for this purpose may be used for slabs.
 2. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated. Do not continue reinforcement through sides of strip placements.
 3. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
 - a. For horizontal joints, new concrete shall be placed on a layer of cement mortar evenly spread over the previously place concrete. Use the same proportions with all coarse aggregate omitted.
 4. Water Stops. Install water stops to form continuous diaphragm in each joint. Make provisions to support and protect exposed water stops during progress of work. Field fabricate joints in water stops in accordance with manufacturer's printed instructions. Provide water stops in construction joints as follows:
 - a. Water bearing walls and slabs.
 - b. Wells or slabs subject to groundwater.
 - c. Elsewhere as indicated.
- B. **Isolation Joints in Slabs-on-Ground.** Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.
 1. Joint filler and sealant materials are specified in Division 7 sections of these specifications.
- C. **Contraction (Control) Joints in Slabs-on-Ground.** Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts 1/8 inch wide by 1/4 slab depth, unless otherwise indicated.
- D. **Control Joints in Retaining Wall.** Provide control joints at 32 feet on center maximum unless otherwise shown. Provide 1 1/2 inch deep by 1/3 wall thickness vertical key way. Horizontal reinforcing shall not pass through joint. Joints need not be provided in retaining wall footings.
- E. **Expansion Joints.** Construct expansion joints where shown. If not shown, provide expansion joints at interval not to exceed the following:

1. Retaining Walls. 96 feet (not required in footings).
2. Exterior slabs-on-grade. 30 feet.

3.6 INSTALLATION OF EMBEDDED ITEMS

- A. **General.** Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- B. **Install reglets** to receive top edge of foundation sheet waterproofing and to receive thru wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. **Forms for Slabs.** Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting type screeds.

3.7 PREPARATION OF FORM SURFACES

- A. **General.** Coat contact surfaces of forms with an approved, nonresidual, low VOC, form coating compound before reinforcement is placed.
 1. Do not allow excess form coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
 2. Coat steel forms with a nonstaining, rust preventative material. Rust stained steel formwork is not acceptable.
 3. Form coatings for use in water treatment plants shall be nontoxic after 30 days from the date the forms are removed.

3.8 ADJUSTING SLUMP AT JOB SITE

- A. **Slump Greater than Specified.** Concrete with slump greater than specified shall not be used.
- B. **Slump Less than Specified.** If on arrival at the job site, the slump of the concrete is less than specified, the following remedies may be used at the Contractor's option.
 1. Add water only if the maximum specified water/cement ratio is not exceeded.
 2. Additional water shall be accompanied by a quantity of cement sufficient to maintain the specified water/cement ratio.
 3. Add an approved water reducing admixture.

3.9 CONCRETE PLACEMENT

- A. **Inspection.** Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. No concrete shall be placed except when the Engineer/Architect and the testing agency are present, unless otherwise authorized by the Engineer/Architect.
- B. **Location.** Provide concrete as specified in the table below unless otherwise

indicated on the drawings.

Location	Design Mix
All reinforced concrete And nonreinforced fillets	Class A
Nonreinforced concrete not designated as Classes A, C, or D	Class B
Nonreinforced so designated on plans	Class C
Grout fill or topping as designated on plans	Class D

- C. **General.** Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete" and as herein specified.
1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams, planes of weakness, or be resistant to the penetration of a vibrator. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.
- D. **Placing Concrete in Forms.** Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- E. **Placing Concrete Slabs.** Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 3. Maintain reinforcing in proper position during concrete placement.
- F. **Cold Weather Placing.** Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

- G. **Temperature.** When air temperature has fallen to or is expected to fall below 40° F. (4° C.), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50° F. (10° C.) and not more than 80° F. (27° C.) at point of placement.
1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 2. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- H. **Hot Weather Placing.** When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90° F. (32° C.). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcing steel with water soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
 4. Use water reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Engineer/Architect.
 5. Use evaporation control compound in accordance with manufacturer's recommendations.

3.10 CONTROLLED DENSITY FILL PLACEMENT

- A. **General.** Place controlled density fill in overexcavated areas under slabs and as directed by the Engineer/Architect.
- B. **Mixing Equipment.** Sufficient mixing capacity of mixers shall be provided to permit the fill to be placed without interruption.
- C. **Placing Fill.** Flowable fill shall be discharged from the mixer by any reasonable means into the space to be filled. The fill material shall be brought up uniformly to the fill line shown on the plans or as directed by the Engineer/Architect. Placing of any material over low strength fill may commence as soon as the surface water is gone or as directed.

3.11 FINISH OF FORMED SURFACES.

Inside face of covered basins, clear wells, and reservoirs, filters below the media line, open tanks and flumes below water or flow lines, and the outside of structures below finish grade lines shall be classified as not exposed to view.

- A. **Finish.** Finish formed concrete surfaces in accordance with the schedule below:

Location	Type of Finish
Concrete surfaces not exposed to view or surfaces to be covered with a coating material applied directly to concrete, such as waterproofing, damp proofing, veneer plaster, painting, or other similar system	Smooth Form Finish
Concrete exposed to view	Smooth Rubbed Finished
B. Smooth Form Finish. For formed concrete surfaces not exposed to view or surfaces to be covered with a coating material applied directly to concrete, or a covering materials applied directly to concrete, such as waterproofing, damp proofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.	
C. Smooth Rubbed Finish. Provide smooth rubbed finish to all concrete surfaces exposed to view which have received smooth form finish treatment, not later than 1 day after form removal.	
1. Moisten concrete surfaces and rub with carborundum brick or other V abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.	
D. Related Unformed Surfaces. At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.	

3.12 MONOLITHIC SLAB FINISHES

- A. **Finish.** Finish monolithic slab surfaces in accordance with the schedule below unless finish is specifically noted on the drawings:

Location	Type of Finish
Tank slabs to receive grout topping	Rough finish
Slabs to receive concrete floor topping or mortar setting beds for tile, Portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated	Scratch finish
Slabs to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated	Float finish
Slabs to be exposed to view or covered	Trowel finish after float

with resilient flooring, carpet, finishing ceramic or quarry tile, paint or other thin film finish coating system

Slabs to be covered with ceramic or

Float finish followed by quarry tile installed with thin trowel and fine broom set mortar finish

Exterior concrete platforms, steps, ramps, and elsewhere as indicated

Float finish followed by nonslip broom finish

- B. **Scratch Finish.** After placing slabs, plane surface to tolerances for floor flatness (Ff) of 15 and floor levelness (Fl) of 13. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- C. **Float Finish.** After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power driven floats, or both. Consolidate surface with power driven floats or by hand floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of Ff 18 - Fl 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- D. **Trowel Finish.** After floating, begin first trowel finish operation using a power driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 20 - Fl 17. Grind smooth surface defects that would telegraph through applied floor covering system.
- E. **Trowel and Fine Broom Finish.** Apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- F. **Nonslip Broom Finish.** Immediately after float finishing, slightly roughen concrete surface by brooming with stiff fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer/Architect before application.
- G. **Rough Finish.** The bottom of concrete tanks which are to receive grout topping shall receive a rough finish for maximum adhesion. The surface to receive the grout topping shall be intentionally roughened to a minimum amplitude of 1/4 inch.
- H. **Chemical Hardener Finish.** Apply chemical hardener finish to existing interior concrete floors where indicated. Clean floors and allow to dry before applying hardener. Dilute liquid hardener with water (parts of hardener/water as follows), and apply in three coats; first coat, 1/3 strength; second coat, 1/2 strength; third coat, 2/3 strength. Evenly apply each coat, and allow 24 hours for drying between coats.
1. Apply proprietary chemical hardeners, in accordance with manufacturer's printed instructions.
 2. After final coat of chemical hardener solution is applied and dried, remove

surplus hardener by scrubbing and mopping with water.

3.13 PLACING GROUT TOPPINGS

A. Procedure

1. Prior to placement of the structurally bonded topping, remove all laitance, debris, and loose and foreign material from the base slab. Use waterblasting, sandblasting, or other methods acceptable to the Engineer/Architect.
2. Thoroughly wet the base slab for at least 24 hours before placing the grout topping.
3. Brush in neat cement grout as a bonding agent immediately before application of grout topping.
4. Where recommended by manufacturer, use the tank mechanism to screed the grout on the tank floor as it is placed. Screed in accordance with the manufacturer's instructions.
5. Float finish topping as specified above.

3.14 CONCRETE CURING AND PROTECTION

- A. **General.** Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation control compound. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

- B. **Curing Methods.** Perform curing of concrete by curing compound, by moist curing, by moisture retaining cover curing, and by combinations thereof in accordance with the schedule below unless curing method is specifically noted on the drawings. If unspecified, Contractor may opt for any of the methods specified below.

Location	Curing Method
Exposed interior slabs with a metallic aggregate hardener finish or colored wear resistant finish, and to exterior slabs, walks, and curbs	Heavy duty curing compound
Floors to receive a finish flooring	Light duty curing compound
Formed concrete surfaces	Moist curing prior to form removal. Followed by any of the methods specified below

- C. **Moisture Curing.** Provide moisture curing by following methods:

1. Keep concrete surface continuously wet by covering with water.
2. Use continuous water fog spray.
3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4 inch lap over adjacent absorptive covers.

- D. **Moisture Cover Curing.** Provide moisture cover curing as follows:
1. Cover concrete surfaces with moisture retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- E. **Heavy Duty Curing.** Provide heavy duty curing and sealing compound as follows:
1. Apply specified curing and compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Apply in two coats, spread in perpendicular directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 2. Use curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
 3. Do not use curing compounds on surfaces which are to be covered with coating material applied directly to concrete, chemical hardener, waterproofing, damp proofing, membrane roofing, flooring (such as ceramic or quarry tile, glue down carpet that is not compatible with curing compound), painting, and other coatings and finish materials, unless otherwise approved by the Engineer/Architect.
 4. Provide light duty curing compound which is compatible with the specific floor coverings to be used.
- F. **Curing Formed Surfaces.** Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by a method specified above.
- G. **Curing Unformed Surfaces.** Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of a curing method.
- H. **Final Cure.** Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture retaining cover, unless otherwise directed.

3.15 SHORES AND SUPPORTS

- A. **General.** Comply with ACI 347 for shoring and reshoring in multistory construction, and as herein specified.
1. Extend shoring from ground to roof for structures four stories or less, unless otherwise permitted.

3.16 REMOVAL OF FORMS

- A. **General.** Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50° F. (10° C.) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form maintained, removal operations, and provided curing and protection operations are maintained.

- B. **Form Removal.** Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days and until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field cured specimens representative of concrete location or members.
 - 1. Form facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.17 REUSE OF FORMS

- A. **Clean and repair surfaces of forms to be reused in work.** Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
- B. **Successive Reuse.** When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Engineer/ Architect .

3.18 MISCELLANEOUS CONCRETE ITEMS

- A. **Filling In.** Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. **Curbs.** Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. **Equipment Bases and Foundations.** Provide machine and equipment bases and foundations, as shown on structural drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.
- D. **Steel Pan Stairs.** Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.

3.19 CONCRETE SURFACE REPAIRS

- A. **Patching Defective Areas.** Repair and patch defective areas and plug form tie holes with cement mortar immediately after removal of forms, when acceptable to Engineer/Architect.
 - 1. Cut out honeycomb, rock pockets, and voids over 1/4 inch in any dimension down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with specified bonding compound. Place patching mortar before bonding compound has dried.

2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface. After shrinkage has occurred, grind surface until flush.
- B. **Repair of Formed Surfaces.** Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer/Architect. Surface defects, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or approved precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- C. **Repair of Unformed Surfaces.** Repair slabs that fail to meet the specified finish requirements. Correct levelness and flatness, and low and high areas as herein specified.
1. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Engineer/Architect.
 4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

3.20 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. **General.** The Contractor will employ a testing laboratory to perform tests and to submit test reports. Contractor shall provide samples of concrete materials at plants or stock piles during the course of the work for tests for compliance with specifications.
- B. **Sampling and testing** for quality control during placement of concrete may include the following, as directed by Engineer/Architect.

- C. **Sampling Fresh Concrete.** ASTM C 172, except modified for slump to comply with ASTM C 94.
1. **Slump.** ASTM C 143; one test at point of truck discharge prior to adding plasticizers for each compressive strength test and additional tests when concrete consistency seems to have changed. If the slump is adjusted at the job site, the concrete testing agency shall be responsible for reporting the following:
 - a. Method used to adjust slump.
 - b. Quantity of each material added.
 - c. Mixing time after addition of materials.
 - d. Resulting slump.
 - e. Resulting water/cement ratio.
 2. **Air Content.** ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one test for each compressive strength test and test first load at air entrained concrete delivered.
 3. **Concrete Temperature.** Test hourly when air temperature is 40° F. (4° C.) and below, when 80° F. (27° C.) and above, and each time a set of compression test specimens is made.
 4. **Compression Test Specimen.** ASTM C 31; one set of four standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required.
 5. **Compressive Strength Tests.** ASTM C 39; one set for each day's pour exceeding 5 cy plus additional sets for each 50 cy more than the first 25 cy of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 6. **When frequency of testing** will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
- D. **Test results will be reported** in writing to Engineer/Architect, Structural Engineer, Ready-Mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7 day tests and 28 day tests.
- E. **Flatness and Levelness.** The Owner will conduct random tests for flatness and levelness in accordance with ASTM E 1155. The Contractor shall pay the cost for the retesting of the areas found not to conform to the specifications after the Contractor has corrected the defects.
- F. **Floor Slope.** Owner will test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.
- G. **Nondestructive Testing.** Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

- H. **Additional Tests.** The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer/Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

END OF SECTION