## CITY OF NORTH MIAMI BEACH

### NMB WATER

#### ENGINEERING AND CONSTRUCTION REQUIREMENTS
### STANDARDS - VOLUME 2

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INTRODUCTION
SECTION 1
INTRODUCTION

1.01 GENERAL

The City of North Miami Beach's NMB WATER (hereinafter referred to as the Department) administers and manages the stormwater system, the water transmission and distribution systems, and the wastewater collection and transmission systems within the City of North Miami Beach and adjacent Water Service Area in order to accomplish the following goals:

A. To plan for and better accommodate water and wastewater users.

B. To establish minimum technical specifications and standards for approval of water distribution and wastewater transmission, and collection systems to be constructed within the City and its service area.

C. To operate and maintain such water or wastewater systems for its own use and for the use and benefit of the inhabitants and of persons, firms, corporations, political subdivisions or other public agencies or parties located within the City of North Miami Beach and the adjacent water service areas or the environs thereto, who shall use the facilities and services of such system.

1.02 DEFINITIONS

Except where specific definitions are used within a specific section, the following terms, phrases, words, and their derivation shall have the meaning given herein when consistent with the context. Words used in the present tense include the future tense, words in the plural number include the singular number and words in the singular number include the plural number. The word "shall" is mandatory, and the word "may" is permissive.

A. AASHTO – means American Association of State Highway and Transportation Officials. Any reference to AASHTO standards shall be taken to mean the most recently published revision unless otherwise specified.

B. ANSI – means American National Standards Institute. Any reference to ANSI standards shall be taken to mean the most recently published revision unless otherwise specified.

C. APPLICANT/BUILDER – means the person, firm or corporation engaged in developing or improving real estate for use or occupancy.

D. ASTM – means American Society for Testing Materials. Any reference to ASTM standards shall be taken to mean the most recently published revision unless otherwise specified.
E. AWWA – means American Water Works Association. Any reference to AWWA Standards shall be taken to mean the most recently published revision unless otherwise specified.

F. BUILDER – used interchangeably with the word Developer, means the person, firm, or corporation engaged in developing or improving real estate for use or occupancy.

G. CITY – means the City of North Miami Beach and/or its designated representative(s).

H. CONTRACTOR – means the person, firm, or corporation with whom the contract for work has been made by the Owner, the Builder, or the City.

I. COUNTY – means Miami-Dade County.

J. DEPARTMENT – means City of North Miami Beach Public Services Department.

K. DEVELOPER – used interchangeably with the BUILDER. See above.


M. DRAWINGS – means engineering drawings prepared by an Engineer to show the proposed construction.

N. ENGINEER – means an Engineer or Engineering firm registered with the State of Florida by the Department of Professional Regulation.

O. EQUIVALENT RESIDENTIAL CONNECTION (ERC) - A means of determining flows and establishing costs for services between different customer categories.

P. FDEP – means the Florida Department of Environmental Protection.

Q. FDOT – means the Florida Department of Transportation.


S. FORCE MAIN – means a pressure pipe joining the pump discharge at the wastewater pumping station.
T. GEOTECHNICAL/SOILS ENGINEER – means a Florida Registered Engineer who provides services related to subsurface evaluation, subsurface exploration and sampling, determination of soil and rock properties, foundation engineering, settlement and seepage analysis, design of earth and earth retaining structures, the design of subsurface drainage systems and the improvement of soil properties and foundation conditions, and testing and evaluation of construction materials.

U. GRAVITY SEWER – A sanitary sewer in which the liquid runs on descending gradients from source to outlet, and where no pumping is required.

V. HRS – means the State of Florida Department of Health and Rehabilitation Services.


Y. MOT – means Maintenance of Traffic Plan as required by the City/County/FDOT.

Z. NATIONAL PIPE THREAD (NPT) - Pipe thread dimensions agreed on by several national associations and approved by the U.S.A. Standards Association.

AA. NEMA – means National Electrical Manufacturers Association. Any reference to NEMA Standards will be taken to mean the most recently published revision unless otherwise specified.

BB. NSF – means National Sanitation Foundation. Any reference to NSF Standards shall be taken to mean the most recently published revision unless otherwise specified.

CC. OSHA – means the Federal Occupational Safety and Health Administration.

DD. OWNER – means the person, firm, corporation or governmental unit holding right of possession of the real estate upon which construction is to take place. May be used interchangeably with DEVELOPER when they are one and the same.

EE. OWNER'S ENGINEER – means an Engineer or Engineering firm registered with the State of Florida Department of Professional Regulation, retained by the Owner to provide professional engineering services for a project.

FF. PLANS – means Drawings as defined herein above.
GG. PPFA – means Plastic Pipe and Fitting Association. Any reference to PPFA Standards shall be taken to mean the most recently published revision, unless otherwise specified.

HH. PUBLIC SERVICES DIRECTOR – means the Director of the Public Services Department of the City of North Miami Beach, Florida, acting directly or through an assistant or the representative authorized by the Director.

II. ROADWAY – means paved area within public right-of-way.

JJ. SANITARY SEWER – A pipe or conduit that carries liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions, together with minor quantities of ground, storm, and surface waters that are not admitted intentionally. See wastewater.

KK. SANITARY SEWER SYSTEM – A group of sanitary sewers so combined as to form a whole to operate in unison.

LL. SFWMD – South Florida Water Management District.

MM. STANDARD DRAWINGS – means the detailed drawings in the Manual related to water distribution and wastewater collection system materials and installation.

NN. SURVEYOR (PMLS) – means person licensed in Florida under chapter 472 of the Florida statutes to practice land surveying in the State of Florida.


QQ. USEPA – means the United States Environmental Protection Agency.


SS. UTILITY SERVICE AREA – means the water and wastewater service areas served by the City.

TT. WASTEWATER – The spent water of a community. From the standpoint of
source, it may be a combination of the liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions, together with any groundwater, surface water, and storm water that may be present. In recent years, the word wastewater has taken precedence over the word sewage.

UU. WATER MAINS – means pipes, fittings, valves, hydrants, services, meters and miscellaneous related appurtenances. Used to convey potable water.

VV. WEF – means Water Environment Federation.

WW. WORK – means the labor, materials, equipment, supplies, services and other items necessary for the execution, completion and fulfillment of the contract.

1.03 EQUIPMENT STANDARDIZATION

It is the intent of the City to standardize on certain equipment, which will be owned and/or maintained by the City. This will reduce the potential spare parts inventory and save maintenance expense. A list of this equipment is included in Appendix A. It is the intent of the City to review and update Appendix A as appropriate to ensure efficient operation and maintenance of the facilities under the jurisdiction of this Manual. For this purpose, the City shall evaluate technical submittals from interested manufacturers or suppliers at least once every three years.

1.04 REFERENCE STANDARDS

Wherever, in this Manual, references are made to the standards, specifications or other published data of the various national, regional or local organizations, these standards, specifications or other published data shall be followed, unless written permission to vary from these standards, specifications or other published data is received from the City. References to these standards, specifications or other published data shall be taken to mean the most recently published revision unless otherwise specified.

1.05 REQUIREMENTS

A. No land development activity including clearing and grubbing; filling or excavation work; road construction; underground utility installation and/or rehabilitation; and/or other activity shall commence without first obtaining engineering plan approval, and an engineering construction permit.

B. No excavation shall commence without first obtaining engineering plan approval of the excavation activity.

C. All letters or copies of permit approvals, or determinations of non-jurisdiction, granted by the South Florida Water Management District (SFWMD), Florida Department of Environmental Protection (FDEP), U.S. Army Corps of Engineers (ACOE), United States Environmental Protection Agency (USEPA), and Miami-
Dade County Department of Environmental Resource Management (DERM) for excavation within wetlands, shall be submitted to the City prior to commencing any excavation or filling in wetland areas.

D. All fill activities within a 100-year flood plain shall provide for compensating storage within the same 100-year flood plain. The City may request a 100-year flood study for a project within a suspected 100-year flood plain with no established 100-year flood elevation.

END OF SECTION
GENERAL
CONSTRUCTION
REQUIREMENTS
SECTION 2
GENERAL CONSTRUCTION REQUIREMENTS

2.01 GENERAL

A. This Section sets forth the general requirements for design and/or construction of roadway, storm sewer, water and wastewater utility facilities under the jurisdiction of the City of North Miami Beach.

2.02 GRADES, SURVEY LINES, AND PROTECTION OF MONUMENTS

A. All work shall be constructed in accordance with the lines and grades shown on the Drawings. The full responsibility for keeping alignment and grade shall rest upon the Contractor.

B. Bench marks and base line controlling points shall be established prior to beginning work. Reference marks for lines and grades, as the work progresses, will be located to cause as little inconvenience to the prosecution of the work as possible. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. The Contractor shall remove any obstructions placed contrary to this provision.

C. The Owner shall, at his own expense, establish all working or construction lines and grades as required from the reference marks, and shall be solely responsible for the accuracy thereof. The Owner shall, however, be subject to the check and review of the City.

D. Property corners and survey monuments shall be preserved using care not to disturb or destroy them. If a property corner or survey monument is disturbed or destroyed during construction whether by accident, careless work, or required to be disturbed or destroyed by the construction work, said property corner or survey monument shall be restored by a Professional Land Surveyor registered in the State of Florida. All costs for this work shall be paid for by the Owner.

2.03 UTILITY COORDINATION

A. Prior to proceeding with trench excavation, the Owner shall contact all utility companies that serve the area for aid in locating their underground services. It shall be the Owner’s responsibility to contact utility companies for marking their location at least two (2) working days before starting construction. The Owner shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing utility, the Contractor shall immediately notify the responsible official of the organization operating the interrupted utility. The Owner shall lend all possible assistance in restoring services and shall assume all cost, charges, or claims connected with the interruption and repair of such services.
B. Wherever obstructions are encountered in the public rights-of-way during the progress of the Work and interfere to such an extent that an alteration of the Drawings is required, the City shall be notified of the deviation from the line and grade and approve revisions to the drawing prior to performing the work. Where storm sewer, gas, water, sanitary sewer, telephone, electrical, or other existing utilities are an impediment to the vertical or horizontal alignment of the proposed work, the City shall approve a change in grade or alignment or shall direct the Owner to arrange with the owners of the utilities for their removal. If a change in line or grade of a gravity sewer is necessary, the city will require the addition of any manholes needed to maintain the integrity of the sewer system.

C. Test pits for the purpose of locating underground pipeline, utilities, or structures in advance of the construction shall be excavated and backfilled by the Contractor. All appropriate Utility Companies shall be notified 48 hours in advance of any test pit investigation. Test pits shall be backfilled immediately after their purpose has been fulfilled and maintained in a manner satisfactory to the City. The costs of such test pits shall be borne by the Owner.

2.04 MAINTENANCE OF TRAFFIC AND CLOSING OF STREETS

A. The Contractor shall carry on the work in a manner which will cause a minimum of interruption to traffic. A maintenance of Traffic Plan in accordance with the latest edition of the FDOT's "Roadway and Traffic Standards" Index 600 Series For DOT Roadway and Part VI of the Manual On Uniform Traffic Control Devices (MUTCD) for all other roadways shall be submitted to the City and the responsible authorities. Where traffic must cross open trenches, the Contractor shall provide suitable bridges. The Contractor shall post suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic. Prior to closing of any streets the Contractor shall notify when applicable the Florida Department of Transportation, Miami Dade County Public Works Department, Miami-Dade Transit Authority, and The City, and obtain the approval of responsible authorities and the City.

B. Unless permission to close a street is received in writing from the proper Authority (City, County, FDOT, etc.), all excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to the City.

C. Detours around construction will be subject to the approval of the authority having jurisdiction and the City. Where detours are permitted the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured the Contractor shall expedite construction operations. The City will strictly control periods when traffic is being detoured.
2.05 PROTECTION OF PUBLIC AND PROPERTY

A. The Contractor shall be solely responsible for adhering to the rules and regulations of OSHA and appropriate authorities regarding safety provisions. To protect persons from injury and to avoid property damage, adequate barricades, construction signs, lights and guards as required shall be placed and maintained by the Contractor at his expense during the progress of the work and until it is safe for traffic to use the roads and streets. All material piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences or barricades and shall be protected by proper lights when visibility is poor. All signs and barricades shall be in accordance with the most recent edition of the Manual on Uniform Traffic Control Devices and the Traffic Control and Safe Practices Manual.

B. Temporary support, adequate protection and maintenance, of all underground and surface utility structures including drains, sewers, manholes, hydrants, valves, valve covers, power poles and other miscellaneous utility structures encountered in the progress of the work, shall be furnished by the Contractor at his expense. Any such structures which may have been disturbed shall be restored immediately upon completion of the work.

C. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges with handrailings and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. The length of an open trench will be controlled by the particular surrounding conditions, but shall be limited to 100 feet unless otherwise approved by the City. No more than ten feet of trench shall be permitted to be left open overnight. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the City may require special construction procedures such as limiting the length of open trench, fencing, prohibiting excavated material in the street and requiring that the trench shall not remain open overnight and it shall be adequately secured by covering with steel plates or other method approved by the City. All trenches, excavated material, equipment or other obstacles which could be dangerous to the public shall be well lighted at night.

D. Owner shall restrict his work to his own property; public right-of-way, as approved by the City or other authority having jurisdiction. The Contractor shall not enter on or use property without the written permission of the property owner. A copy of such authorization shall be provided by the City.

E. All trees and shrubs not approved for removal shall be protected by the Owner at his expense. No excavated materials shall be placed so as to injure such trees or
shrubs. Trees or shrubs destroyed shall be replaced with new stock of similar size and age at Owner's sole expense.

F. Lawn areas shall be left in as good or better condition as before starting of the work. Where sod is to be removed it shall be carefully restored with new sod of the same type and quality.

G. Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good a condition as before the starting of the work. The manner in which the fence is repaired or replaced and the materials used shall be subject to the approval of the City.

H. The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses and drainage ditches. The Contractor shall provide for the interception and retention of small amounts of sediment (silt) from construction sites in order to prevent silt from leaving the construction site. Filter barriers or silt fences shall be employed in this regard. Filter barriers composed of burlap or standard weight synthetic fabric stapled to wooden stakes shall be used in ditch lines, around drop inlets, and at temporary sites where construction changes the earth contour and water run-off. Filter barriers shall be used where flows not exceeding one (1) cubic foot per second are expected. Silt fences shall be employed where sheet or overland flows are expected. Filter barriers and silt fences shall be constructed according to the guidelines set forth in the FDEP guide to a Sound Land and Water Management, Stormwater Management Practices, Chapter 6. At completion of the work, the Contractor, at his own expense, shall remove any siltation deposits and restore the site to the original grade.

2.06 ACCESS TO THE PUBLIC SERVICES

A. Neither the materials excavated nor the materials or equipment used in the construction of the Work shall be so placed as to prevent free access to public services. Fire hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, or other utility controls shall be left unobstructed and accessible. Gutters shall be kept clear or other satisfactory provisions made for street drainage. Natural water courses shall not be obstructed or polluted.

2.07 PUBLIC NUISANCE

A. The Contractor shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, or excessive noise or dust. The Contractor shall eliminate noise to as great an extent as practicable at all times. Noise levels between the hours of 7:00 p.m. and 7:00 a.m. weekdays and 7:00 p.m. Friday through 7:00 a.m. Monday shall not exceed 55dB.
2.08 CONSTRUCTION HOURS

A. No work shall be done between the hours of 7:00 p.m. and 7:00 a.m. weekdays, or between 7:00 p.m. Friday and 7:00 a.m. Monday without written request for doing the work being provided to the City a minimum 48 hours before starting the work. The request will include the proposed hours of work and justification for the request. Upon authorization by the City and any other effected agencies, the work may proceed.

2.09 CONSTRUCTION IN EASEMENTS AND RIGHTS-OF-WAY

A. In easements across private property, the Owner shall confine all operations within the easement area and shall be responsible and liable for all damage outside of the easement area. Precautions shall be taken by adequate sheeting or other approved method to prevent any cave-in or subsidence beyond the easement limits or damage to improvements within the easement.

B. The Contractor shall strictly adhere to the requirements of FDOT where construction work is in a right-of-way under the jurisdiction of the State of Florida, and shall take care to avoid any unreasonable traffic conflicts due to the work in road rights-of-way.

C. Construction in the City of North Miami Beach Rights-of-Way shall be governed by this manual, as amended.

2.10 SUSPENSION OF WORK DUE TO WEATHER

A. During inclement weather, all work which might be damaged or rendered inferior by such weather conditions shall be suspended. During suspension of the work from any cause, the work shall be suitably covered and protected so as to preserve it from injury by the weather or otherwise.

B. During such periods of time as are designated by the United States Weather Bureau as being a hurricane alert, the Contractor shall perform all precautions as necessary to safeguard the work and property, including the removal of all small equipment and materials from the site, lashing all other equipment and materials to each other and to rigid construction, and any other safety measures as may be required to protect the public and the project.

1. Upon Notification of a Hurricane Watch, the Contractor should prepare or have in place a Plan of Action for the specific actions to be taken on their particular projects.

2. Upon Notification of a Hurricane Warning:

   a. The Contractor shall implement their Plan of Action to protect the project and the public.
b. For construction projects within the public right-of-ways, the Contractor shall suspend his construction operations, backfill all open trenches, remove all construction equipment and materials from the right-of-way, remove unnecessary traffic barricades and signs and secure remaining barricades by "half burial" or "double sand bags".

2.11 USE OF CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or other classification, must show approval of either United States Environmental Protection Agency (USEPA) or United States Department of Agriculture (USDA). Use of all such chemicals and disposal of residues shall be in strict conformance with label instructions. All chemicals in contact with potable water shall be NSF approved.

2.12 COOPERATION WITH OTHER CONTRACTORS AND FORCES

A. During construction progress, it may be necessary for other contractors and persons employed by the City to work in or about the site. The City reserves the right to put such other contractors to work and to afford such access to the construction site and at such times as the City deems proper. The Owner shall not impede or interfere with the work of such other contractors and shall cooperate with the other contractor(s) for proper prosecution of the work.

2.13 SUBSURFACE EXPLORATION

A. The Owner shall make such subsurface explorations as the Owner believes necessary to perform the Work or as requested by the City.

2.14 CLEANING

A. During construction the Owner shall, at all times, keep the construction site and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the City, such material, debris, or rubbish constitutes a nuisance or is objectionable.

B. At the conclusion of the work, all tools, temporary structures and materials belonging to the Owner shall be promptly removed. The Owner shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

2.15 SALVAGE

A. Any existing City owned equipment or material including but not limited to valves, pipes, fittings, couplings, etc., which are removed or replaced as a result
of construction may be designated as salvage by the City, and if so, shall be carefully removed from the site and delivered to a storage area designated by the City.

2.16 SHOP DRAWINGS AND SAMPLES

A. If requested by the City, prior to construction, the Owner shall submit three (3) copies of the shop drawings, signed by the Owner's Engineer, to the City. The data shown on the shop drawings shall be complete with respect to dimensions, design criteria, materials of construction and the like to enable review of the information as required. The Owner shall, if requested by the City, furnish certificates, affidavits of compliance, test reports, or samples for check analysis for any of the materials specified in this Manual.

2.17 CLEARING AND GRUBBING

A. The Contractor shall clear and grub all of the area within the limits of construction conform to the applicable site clearing ordinance, landscaping, and tree ordinances of the City.

B. The surface of the ground for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, trees and shrubs to remain shall be preserved as specified in Section 2.05E. Clearing operations shall be conducted so as to prevent damage to existing structures and installations and to those under construction, and so as to provide for the safety of employees and others.

C. Grubbing shall consist of the complete removal of all stumps, roots larger than 1 ½-inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

D. In areas so designated, top soil shall be stripped and stockpiled. Topsoil so stockpiled shall be protected until it is placed. Any topsoil remaining after all work is in place shall be disposed of by the Contractor.

2.18 EXCAVATION, BACKFILL, COMPACTION AND GRADING

A. The Owner shall furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, fill, compaction, grading and slope protection required to complete the work.
B. The Owner shall examine the site and undertake subsurface investigations including soil borings before commencing the work. The City will not be responsible for presumed or existing soil conditions in the work area.

C. Owner shall locate existing utilities in the areas of the work. If utilities are to remain in place, the Owner shall provide adequate means of protection during earthwork operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, the Contractor shall consult the owner of such piping or utility immediately for directions. Payment for damage and repair to such piping or utilities is the Owner’s responsibility. Refer to Section 2.03 for utility coordination requirements. The City shall not be responsible for uncharted or incorrectly charted water and wastewater mains or other utilities. It is the Owner’s responsibility to ensure that such facilities exist at the presumed point prior to commencing construction.

D. Materials for use and backfill, whether in situ or borrow, shall be as described under this section. Materials for structural fill shall be bedding rock, sand or select common fill as specified herein or other suitable material as approved by the City. The Owner shall, upon request by the City, provide test reports, prepared by a License Testing Laboratory to determine the acceptability of the material.

1. Common fill shall consist of mineral soil and be substantially free of clay, organic material, loam, wood, trash and other objectionable material which may be compressible or which cannot be compacted properly. Common fill shall not contain stones larger than six (6) inches in any dimension, or asphalt, broken concrete, masonry, rubble, or other similar materials. It shall have physical properties such that it can be readily spread and compacted during filling. Additionally, common fill shall be no more than 12 percent by weight finer than the No. 200 mesh sieve unless finer material is approved for use in a specific location by the City. Material falling within the above specifications encountered during the excavation may be stored in segregated stockpiles for reuse. All material which, in the opinion of the City, is not suitable for reuse, shall be spoiled as specified herein for disposal as unsuitable materials.

2. Select common fill shall be as specified above for common fill except that the material shall contain no stones larger than 1 ½ inches, and shall be no more than five (5) percent by weight finer than the No. 200 mesh sieve.

3. Bedding rock shall be 3/16-inch to ¾-inch washed and graded stone (FDOT #67). This stone shall be graded so that 100 percent will pass a ¾-inch screen and 95 to 100 percent will be retained on a No. 8 screen.

4. Sand Bedding shall be an inorganic, non-plastic granular soil containing less than 5% material passing the No. 200 sieve and 100% passing a No. 4 sieve.
E. All sheeting, shoring and bracing of excavations will be in accordance with the Florida Trench Safety Act. The Contractor will be responsible for design and selection. Structural plans for the sheet piling installation and the calculations for the required Section Modulus and the Sheet Piling Designation shall be prepared by a Professional Engineer registered in the State of Florida. Sealed plans shall be submitted to the Engineer of Record for approval prior to installation of the piling system.

F. The Contractor shall excavate, construct and place all pipelines, concrete work, fill, and bedding rock, in-the-dry. In addition, the Contractor shall not make the final 24 inches of excavation until the water level is a minimum of one (1) foot below proposed bottom of excavation. For the purpose of these specifications, "in-the-dry" is defined to be within two (2) percent of the optimum moisture content of the soil. The City reserves the right to ask the Contractor to demonstrate that the water level is a minimum of one (1) foot below the proposed bottom of excavation before allowing the construction to proceed.

G. The Contractor shall keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations. Dewatering shall at all times be conducted in such a manner so as to preserve the natural undisturbed bearing capacity of the subgrade soils at the proposed bottom of the excavation. During backfilling and construction, water levels shall be measured in observation wells located as directed by the City. Continuous pumping will be required as long as water levels are required to be below natural levels.

H. Discharge water shall be clear with no visible soil particles. Discharge from dewatering shall be disposed of in such a manner that it will not interfere with the normal drainage of the area in which the work is being performed, create a public nuisance, or cause ponding. The operations shall not cause injury to any portion of the work completed or in progress, or to the surface of streets, or to private property. The dewatering operation shall comply with the requirements of appropriate regulatory agencies. Additionally, where private property will be involved, advance permission shall be obtained by the owner.

I. Excavation consists of removal, storage and disposal of material encountered when establishing required grade elevations. Authorized earth excavation includes removal and disposal of pavements and other obstructions visible on the ground surface, underground structures and utilities indicated to be demolished and removed, and other materials encountered that are not classified as rock excavation or unauthorized excavation. Unauthorized excavation consists of removal of material beyond the limits needed to establish required grade and subgrade elevations without specific direction of the City. Unauthorized
excavation, as well as remedial work directed by the City shall be at the Contractor’s expense. Such remedial work shall be performed as directed by the City.

J. If requested by the City, when excavation has reached required subgrade elevations, a Geotechnical/Soils Engineer shall make an inspection of conditions. If the subgrade is unsuitable, the Contractor shall carry the excavation deeper and replace excavated material with select common fill or bedding rock, as directed by the City. If the Contractor excavates below grade, through error or for his own convenience or through failure to properly dewater the excavation or disturbs the subgrade before dewatering is sufficiently complete, he may be directed by the City to excavate below grade and refill the excavation using select common fill or bedding rock.

K. Slope sides of excavations shall comply with local codes and ordinances, and with OSHA requirements. The Contractor shall shore and brace where sloping is not possible due to space restrictions or the stability of the material excavated. Sides and slopes shall be maintained in a safe condition until completion of backfilling. The Contractor shall stockpile satisfactory excavated materials at a location approved by the City until required. When needed in the work, material shall be located and graded at the direction of a Geotechnical/Soils Engineer. Stockpiles shall be placed and graded for proper drainage. All soil materials shall be located away from the edge of excavations. All surplus and/or unsuitable excavated material shall be legally disposed of by the Contractor. Any permits required for the hauling and disposing of this material shall be obtained by the Contractor prior to commencing hauling operations.

1. Excavation for Structures: All such excavations shall conform to the elevations and dimensions shown on the Drawings within a tolerance of plus or minus 0.10 feet and extending a sufficient distance from the footings and foundations to permit placing and removing formwork, installation of services and other construction, inspection or as shown on the Drawings. In excavating for footings and foundations, care shall be exercised not to disturb the bottom of the excavation. Bottoms shall be trimmed to required lines and grades to leave a solid base to receive concrete.

2. Trench Excavation: Excavation for all trenches required for the installation of utility pipes shall be made in accordance with this manual and in such a manner and to such widths as will give suitable room for laying the pipe within the trenches, for bracing and supporting, and for pumping and drainage facilities.

3. The bottom of the excavations shall be firm and dry and in all respects acceptable to the City. Excavation shall not exceed normal trench width as specified in this manual. Any excavation which exceeds the normal
trench width shall require special backfill requirements as determined by
the City.

L. Material placed in fill areas under and around structures shall be deposited within
the lines and to the grades shown on the Drawings or as directed by the City,
making due allowance for settlement of the material. Fill shall be placed on only
properly prepared surfaces which have been inspected and approved by the City.
If sufficient select common or common fill material is not available from
excavation on site, the Contractor shall provide fill as may be required.

M. Fill shall be brought up in substantially level lifts starting in the deepest portion of
the fill. The entire surface of the work shall be maintained free from ruts and in
such condition that construction equipment can readily travel over any section.
Fill shall be placed and spread in layers by a backhoe or other approved method.
Prior to the process of placing and spreading, all materials not as specified under
Section 2.18D shall be removed from the fill sites.

N. Before compaction, material shall be moistened or aerated as necessary to provide
the optimum moisture content. Material which is too wet shall be spread on the
fill area and permitted to dry, assisted by harrowing if necessary, until moisture
content is reduced to allowable limits. If added moisture is required, water shall
be applied which will insure uniform distribution of the water over the area to be
treated, and give complete and accurate control of the amount of water to be used.
If too much water is added, the area shall be permitted to dry before compaction is
continued. The Contractor shall compact each layer to the required percentage of
maximum dry density or relative dry density in accordance with Section 2.18,O.
Fill under and around structures, shall be compacted in 6-inch layer to a minimum
density 95 percent of the maximum dry density as determined by AASHTO T-
180. If the compacted surface of any layer of material is determined to be too
smooth to bond properly with the succeeding layer, it shall be loosened by
harrowing or by another approved method before the succeeding layer is placed.

O. When backfilling utility trenches, the Contractor shall control soil compaction
during construction to provide the percentage of maximum density specified. The
Contractor shall provide the City with copies of all soils testing reports, prepared
by a Geotechnical/Soils Engineer, demonstrating compliance with this Manual.
When the existing trench bottom has a density less than that specified under
Section 2.18,O,1, the Contractor shall break up the trench bottom surface,
pulverize, moisture-condition to the optimum moisture content, and compact to
required depth and percentage of maximum density.

1. Percentage of Maximum Density Requirements

a. Select backfill material shall be placed under and around the pipe
to one foot above the crown (or to two feet above crown for PVC
gravity sewers) in 6-inch layers. Each layer shall be thoroughly
compacted to at least 90 percent of maximum density as defined by AASHTO Standard No. T-180. The material in the ditch may be compacted by either hand tamper or a mechanized power tamper, provided the results obtained meet the continued approval of the City. Particular attention and care shall be exercised in obtaining thorough support for the branch of all service connection fittings. Care shall be taken to preserve the alignment and gradient of the installed pipe.

b. Backfilling and compacting of material lying above a point one foot (or two feet for PVC pipe), above the crown of the pipe and below the pavement base or the surface of the ground, if out of pavement, shall be accomplished in layers not exceeding 8 inches in thickness. Each layer shall be thoroughly compacted with a powered hand tamper or a mechanized power tamper to at least 98 percent of maximum density as determined by AASHTO Specification T-180 or such greater density as may be required by the governing authority over the area in which the work is performed. A testing laboratory will make periodic field tests to determine the density being obtained in each lift, or layer, or the backfill.

c. When compacted backfill fails to meet the specified percentage of maximum density as shown by test results, it shall be reworked and recompacted, and then retested. The reworking, recompacting and retesting of the backfill shall be repeated as many times as may be necessary to obtain compacted backfill with density meeting or exceeding the specified percentage as indicated by test results.

2. One (1) compaction test location shall be required for each 200 linear feet of pipe and for every 500 square feet of backfill around structures as a minimum. The City may determine that more compaction tests are required to certify the installation depending on field conditions. The locations of compaction tests within the trench shall be in conformance with the following schedule:

a. One (1) test at the spring line of the pipe.

b. At least one (1) test for each layer of backfill within the pipe bedding zone for pipes 24 inches and larger.

c. One (1) test at an elevation of one (1) foot above the top of the pipe (or two feet for gravity sewers).

d. One (1) test for each layer of backfill placed from one (1) foot above the top of the pipe to finished grade elevation.
P. All areas within the limits of construction, including transition areas, shall be uniformly graded to produce a smooth uniform surface. Areas adjacent to structures or paved surfaces shall be graded to drain away from structures and pavement. Ponding shall be prevented. After grading, the area shall be compacted to the specified depth and percentage of maximum density. No grading shall be done in areas where there are existing pipelines that may be uncovered or damaged until such lines have been relocated.

Q. The Contractor shall protect newly graded areas from traffic and erosion and keep them free of trash and debris. The Contractor shall repair and reestablish grades in settled, eroded and rutted areas. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, the Contractor shall scarify the surface and reshape and compact it to the required density prior to further construction.

R. Quality control testing shall be performed during construction to ensure compliance with the requirements of this Manual. The Contractor shall allow the testing service to inspect and approve fill materials and fill layers before further construction is performed. The Contractor shall give copies of all test results in a report form to the City to demonstrate compliance with the compaction requirements stipulated in this Manual.

S. The Contractor shall examine the areas and conditions under which excavating, filling and grading are to be performed, and not proceed with the work until unsatisfactory conditions have been corrected. The Contractor shall examine the existing grade prior to the commencement of work and report to the City if the elevations of existing grades vary from the elevations shown on the Drawings.

T. All work shall be performed in compliance with applicable requirements of governing authorities having jurisdiction. The Owner/Contractor, at his expense, shall engage soil testing and inspection services for quality control testing during earthwork operations. The testing and inspection service shall be subject to the approval of the City.

2.19 MATERIAL REQUIREMENTS

A. GENERAL

Materials referred to by brand name in this section of this Manual represent specific requirements of the City. If desired, requests for substitutions of specified materials shall be made in writing to the City prior to construction. Determination of the equality of the substitute materials will be at the sole discretion of the City. All equipment and materials to be installed shall be new and unused.
1. All materials and chemicals in contact with potable water shall be NSF approved. All pipes and fittings for water, wastewater and storm sewer systems shall be clearly marked with the name or trademark of the manufacturer, the batch number, pipe size, the location of the plant and the strength designation, as applicable.

2. Ductile Iron (DI) Piping:

   a. Pipe shall be in accordance with ANSI/AWWA Standards A21.50/C-150 and A21.51/C-151. The minimum pressure Class shall be as shown in table 2-1 below, unless heavier class required for design conditions.

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<thead>
<tr>
<th>Size</th>
<th>Pressure Class</th>
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<tbody>
<tr>
<td>4</td>
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   Note: 10-inch, 14-inch and 18-inch DI pipes are not acceptable.

   The Pressure Class for pipe greater than 24-inches will be designated case by case, based on actual design conditions and in accordance with ANSI/AWWA Standards A21.50/C-150 and A21.51/C151.

   b. Ductile iron pipe fittings shall conform to ANSI Standard A21.10 or A21.53 and AWWA C-110 or C-153. A 250-psi minimum pressure rating is required.

   c. Joints:


      ii. Restrained joint ductile iron pipe and fittings shall be constructed using pipe and fittings with restrained "locked-
type" joints manufactured by the pipe and fitting manufacturer and the joints shall be capable of withstanding withdrawal at the specified test pressure. Any restrained joints that allow for elongation upon pressurization will not be allowed. Restrained pipe joints that achieve restraint by incorporating cut out sections in the wall of the pipe shall have a minimum wall thickness at the point of cut out that corresponds with the minimum specified wall thickness for the rest of the pipe.

iii. Flexible type joints shall be of the boltless type, with a joint deflection of up to 15 degrees, and shall be specifically designed for flexible joint use.

iv. Flanged connections shall be in accordance with ANSI Standard B16.1, 125 lb. and shall have full faced type rubber gaskets 1/8-inch thick. Bolts and nuts shall be Grade B conforming to the ASTM Designation A307, for Steel Machine Bolts and Nuts and Tap Bolts.

v. Restraining devices may be substituted for the restrained "locked-type" joints manufactured by the ductile iron pipe and fitting manufacturer. Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 (Brinnell Hardness Number) BHN. Dimensions of the gland shall be such that the gland can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI A21.11 and ANSI/AWWA C-153/A21.53. Twist-off nuts shall be used to insure proper actuating of the restraining devices. The mechanical joint restraint device shall have a working pressure of at least 250psi with a minimum safety factor of 2:1.

vi. Thrust blocks shall be permitted only where approved by the City.
d. Coatings:

i. Ductile iron pipe and fittings for underground service shall receive an exterior bituminous coating of coal tar varnish or asphalt base paint, 1.0-mil film thickness in accordance with ANSI/AWWA A21.51/C-151.

ii. Exposed ductile iron pipe and fittings shall receive a SSPC-SP6 commercial blast cleaning followed by a factory applied exterior coating of a rust inhibitive primer, 6.0 mils DFT minimum, compatible with the finish. All field touch-up shall be done using the same paint as used for the prime coat. The finished coat shall be a durable two-component, high solids, surface tolerant polyamide cured epoxy coating. Final color shall be blue for potable water and green for wastewater, unless otherwise directed by the City.

2. Polyvinyl Chloride (PVC) Piping:

a. Potable water and wastewater force main pipe 4 inch through 12 inch, shall be manufactured from clean virgin Type I, Grade I rigid, unplasticized polyvinyl chloride resin conforming to ASTM Designation D1784, shall have the National Sanitation Foundation (NSF) seal, shall conform to AWWA C-900, and shall have a dimension ratio (DR) of not more than 18. PVC pipe shall be blue in color. The PVC pipe shall have integral bell push on type joints conforming to ASTM D3139. Fittings used with PVC shall conform to 2.19, A, 2 of this Section.

b. All PVC pipe and accessories less than four (4) inches in diameter shall be solvent weld Schedule 80 and shall be of rigid normal impact polyvinyl chloride. The pipe and accessories shall conform to ASTM Specification D1785 and Product Standard PS21-70.

B. JACK AND BORE INSTALLATION:

1. Steel casings shall conform to the requirements of ASTM Designation A139 (straight seam pipe only) Grade “B” with a minimum yield strength of 35,000 psi. The casing pipes shall have the minimum nominal diameter and wall thickness as shown in Table 2-2.
Table 2-2

<table>
<thead>
<tr>
<th>Nominal Carrier Pipe Diameter (inches)</th>
<th>Minimum Casing Diameter (inches)</th>
<th>Minimum Wall Thickness (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>12</td>
<td>0.250</td>
</tr>
<tr>
<td>6</td>
<td>16</td>
<td>0.250</td>
</tr>
<tr>
<td>8</td>
<td>20</td>
<td>0.250</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>0.250</td>
</tr>
<tr>
<td>12</td>
<td>24</td>
<td>0.250</td>
</tr>
<tr>
<td>16</td>
<td>30</td>
<td>0.312</td>
</tr>
<tr>
<td>20</td>
<td>36</td>
<td>0.375</td>
</tr>
<tr>
<td>24</td>
<td>42</td>
<td>0.500</td>
</tr>
<tr>
<td>30</td>
<td>48</td>
<td>0.500</td>
</tr>
<tr>
<td>36</td>
<td>54</td>
<td>0.500</td>
</tr>
<tr>
<td>42</td>
<td>60</td>
<td>0.500</td>
</tr>
<tr>
<td>48</td>
<td>72</td>
<td>0.500</td>
</tr>
</tbody>
</table>

2. Field and shop welds of the casing pipes shall conform with the American Welding Society (AWS) standard specifications. Field welds shall be complete penetration, single-bevel-groove type joints. Welds shall be airtight and continuous over the entire circumference of the pipe and shall not increase the outside pipe diameter by more than 3/4 inch.

3. The carrier pipe shall be the pressure Class ductile iron pipe as identified in Section 2.19 of this Manual with restrained joints.

4. The carrier pipe shall be supported within the casing pipe so that the pipe bells do not rest directly on the casing. The load of the carrier pipes shall be distributed along the casing pipe with Teflon skids. All nuts and bolts shall be high strength, low alloy meeting AWWA C-111. Runners shall be made of a high molecular weight polymer with inherent high abrasion resistance and a low coefficient of friction. Bonding straps and clamps shall be 1/32 inch thick by 1 1/4 inch wide, minimum. Spacers shall be installed 7 feet or less, on center.

C. SPECIAL ITEMS:

1. Expansion Joints: Pipe expansion joints shall be suitable for the applicable service with a minimum 150-psi working pressure.

2. Flanged Coupling Adapters: Units shall be compatible with ANSI Standard B16.1, 125 lb. flanges.
3. **Cast Iron Sleeves and Wall Pipes:** Units shall have integral annular ring water-stops, and also conform to other requirements for cast iron fittings specified in this section. Sleeves and wall pipes to have laying length and ends required for proper installation.

4. **Tapping Saddles:** Units shall be fabricated of ductile iron in accordance with ASTM A536, and suitable for either wet or dry installation for connections three (3) inches or less. Ductile iron body shall have a fusion bonded epoxy or nylon coating with a minimum thickness of 12 mils. The sealing gasket shall be the "O-Ring" type suitable for the applicable service. The outlet flange shall be ANSI B16.1, 125 lb. standard. Tie straps and bolts shall be of type 316 stainless steel. The gasket material shall be an elastomeric compound resistant to degradation by oil, natural gas, acids, alkalies, aliphatic fluids, and chloramines.

5. **Tapping Sleeves and Valves:** Units shall be of the ductile iron for pressure connections four (4) inches and larger. All taps shall utilize mechanical-joint sleeves.

   a. **Sleeves for taps four (4) inches and larger shall be either cast iron, mechanical joint type or stainless steel, as further defined below.**

      i. **Stainless steel sleeves may be used on less than full diameter taps.** Stainless steel tapping sleeves shall be all 304 stainless steel, including flanges, bolts and nuts and shall be rated for 150 psi minimum operating pressure and 200 psi minimum test pressure. The tapping sleeve shall have a pilot flange recessed for tapping per MSS SP-60. The pilot flange shall be pressure rated Class D according to AWWA C207 with 125 pound drilling conforming to ANSI B16. Each sleeve shall be supplied with a flange gasket bonded to the flange. The body gasket shall be a full circle, grid pattern, covering the entire length of the sleeve, cloth reinforced, with attached stainless steel bridge to support the gasket at the lugs. The gasket shall be made of SBR rubber or similar material, compounded for use with water, salt solution, mild acids, bases and sewage. The sleeve shall have a 3/4 inch NPT bronze or stainless steel test plug. All welds shall conform to ASTM A380 and shall be fully passivated.

      ii. **Cast iron sleeves shall be used where the tap is equal to the diameter of the tapped pipe, as directed by the City, or at the option of the Contractor.** Sleeves shall be of the mechanical joint type having a flat faced cast iron flange,
recessed for a tapping valve. All end and side gaskets shall be totally confined. The throat section of tapping sleeves through twelve inch size shall conform to MSS-SSP6-60. Test plug shall be provided on the outlet throat.

b. Tapping gate valves shall comply with AWWA Standard C500 latest revision. The valve port shall be free and full to allow for unobstructed flow. All gate valves are to be iron body, bronze, mounted, double disc, resilient seat nonrising stem, parallel fit type, opening left (counter clockwise). Non-geared valves shall be furnished with "O" ring packing (two (2) "O" rings).

6. Polyethylene Encasement: Encasement shall have a minimum thickness of eight (8) mils and comply with the applicable provisions of ANSI/AWWA C-105/A21.5, "Polyethylene Encasement for Gray and Ductile Iron Piping for Water and Other Liquids."

D. VALVES
1. The valve type, size, rating, flow direction arrow if applicable, and manufacturer shall be clearly marked on each unit. Valves shall open left (counterclockwise), with an arrow cast in the metal of the operating handwheels and nuts indicating the direction of opening.

E. VALVE BOXES - ASTM A48, Class 30

1. Valve boxes shall be of the heavy duty, traffic bearing cast iron, adjustable screw type with a drop cover. The valve box assembly shall consist of a bottom section, top section and cover which is cast from gray iron, formulated to ASTM specification A-48 latest revision, class 30 minimum and shall be free from blowholes, shrinkage or other imperfections not true to pattern. The shaft size shall be 5 1/4" and the adjustable length shall be from 18" to 24". The wall thickness shall be 3/16" + 1/16". The weight of the assembly shall be 61 pounds + 2 pounds, with the cover weight being a minimum of 12 pounds.

2. The name of the manufacturer and foundry of origin shall be cast into each of the components of the assembly in legible form. The assembly shall be suitable for highway traffic wheel loads of 16,000 pounds and shall withstand a proof test of 25,000 pounds without failure or permanent deflection, as per Federal Specification RR-F-621-C, latest version.

3. Covers shall be cast with the applicable inscription in legible lettering on the top, "sewer" or "water", depending on the intended application.
F. COLOR CODING

1. Detector Tape (4 mils min. thickness) shall be placed 18 inches above all pipes during pipe installation/backfilling. Metalized Detector Tape shall be utilized for non-metallic pipe and shall be one layer of metalized foil laminated between two layers of inert plastic film (minimum 5.5 mils thickness). Tapes shall be of the color and marked as follows:
   a. Water Lines – Blue continuously marked “Caution, Water Line Buried Below”
   b. Sanitary Gravity Sewers - Green continuously marked “Caution, Sanitary Gravity Sewer Buried Below”
   c. Wastewater Force Mains – Green continuously marked “Caution, Wastewater Force Main Buried Below”
   d. Irrigation Lines – Purple continuously marked “Caution, Irrigation Line Buried Below.”

2. All above ground pipe and fitting, valve boxes, air release valve covers, and any other marking device, shall be color coded in accordance with the Utility Location and Coordination Council Uniform Color code, which is as follows:

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Electrical power line, cable, conduit, and lighting cable</td>
</tr>
<tr>
<td>Yellow</td>
<td>Gas, oil, steam, petroleum or gaseous materials</td>
</tr>
<tr>
<td>Orange</td>
<td>Communication, telephone, alarm, or signal lines, cable, or conduit</td>
</tr>
<tr>
<td>Blue</td>
<td>Water Lines</td>
</tr>
<tr>
<td>Green</td>
<td>Gravity Sewer Lines, Wastewater Force Mains</td>
</tr>
<tr>
<td>Purple</td>
<td>Irrigation Lines</td>
</tr>
</tbody>
</table>

2.20 DIRECTIONAL BORING

A. GENERAL REQUIREMENTS:

1. Prior to beginning work, the Contractor must submit to the City a work plan detailing the procedure and schedule to be used to execute the project. The work plan should include a description of all equipment to be used, down-hole tools, a list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable), list of subcontractors, a schedule of work activity, a safety plan (including MSDS of any potentially hazardous substances to be used), traffic control plan (if applicable), an environmental protection plan and contingency plans for possible problems. Work plan should be...
2. Contractor shall submit specifications on directional drilling equipment. Equipment shall include but not limited to: drilling rig, mud system, mud motors (if applicable), down-hole tools, guidance system, and rig safety systems. Calibration records for guidance equipment shall be included. Specifications for any drilling fluid additives that Contractor intends to use or might use shall be submitted.

3. Specifications on materials to be used shall be submitted. Materials shall include the pipe, fittings and any other item which is to be an installed component of the project.

4. The Contractor shall furnish the City with copies of his site surface and subsurface (soil borings) examination data prior to starting work.

5. The Contractor shall perform directional drilling in accordance with an approved drilling method. The drilling method and sequencing of the drill shall be submitted by the Contractor at least 10 working days before the scheduled pre-construction meeting. The Contractor shall also submit, for approval, the proposed layout drawings, drilling method, along with his proposed crossing(s) configuration, including entry and exit angles, radius of curvature, and entry and exit points.

6. All work performed within the right-of-way of Florida Department of Transportation (FDOT), South Florida Water Management District, railroad company or other governing agencies’ right-of-ways shall comply with all requirements and conditions of the governing authority, permit requirements and all requirements and conditions of these specifications.

B. EXECUTION

1. The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the crossing, a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be re-used, a guidance system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle the drilling fluid volume, trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.
2. The drill head shall be steerable by changing its rotation and shall provide the necessary cuffing surfaces and drilling fluid jets.

3. Mud Motors (if required) shall be adequate power to turn the required drilling tools.

4. Drill pipes shall be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tool joints should be hardened to 32-36 RC.

5. Drilling fluid shall be composed of clean water and appropriate clay additives. Water shall be from an authorized source with a pH of 8.5-10. Water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. The water and additives shall be mixed thoroughly and be absent of any clumps or clods. No potentially hazardous material may be used in drilling fluid.

C. PIPE AND FITTINGS - HIGH DENSITY POLYETHYLENE (HDPE)

1. High density polyethylene (HDPE) pipe used in directional drilling shall be smooth wall, Type III, Class C, Category 5, Grade P 34; PE 3408; as defined in ASTM D1248. Minimum cell classification, as given by ASTM 3350, shall be PE 335434C. Pipe shall meet the standards of ASTM F714, as modified herein, including the "Governmental/Military Procurement" sections. Minimum hydrostatic design basis shall be 1600 psi. In all cases, hydrostatic design basis and pressure rating shall be as determined using the methods of ASTM F714. Pipe of this type shall be butt-fusion welded at joints. All welding of pipes shall be in strict conformity with the recommendations of the pipe manufacturer and performed by a firm or individual approved by the manufacturer.

2. As a part of the shop drawing submittals, the Contractor shall furnish, signed by a Florida Registered Engineer, all calculations to determine, the pipe thickness, SDR rating, allowable stresses, in accordance with ASME B31.8, Table A842.22 and recommended coating, as required by the manufacturer.

3. The Contractor will hydrostatically test the pipe after pullback to ensure its integrity. A calibrated pressure recorder shall be used to record the pressure during the test period. This record shall be presented to the Engineer of Record and made available to the City. The Contractor shall provide as-built drawings reflecting actual installation.
2.21 AERIAL CROSSINGS

A. Aerial crossings shall be in accordance with all requirements of the permitting agency having jurisdiction over the work area, and as approved by the City.

B. All steel pipes shall be furnished with an Affidavit of Compliance certifying that the pipe complies with the requirements specified herein and AWWA Standard C200. No project containing the pipe described below will be accepted until such certificates have been submitted to and approved by the City.

C. Steel pipe shall be of a size and wall thickness sufficient to meet the span requirements with a safety factor of 1.5. In all cases, the wall thickness shall be at least 1/2-inch thick.

D. All steel pipe shall have pipe ends beveled for field butt welding. Steel hub (slip-on) welding type flanges shall be welded to the pipe by the manufacturer where shown on the Plans. The flanges shall be welded to the straight run of steel pipe.
   1. Flanges shall conform to and shall be installed in accordance with AWWA Standard C207, "Steel Pipe Flanges for Waterworks Service-Sizes 4 In. Through 144 In.", for Class E flanges.
   2. The flanges shall have the same drillings and diameters as ANSI Specification B16.1 for Class 125 cast iron flanges, and shall be compatible with the flanges on the abutting pipe or fitting.
   3. After welding, the face of the flanges shall be in a plane normal to the centerline of the pipe. Flange joint materials shall be ANSI sized and approved and shall consist of hot-dip galvanized carbon steel bolts and nuts, and 1/8-inch thick full-faced neoprene gaskets.
   4. A AWWA-thread outlet shall be installed at the high point to receive the air release device.

E. All welding done under this Project shall be performed by operators who are certified by a testing laboratory approved by the Miami-Dade County Building and Zoning Department as qualified to weld downhand and overhead. The Contractor shall furnish proof that his welders are so qualified. Adjacent lengths of steel pipe shall be welded together throughout the circumference of the pipe and the welding shall be performed in accordance with AWWA Standard C206, "Field Welding of Steel Water Pipe". All welding shall be by electric arc with current furnished by an engine-driven generator. The use of motor-driven generators will be permitted if the Contractor furnishes the necessary electric power.
F. In the event that false bents are used to support the steel pipe across the canal during installation, they shall be removed upon completion of the work. Two layers of 30-pound roofing felt shall be attached to the pipe with wire. Prior to the pouring of the saddle supports, forms shall be erected upon which the wrapped pipe shall rest until the support is poured and cured. Then the excess shall be trimmed off leaving only that portion between the concrete saddle and the pipe.

G. Structural supports shall be provided as required by the Engineer to prevent overturning and settlement. The impact of flood waters and debris shall be considered, and the bottom of the pipe shall be placed no lower than that specified by all agencies having jurisdiction or one (1) foot above the 100 year flood elevation, whichever is greater.

2.22 UTILITY NOTIFICATION REQUIREMENTS

A. Prior to commencement of construction, the Contractor shall attend a preconstruction conference which will be held with the City, various utility companies, and other interested parties for the purpose of coordinating the work in accordance with Section 2.03 of the Public Service Department Engineering and Construction Requirements, Volume 1. All parties to this conference should be prepared to discuss any problems anticipated with execution of the work. The time and place of meeting will be set by the City.

B. The Contractor is required to cooperate in order to minimize disruption of activities of other contractors.

2.23 WATER USED IN CONSTRUCTION

A. Water required for the Project shall be furnished by the City at the Contractor's expense. All temporary piping, valves, hoses, equipment and other items required for handling water shall be furnished by the Contractor. Under no circumstance shall the Contractor utilize a water source until such source has been approved for use by the City.

B. The Contractor can obtain a meter through proper application and payment of deposit fee at the City's Office, 17050 NE 19 Avenue, North Miami Beach. The deposit fee will be refunded to the Contractor upon return of the meter in a sound satisfactory condition. The largest meter available is 2-inches NPS. Any additional fees, which may be required by other governmental agencies for utilizing the fire hydrants shall be borne by the Contractor.

2.24 PROJECT CLOSE OUT

A. The Work will not be considered Substantially Complete and the Owner/Contractor may not request a substantial completion inspection, opening or putting a proposed system into operation or acceptance for operation of facilities until the following has been submitted and accepted by the City:
1. As-Built Drawings

a. As-built drawings shall be submitted for all projects where facilities will be conveyed to the City.

b. The Surveyor shall show on the as-built drawings the Florida State Plane Coordinate (current readjustment) of at least two horizontal control points on or parallel to the centerline of a street within the project boundary. The Contractor shall also provide state plane coordinates (current readjustment) for all manholes and valve boxes constructed, modified or installed as part of the project.

c. The City reserves the right to require submittal of record drawings on electronic media.

d. A Bill of Materials (on Department form) shall also be certified as correct by signature and presented at the time of as-built submission. Quantities shown on the Bill of Materials shall match installed and as-built quantities, not quantities proposed, bid or bought nor scaled distances or quantities.

e. As-builts shall include a signed, sealed and dated certification statement by the responsible surveyor or Engineer-of-Record stating the information was obtained under his direction and is true and correct as shown. If signed and sealed by the Engineer-of-Record the certification must also state that the information was collected in the field by a Florida Registered Land Surveyor under his direction.

f. Certified by the Florida Registered Land Surveyor who shall be fully responsible for the accuracy of the as-builts. As-builts may not contain any statement that the information was obtained from another party other than a licensed land surveyor under his direction. (For example, a statement such as "As-built information provided by "Contractor" shall not be permitted).

g. The following shall be submitted as one package in order to be accepted for review by the City:

i. One (1) 4-mil mylar set

ii. Two (2) signed and sealed paper copies.

iii. Two (2) copies of Bill of Materials
Where requested by the permittee and at the discretion of the City, a preliminary "courtesy review" may be conducted. This review will not include mylar sets or signed and sealed drawings.

h. The format and general requirements shall be as follows:

i. Size shall be 24" x 36", except if the original design was approved on a smaller-sized paper.

ii. Format shall be based on the approved construction drawings, and include the cover sheet which indicates that the drawings are "as-built". Also, included shall be all detail sheets.

iii. As-built drawings to be same scale as permit drawings unless otherwise required by utility.

iv. All information shall be drawn in ink.

i. To ensure that as-builts may serve their intended purposes now and in the future, they should be prepared with consideration for quality. The City will consider the following elements to ensure the quality of as-builts.

i. As-builts shall be prepared in a professional manner consistent with common engineering standards for layout, lettering and line-work.

ii. As-built information shall be portrayed in a manner that is readily understandable by someone not familiar with the specific job.

iii. Preparer shall endeavor to present as-built information clearly without "cluttering" the drawing.

iv. Mylars(s) shall not have an overly dark or opaque overall appearance.

B. Prepare three (3) final copies of Operation and Maintenance (O & M) Manuals covering all equipment and systems provided under the Work.

1. Operating and Maintenance manuals will be used for use by City personnel in the operation and maintenance of the various systems.
2. The City shall be furnished with one set of any special tools required for servicing for each type of equipment actual furnished.

3. Prepare data in the form of an instructional manual for use by City's personnel.

4. Format:
   a. Size: 8 1/2 in. x 11 in.
   b. Paper: 20-pound minimum, white, for typed pages.
   c. Text: Manufacturer's printed data or neatly typewritten.
   d. Drawings:
      i. Provide reinforced punched binder tab, bind in with text.
      ii. Fold larger drawings to the size of the text paper.
   e. Provide fly-leaf for each separate product, or each piece of operating equipment.
      i. Provide typed description of product, and major component parts of equipment.
      ii. Provide indexed tabs.
   f. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS" List.
      i. Title of Project
      ii. Identify of separate structure as applicable.
      iii. Identify of general subject matter covered in the manual.

5. Binders:
   b. Maximum ring size: As required (Minimum 1 1/2 inches).
6. Content of Manual:
   a. Neatly typewritten table of contents, arranged in a systematic order.
      i. Contractor, name of responsible principal, address and telephone number.
      ii. A list of each product required to be included, indexed to the content of the volume.
      iii. List, with each product, the name, address and telephone number of:
         1) Subcontractor or installer
         2) Maintenance contractor, as appropriate.
         3) Identify the area of responsibility of each.
         4) Local source of supply for parts and replacement.
      iv. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

7. Product Data:
   a. Include only those sheets which are pertinent to the specific product.
   b. Annotate each sheet to:
      i. Clearly identify the specific product or part installed.
      ii. Clearly identify the data applicable in the installation.
      iii. Delete references to inapplicable information.

8. Drawings:
   a. Supplement product data with drawings as necessary.
      i. Relations of component part of equipment and system.
      ii. Control wiring, schematic wiring, and flow diagram.
b. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.

c. Do not use Project Record Documents as maintenance drawings.

9. Written text, as required to supplement product data for the particular installation:

a. Organize in consistent format under separate headings for different procedures.

b. Provide a logical sequence of instructions for each procedure.

10. Copy of each warranty, bond and service contract issued.

a. Provide information sheet for Department's personnel, give:

   i. Proper procedures in the event of failure.

   ii. Instances which might affect the validity of warranties or bonds.

C. Provide Owner's personnel necessary to operate and maintain equipment installed.

D. In preparation for final acceptance or occupancy, conduct final inspection of exposed interior and exterior surfaces, and of concealed spaces. Remove grease, dust, dirt, rust stains, labels, fingerprints and other foreign materials from finished surfaces. Maintain cleaning operations until project has been finally accepted.

E. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for one (1) year, unless otherwise specified, commencing at the time of final acceptance by the Owner.

1. Prepare in duplicate packets.

2. Format:

   a. Size 8 1/2 inches by 11 inches, punch sheets for standard three (3) post binder.

      i. Fold larger sheets to fit into binders.

   b. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
i. Title of Project.

ii. Name of Contractor.

3. Binders: Commercial quality, three (3) post binder, with durable and cleanable plastic covers and maximum post width of two (2) inches.

END OF SECTION
CALL 48 HOURS BEFORE YOU DIG

IT'S THE LAW!
1-800-432-4770

Sunshine State One Call of Florida, Inc.

NOTES:
1. PRIOR TO BEGINNING ANY WORK, CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES THAT HAVE FACILITIES WITHIN THE CITY'S SERVICE AREA.
2. THE ABOVE STICKER SHALL APPEAR ON THE COVER SHEET OF ALL CONSTRUCTION PLANS SUBMITTED TO THE CITY.
3. COMPLY WITH MIAMI-DADE COUNTY WHITE LINING ORDINANCE.
4" SCHED 40 STEEL PIPE FILLED WITH CONCRETE

COLOR OF FINISH COAT SHALL BE OSHA SAFETY YELLOW

3000 PSI CONCRETE
FENCE DETAIL

NOTE:
1. TRUSS BARS ARE REQUIRED FOR THE FIRST SPAN ON EACH SIDE OF A CORNER POST.
DOUBLE SWING GATE DETAIL

NOTE:
1. TRUSS BARS ARE REQUIRED FOR THE FIRST SPAN ON EACH SIDE OF A CORNER POST.
NOTE:

DETECTABLE IDENTIFICATION TAPE SHALL BE INSTALLED DIRECTLY OVER CENTERLINE OF THE PIPE AT 18-INCHES ABOVE THE PIPE.
3/4” - 9-11 GAUGE FLATTENED
EXPANDED METAL TO COVER FACE
OF GUARD FRAME & SPOT
WELDED TO IT AT 6” O.C. TO ALL
STRAPS & ANGLES

3"2"x3/8” STEEL
ANGLE (5) REQ’D.

1. ENTIRE GUARD ASSEMBLY TO BE HOT-DIP
   GALVANIZED AFTER FABRICATION.

2. CENTER ANGLES ON 4” STEEL STRAP.

3. THE DEPARTMENT PREFERENCES A 2' WIDE
   X 3' HINGED OPENING WITH LATCH FOR PADLOCK.
   CENTER OVER PIPE.

NOTES:

<table>
<thead>
<tr>
<th>&quot;A&quot;</th>
<th>&quot;B&quot;</th>
<th>&quot;C&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>12”</td>
<td>52”</td>
<td>3”</td>
</tr>
<tr>
<td>16”</td>
<td>60”</td>
<td>3”</td>
</tr>
<tr>
<td>20”</td>
<td>45”</td>
<td>3”</td>
</tr>
<tr>
<td>24”</td>
<td>45”</td>
<td>3”</td>
</tr>
<tr>
<td>30” &amp; LARGER</td>
<td>45”</td>
<td>5”</td>
</tr>
</tbody>
</table>

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

PIPE GUARD
(12” PIPE & LARGER)

Date: Nov. 2000  Scale: N.T.S.  Dwg: F308  Fig: 220
7/8" DIA. DRILLED HOLE

MAY BE BENT AS SHOWN OR WELDED & GROUND SMOOTH

3/4" LOCK WASHER (316 STAINLESS STEEL)

3/8"x4" STEEL STRAP

3/4"x 2-1/2" 316 STAINLESS STEEL

1-1/2"

1-1/8"

1/2"

3/8"

1"

2"

1"
A M possibilité COVER FOR LATERAL NOT CROSSING CENTERLINE.

B WATER METER SHALL BE PLACED AS SHOWN ABOVE.

C MAINTAIN 18" MIN. VERTICAL CLEARANCE AT ALL TIMES.

REF: NATIONAL ELECTRICAL CODE 1990 HANDBOOK, SEC. 225.18 & SEC. 230.24(b).

NOTES

1. ALL CONSTRUCTION OR ADJUSTMENT OF UNDERGROUND UTILITIES MUST BE COMPLETED BEFORE FINAL ASPHALTIC CONCRETE SURFACE MAY BE PLACED.

2. ON STREETS WITH CURB & GUTTER, PLACE UTILITY POLES AT THE R/W LINE AND FIRE HYDRANTS IN ACCORDANCE WITH FIG. 335.

R/W WIDTH | SEWER & WATER MAIN OFFSETS
---|---
50' | 12'
60' | 15'
70' | 17'
NOTES:

1. All main valves shall be located within 18" of tees and crosses or where directed by the city.
2. All sanitary sewer manholes at intersections shall be located at the centerline of the intersecting streets.
3. Fire hydrants at intersections shall be located opposite the P.C. of the R/W line.
4. All underground utilities shall be placed parallel or perpendicular to the centerline of R/W.
5. Locate fire hydrant in accordance with Fig. 335.
NOTES:
1. ALL MAIN VALVES SHALL BE LOCATED WITHIN 18" OF TEES AND CROSSES OR WHERE DIRECTED BY THE CITY.
2. ALL SANITARY SEWER MANHOLES AT INTERSECTIONS SHALL BE LOCATED AT THE CENTERLINE OF THE INTERSECTING STREETS.
3. FIRE HYDRANTS AT INTERSECTIONS SHALL BE LOCATED OPPOSITE THE P.C. OF THE R/W LINE.
4. ALL UNDERGROUND UTILITIES SHALL BE PLACED PARALLEL OR PERPENDICULAR TO THE CENTERLINE OF R/W.
5. LOCATE FIRE HYDRANTS IN ACCORDANCE WITH FIG. 335.

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

UTILITY PLACEMENT WITHIN
PUBLIC RIGHT-OF-WAY
FOR ARTERIAL STREETS

Date: Nov. 2000  Scale: N.T.S.  Dwg: F347A  Fig: 223B
5' WIDE MIN. CONCRETE SLAB

WATER OR SEWER MAIN

AIR RELEASE VALVE *

* FOR SEWER FORCE MAINS ONLY

PLAN

AIR RELEASE VALVE *

RUNNING SURFACE

WATER OR SEWER MAIN

PROFILE

ASPHALTIC CONCRETE WEARING SURFACE

LIMEROCK BASE

2" CLEAR (TYP.)

#4 BARS @ 12" C-C.
EA WAY TOP & BOTT.

COMPACTED FILL

NOTES:

1. REINF. CONCRETE SLAB DESIGNED BY P.E. FOR PIPE DIA.>30".

2. COVER CAN BE 30" MINIMUM FOR PIPE DIA.≤12".

3. 36" MIN. COVER FOR PIPE DIA.>16".

SECTION A–A

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

REINFORCED CONC. SLAB
(FOR GROUND COVER LESS THAN 2.5’)

Date: Nov. 2000  Scale: N.T.S.  Dwg: F307  Fig: 230

Date  Revisions  Appr. by
24" x 24" x 6"
THICK CONC. PAD
TYP. EACH VALVE BOX.

3" DIA. BRONZE DISC
ANCHORED IN CONC.

2500 P.S.I.
CONCRETE MIN.

VALVE BOX AND
COVER (TYP.)

10' WATER
L-20

3" DIA. BRONZE DISC ANCHORED IN CONC. PAD STAMP AS REQ'D.

UNPAVED | PAVED

3" DIAMETER BRONZE DISC ANCHORED AS SHOWN ABOVE

TOP FLUSH WITH FINISHED GRADE

SOD
8" MAX.

BASE

ASPHALT SURFACE

VALVE BOX AND
COVER (TYP.)

* FOR #2 VALVE BOXES; 15" FOR #3 VALVE BOXES

NOTES:

1. VALVE BOX AND EXTENSION (MDWASD #2) USE U.S. FOUNDRY #7615.
2. USE U.S. FOUNDRY #7630 VALVE BOX AND EXTENSION (MDWASD #3) FOR ALL OTHER VALVE APPLICATIONS.
MINIMUM LENGTH (FT) TO BE RESTRAINED ON EACH SIDE OF FITTING(S). *

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>6&quot;</th>
<th>8&quot;</th>
<th>10&quot;</th>
<th>12&quot;</th>
<th>16&quot;</th>
<th>20&quot;</th>
<th>24&quot;</th>
<th>30&quot;</th>
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<tr>
<td>90° BEND</td>
<td>23</td>
<td>30</td>
<td>36</td>
<td>42</td>
<td>53</td>
<td>63</td>
<td>73</td>
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<td>45° BEND</td>
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<td>15</td>
<td>17</td>
<td>22</td>
<td>26</td>
<td>30</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td>22-1/2° BEND</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>11</td>
<td>26</td>
<td>30</td>
<td>36</td>
<td>19</td>
</tr>
<tr>
<td>11-1/4° BEND</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>PLUG, BRANCH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OF TEE OR DEAD</td>
<td>23</td>
<td>30</td>
<td>36</td>
<td>42</td>
<td>53</td>
<td>63</td>
<td>73</td>
<td>86</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES:

1. FITTINGS SHALL BE RESTRAINED JOINTS UNLESS OTHERWISE INDICATED.

2. INSTALL FULL LENGTH JOINTS WITH TOTAL LENGTH EQUAL TO OR GREATER THAN SHOWN IN THE TABLE.

3. WHERE TWO OR MORE FITTINGS ARE TOGETHER, USE FITTING WHICH YIELDS GREATEST LENGTH OF RESTRAINED PIPE.

4. LENGTHS SHOWN IN THE TABLE HAVE BEEN CALCULATED IN ACCORDANCE WITH THE PROCEDURE OUTLINED IN "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE" AS PUBLISHED BY DIPRA, WITH THE FOLLOWING ASSUMPTIONS:

   WORKING PRESSURE: __150_____ P.S.I.*
   SOIL CONDITIONS: ___SAND / SILT_______ *
   MINIMUM COVER: ___3 FT. *

   ENGINEER OF RECORD SHALL CONFIRM ACTUAL LAYING CONDITIONS AND INCREASE RESTRAINED LENGTHS AS REQUIRED.

5. FOR PIPE ENCASED IN POLYETHYLENE, INCREASE THE GIVEN VALUE BY A FACTOR 1.5.

6. ALL FITTINGS AND PIPE JOINTS 6″ OR SMALLER MAY BE RESTRAINED USING THRUST BLOCKS. ALL OTHERS MUST BE RESTRAINED AS FOLLOWS:

   JOINT               RESTRAINT
   PUSH-ON PVC         EBAE IRON SERIES 2800 HARNESS
   PUSH-ON DIP         TR-FLEX BY U.S. PIPE OR FLEX RING BY AMERICAN
   FITTINGS WITH DIP   EBAE IRON SERIES 1100 MEGALUG
   FITTINGS WITH PVC   EBAE IRON SERIES 2000 MEGALUG
### Typical Section

**Notes:**
1. Thrust block bearing areas shall be poured against undisturbed material, where trench wall has been disturbed, excavate all loose material and extend to undisturbed material.
2. Extend thrust block full length of fittings. Joints shall not be covered by thrust blocks. Fittings shall be protected by polyethylene film (8 mil) prior to placing concrete thrust block.
3. Rough blocking forms shall be used along sides of thrust blocks, as required.
4. Thrust blocks shall be used in combination, as required, to suit the specific fitting arrangement.
5. Alternate designed restraining systems shall be provided where standard thrust blocking is not suitable and/or soil resistance bearing is less than 1500 psf.
6. All wood blocking shall be pressure treated with preservative.
7. For Pipe 8" or larger, thrust block may only be used where approved by the city.
8. Soil type: Good sand
9. Laying conditions: Type 2, Standard ANSI/AWWA C150/A21.50
10. Hydrostatic test pressure: 150 psi
11. Depth of cover: 2.5 ft.
12. Lengths listed here are based on Class 50 D.I.P.

<table>
<thead>
<tr>
<th>Pipe Size (Inches)</th>
<th>BEND 90° (SQ FT)</th>
<th>BEND 45° (SQ FT)</th>
<th>BEND 22-1/2° (SQ FT)</th>
<th>BEND 11-1/4° (SQ FT)</th>
<th>TEE &amp; PLUG (SQ FT)</th>
<th>Design Press (PSI)</th>
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</thead>
<tbody>
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<td>4.0</td>
<td>2.2</td>
<td>1.1</td>
<td>0.6</td>
<td>2.8</td>
<td>150</td>
</tr>
<tr>
<td>8</td>
<td>7.1</td>
<td>3.8</td>
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<td>1.0</td>
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<td>150</td>
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<tr>
<td>10</td>
<td>11.1</td>
<td>6.0</td>
<td>3.1</td>
<td>1.5</td>
<td>7.9</td>
<td>150</td>
</tr>
<tr>
<td>12</td>
<td>16.0</td>
<td>8.7</td>
<td>4.4</td>
<td>2.2</td>
<td>11.3</td>
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<td>21.8</td>
<td>11.8</td>
<td>6.0</td>
<td>3.0</td>
<td>15.4</td>
<td>150</td>
</tr>
<tr>
<td>16</td>
<td>28.4</td>
<td>15.4</td>
<td>7.8</td>
<td>3.9</td>
<td>20.1</td>
<td>150</td>
</tr>
</tbody>
</table>

**Note:**
Thrust block areas to be computed on basis of Lb. per sq. ft. soil restraint bearing. (1,500 Min.) See note 3

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**City of North Miami Beach**
**Public Services Department**

**Thrust Block Detail**

<table>
<thead>
<tr>
<th>Date</th>
<th>Revisions</th>
<th>Appr. by</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2000</td>
<td>Scale: N.T.S</td>
<td>Dwg: F107</td>
</tr>
</tbody>
</table>
NOTES:

1. FOR EXCAVATION AND BACKFILL AROUND MANHOLES, APPURTEYNANCES, OR IN WATER, REFER TO PROVISIONS WITHIN THE SPECIFICATIONS.

2. UNLESS OTHERWISE SPECIFIED, BEDDING MATERIAL SHALL CONSIST OF SELECT BACKFILL MATERIAL 2” MAX. SIZE, OR WASHED AND GRADED LIMESTONE (3/8” – 7/8”), COMPACTED TO AT LEAST 90% OF MAX. DENSITY, 6” LIFTS, PER AASHTO SPEC. NO. T-180.

3. WHERE REQUIRED, SHEETING AND SHORING SHALL BE IN ACCORDANCE WITH SPECIFICATION.

4. WHERE UNSTABLE SOILS ARE ENCOUNTERED, INCLUDING PEAT, MUCK OR OTHER ORGANIC SOILS, ELASTIC SILT AND CLAYS, A FOUNDATION IS REQUIRED, COMPACTED TO AT LEAST 90% OF MAX. DENSITY, 6” LIFTS. FOUNDATION MATERIAL SHALL BE SELECT BACKFILL MATERIAL, 2” MAXIMUM SIZE, 6” LIFTS. EXTEND EXCAVATION UNTIL A SUITABLE MATERIAL IS FOUND.
NOTES:
1. (*) 15" MAX. FOR PIPE DIAMETER LESS THAN 24", AND 24" MAX. FOR PIPE DIA. 24" AND OVER.
2. "D" REFERS TO THE DIAMETER OF THE PIPE.
3. "T" REFERS TO THE THICKNESS OF THE PIPE.
4. USE OF CONCRETE ARCH HALF ENCASEMENT OR FULL ENCASEMENT TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE CITY.
5. REFER TO SECTION 2.18-E OF THE UTILITY AND ENGINEERING STANDARDS MANUAL FOR SHEETING AND BRACING IN EXCAVATIONS.
NOTES:

1. WHEN CONSTRUCTION IS WITHIN FDOT OR RAIL ROAD JURISDICTION, ADDITIONAL REQUIREMENTS OF THE UTILITY ACCOMMODATION MANUAL SHALL BE MET.

2. CASING SHALL BE OF SUFFICIENT LENGTH TO EXTEND UNDER ALL PAVEMENTS AND IN NO CASE SHALL THE END OF THE CASING BE CLOSER THAN EIGHT (8) FEET FROM THE PAVEMENT EDGE INCLUDING PAVED SHOULDERS PLUS ADDITIONAL LENGTH AS NECESSARY TO EXTEND TO THE_excavated slopes of the jacking and receiving pits.

3. CONTRACTOR SHALL MAINTAIN A MINIMUM OF A 2:1 SLOPE (ANY STEEPER AND PIT MUST BE SHEETED AND SHORED) BEGINNING EIGHT (8) FEET FROM EDGE OF PAVEMENT.
NOTES
1. DUCTILE IRON M.J. TAPPING SLEEVES SHALL BE USED FOR C.I. OR D.I. PIPE, WHEN MAKING A FULL DIAMETER TAP. WHERE THE TAP IS LESS THAN THE DIAMETER OF THE EXISTING MAIN, A STAINLESS STEEL SLEEVE MAY BE USED.
2. TAP SLEEVE TO BE ROMAC STAINLESS STEEL STYLE (SST) OR JCM 432 FOR A.C OR PLASTIC PIPE.
3. WHEN TAPPING INTO A FORCE MAIN, AFTER COMPLETION OF THE TAPPING OPERATION, A PLUG VALVE SHALL BE INSTALLED AFTER THE TAPPING VALVE.
NOTES:

1. TAPPING SLEEVE TO BE STAINLESS STEEL WHEN TAPPING ASBESTOS CEMENT OR PVC PIPE. SLEEVE SHALL BE ROMAC STYLE SST OR JCM 432.

2. ALL JOINTS TO BE RESTRAINED WITH MEGALUG RETAINER GLANDS.
NOTES:

1. TAPPING SLEEVE TO BE STAINLESS STEEL WHEN TAPPING ASBESTOS CEMENT OR PVC PIPE. SLEEVE SHALL BE ROMAC STYLE SST OR JCM 432.

2. ALL JOINTS TO BE RESTRAINED WITH MEGALUG RETAINER GLANDS.
WATER DISTRIBUTION SYSTEMS
SECTION 3
WATER DISTRIBUTION SYSTEMS

3.01 GENERAL

A. This section sets forth the general requirements for design and installation of potable water distribution systems. Pipe used in water distribution systems shall be either polyvinyl chloride (PVC), or ductile iron (DI) pipe as specified in Section 2 of this Manual.

B. The Owner shall be responsible for all materials furnished, stored and installed until the date of substantial completion. The Owner shall replace, at the Owner's expense, all material found to be damaged or defective. The Owner shall, if requested by the City, furnish certificates, affidavits of compliance, test reports, or samples for any of the materials proposed for installation in the work. All materials delivered to the project site for installation are subject to random testing for compliance with the designated specifications.

C. The Engineer of Record shall submit signed, sealed and dated design calculations with the Drawings. Calculations shall show that the proposed system will have sufficient hydraulic capacity to transport all design flows.

3.02 DESIGN STANDARDS

A. All proposed facilities shall comply with the design and installation requirements as established by the HRS, FDEP, Miami-Dade County, this Manual, and the most recent edition of "Recommended Standards for Water Works" (Ten States Standards).

B. Water mains shall be located in dedicated rights-of-way or utility easements. In general, water mains shall be installed on the North and West side of the right-of-way. All water mains located outside of dedicated rights-of-way shall require a 15-foot easement or larger, as required by the City. In general, water mains shall not be located along side or rear lot lines.

C. Flow demands for design shall be calculated on the basis of the ultimate development as known or projected. The average daily flow for domestic use shall be calculated at the minimum rate of 350 gpd per ERC. Flow demands for commercial, industrial, or other special developments shall be established using Chapter 23 of the City's Code of Ordinances. The minimum design for water distribution systems shall provide for at least 100 percent of the combined maximum day demand rate with the required fire flow for said rate or peak hourly flows, whichever is greater. The Owner's Engineer shall model the City’s complete system (as provided by the City) and the proposed improvements. The
allowable minimum service pressure under said design condition shall be not less than 30 pounds per square inch (psi). However, minimum service pressure under maximum daily flow alone shall not be less than 50 psi. The Owner's Engineer shall submit signed, sealed and dated design calculations with the Drawings for all water distribution projects. The calculations shall show that the water distribution mains will have sufficient hydraulic capacity to transport peak hourly flows and the combination of maximum daily flows and fire flows while meeting a minimum pressure. The Owner may also be required to make improvements to the central water system to maintain minimum standards throughout the system.

1. Maximum daily flow shall be determined by applying a peak factor of 2.5 to the average daily flow calculated above. Peak hour flow shall be determined by applying a peak factor of 4.0 to the average daily flow calculated above.

2. Minimum system requirements for fire flow rates, duration (time) for total flow, as related to the total ultimate maximum-day demand, shall be designed in conformance with the Insurance Services Office Fire Suppression Rating Schedule, Latest Edition, and local, county and state fire code regulations.

3. No water mains shall be smaller than 8-inches, unless otherwise approved by the City.

4. Water mains 12-inch diameter or less may be either ductile iron or PVC, where approved by City. All water mains, larger than 12-inch diameter shall be ductile iron. Mains 3-inch diameter or smaller shall be polyethylene. All pipe and fitting materials shall be in conformance with Section 2 of this manual.

D. Spacing for hydrants located within low density (residential) areas shall in no case exceed 500 feet (measured along the roadway) and shall be connected to 8-inch diameter water mains, which are of satisfactory loop design. Connection to dead-end stubs is acceptable, providing said stub water main is not less than 8 inches in diameter or approved by the City. Hydrants located in commercial, industrial or other high density areas shall be spaced no further than 300 feet apart (measured along the roadway), and shall connect to looped water mains 8 inches in diameter or larger if required by the design flow demand. All hydrants shall be located no less than four (4) and no more than seven (7) feet from the edge of pavement of the adjacent roadway, and no less than four (4) feet from any physical feature which may obstruct access or view of any hydrant. Exact locations of fire hydrants shall be in conformance with local and state fire code regulations. Privately owned hydrants will not be allowed.

E. Valves shall be provided for all branch connections, main ends, fire hydrant stubs or other locations, as required to provide an operable, easily maintained and repaired water distribution system. In-line valves are to be placed so that the
maximum allowable length of water main required to be shut-down for repair work shall be 500 feet in commercial, industrial or high density residential districts, or 800 feet in other areas.

F. In order to provide increased reliability of service, dead ends shall be minimized by making appropriate tie-ins whenever practical, as determined by the City. Where dead end mains occur, they shall be provided with a fire hydrant or blow-off for flushing purposes. Flushing devices shall be sized to provide flows which will provide a velocity of at least 2.5 feet per second in the water main being flushed. No flushing device shall be connected to any sewer.

G. Water mains that are installed in the vicinity of other pipe lines shall meet the horizontal and vertical separations specified by Miami-Dade County and the "Recommended Standards for Water Works” (Ten State Standards).

H. Expansion joints shall be provided between the aerial and buried sections of pipe. Underground valves shall be provided at both ends of the crossing so that the section can be isolated for testing or repair. The valves shall be easily accessible and not subject to flooding. An automatic air release valve shall be installed at the high point of the crossing. Appropriate guards shall be installed at both ends of the crossing to prevent pipe access to the public.

I. It shall be the responsibility of the Owner to obtain all applicable regulatory permits. When the aerial crossing is accomplished by attachment to a bridge or drainage structure, the Owner shall meet all requirements of the agencies that own or have jurisdiction over such structures.

J. Subaqueous crossings shall be designed such that the top of pipe is minimum of five (5) feet below the design cross section of the canal with a 1-foot concrete slab, placed 3.5 feet above the main. The pipe material shall meet appropriate AWWA Standards for use in submerged conditions. Valves and air release valves shall be provided at both ends of the water crossing so that the section can be easily isolated for testing or repair. The valves shall be easily accessible, and not subject to flooding. It shall be the responsibility of the Owner to obtain all applicable regulatory permits, including dredge and fill permits.

K. Methods for air release shall be provided where the water main profile is such that entrapment of air pockets could occur. All dead-end water mains, temporary or permanent, shall be equipped with a manually operated blow-off assembly at the terminus.

L. All water service connections shall be metered. In general, the method of metering will follow the guidelines listed below. However, the Owner's Engineer must obtain approval before finalizing the design of the metering system. No trees or shrubs to be planted within 4 feet of the water meter.
1. Single Family, Duplex, and Multi-Family Subdivisions with Public Rights-of-Way: Each unit shall be individually metered. Individual services shall be installed to the property lines as indicated by the Standard Details.

2. Single Family and Duplex Subdivisions with Private Streets: Individual meters may be permitted if the private streets are designed to City standards and easements are dedicated over the entire private street common areas. In addition, sufficient area must be available to locate water mains, services, and meters.

3. Commercial, Industrial, and Institutional Projects: Each building shall be individually metered and provided with a reduced pressure backflow preventer. Meter(s) shall be located in the public rights-of-way at the property line or within a dedicated easement. Where on-site fire systems are required, a dual system (separate domestic and fire lines) will be required with their respective backflow assemblies. All such projects shall require installation of a fire line double check valve detector assembly backflow preventer device.

4. Irrigation meters: Dedicated irrigation meters may be approved by the City and installed in accordance with the standard details.

5. Meter Installation: All meters will be installed by the City after payment of applicable fees and charges. All meters will be installed underground in an approved meter box. For single family lots, when facing the lot, meters shall be installed on the right side for odd numbered lots and on the left side for even numbered lots. Installation of meters under sidewalks or pavement shall not be permitted.

6. Meter Sizes: The size of all meters shall be approved by the City. The Owner's Engineer shall provide sufficient information on estimated peak flows and low flows as well as fixture counts so that the meter size can be determined.

7. Submetering shall not be permitted.

M. In order to protect the public water supply system from contamination due to cross-connections, the Owner shall install City approved backflow prevention assemblies on all service connections to the City's system in accordance with Section 2.03 of the Public Services Department Engineering and Construction Requirements, Volume 1. The City will determine the degree of hazard and require the appropriate backflow assembly.
3.03 MATERIAL REQUIREMENTS


B. Valves:

1. Gate valves 2 inches and larger shall be resilient seat gate valves manufactured to meet or exceed the requirements of AWWA C-509. The valve body, bonnet, and bonnet cover shall be cast iron and comply with ASTM A126, Class B. The valves shall be non-rising stem with the stem made of cast, forged, or rolled bronze as specified in AWWA C-509. Two (2) stem seals shall be provided and shall be “O-Ring” type. The stem must be independent of the gate. Resilient seat of valve shall be formed by a special corrosion and chloramine resistant, synthetic elastomer (EPDM or equal) which is permanently bonded to and completely encapsulates a cast iron valve disk. The resilient sealing mechanism shall provide zero leakage at the system working pressure when installed with the line flow in either direction. All ferrous surfaces inside and outside shall have a fusion-bonded epoxy coating. All nuts, bolts, washers and springs shall be 316 stainless steel. The valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.

   a. Valves for underground service shall be mechanical joint and shall be equipped with 2-inch square cast iron wrench nuts.

   b. Valves for above ground service shall be flanged and shall be outside screw and yoke (OS&Y), rising stem type. Valves shall have cast iron handwheels or chain operators with galvanized steel chains, as required.

   c. Valves 16 inches and larger shall be equipped with approved gearing actuators with sealed enclosures for buried or submerged service, installed horizontally and shall be furnished by the valve manufacturer. Position indicators shall be furnished as required. Valves shall be additionally equipped as specified under the applicable section of AWWA C-500.

   d. Valves two (2) inches and smaller shall be bronze, wedge disc, 150-psi minimum working pressure, equipped with wrought steel or cast iron operating handwheels.

2. Butterfly Valves shall be cast or ductile iron body that conforms to ASTM A126, Class B. All retaining segments and adjusting devices shall be of
corrosion resistant material. The valves shall have bonded or mechanically restrained seats as outlined in AWWA C-504. Valve seats shall be a natural rubber or synthetic rubber compound. The valve shaft shall be turned, ground and polished, constructed 18-8 stainless steel, and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. The shaft shall be a one (1) piece unit extending full size through the valve disc. The shaft shall be long body type, with the valve class, shaft size and other special requirements selected in accordance with the specific design, and shall comply with the provisions of AWWA C-504, "Rubber Seated Butterfly Valves". Valve operation shall be by approved gear actuators, with sealed enclosures for buried or submerged service. Position indicators shall be furnished, as required. Units shall be equipped with actuating nuts, cast iron handwheels or chain operators, with galvanized steel chains, as appropriate for the installation. All exposed nuts, bolts, springs and washers shall be 316 stainless steel. Appurtenances shall be furnished by the valve manufacturer.

3. Air release valves shall be a heavy-duty automatic air release type for 150-psi working pressure, tested to 300 psi. Body, cover and baffle shall be cast iron. All internal parts shall be 300 series stainless steel. Valve shall be selected with the orifice sized for venting at an acceptable discharge rate over the entire pressure range the main will be operated. It shall have adjustable sealing faces of BUNA-N rubber and stainless steel. Valves which use a needle valve to seal the orifice shall not be acceptable. Valve shall have a 2-inch NPT screwed inlet correction. The valves shall be provided with a 1-inch vacuum check to prevent air from reentering the line. All valves shall comply with AWWA C-512.

C. Backflow preventers shall work on the reduced pressure principle. The assembly shall consist of two (2) spring loaded check valves, automatic differential pressure relief valve, drain valve and shut-off valves. The body material shall be bronze or cast iron for a working pressure of not less than 150 psi, with bronze or stainless steel trim. Drain lines with air gaps shall be provided.

D. FIRE HYDRANTS

1. Hydrants shall comply with AWWA Standard C-502, "Dry Barrel Fire Hydrants"; and shall be equipped with a minimum of one (1) pumper outlet nozzle 4 1/2 inches in diameter and two (2) hose nozzles 2 1/2 inches in diameter, all having American National Standard hose threads. Units shall be traffic type with breakable safety clips, or flange, and stem, with safety coupling located below barrel break line to preclude valve opening. Fire hydrant shall be of ample length for depth of burial. Outlet nozzles shall be a minimum distance of 18 inches and no greater than 24
inches from the center of the nozzles to ground line. The valve shall be compression type with 5 1/4 inches minimum valve opening and shoe inlet connection to be six (6) inches minimum. Fire hydrants shall be equipped with "O-Ring" packing. All iron parts of the hydrant both inside and outside shall be painted, in accordance with AWWA C-502. All inside surfaces and the outside surfaces below the ground line shall be coated with coal tar varnish, 10 mils min. DFT. The outside of the hydrant above the finished ground shall be painted with two (2) coats of an approved yellow enamel paint.

2. Hydrants shall be installed plumb and in true alignment with the connection pipes to the water main. They shall be secured with restraining assemblies. Final field location of all hydrants shall be approved by the City. Guard posts (see standard detail) around fire hydrants are required when hydrants are placed within four (4) feet of all driveways, turning radii, or parking areas.

E. SERVICE CONNECTIONS

1. All service lines shall be 1-inch, or 2-inch polyethylene or copper tubing. Tubing shall be continuous between tap and meter box, splicing shall not be accepted.

a. Polyethylene Tubing shall be an ethylene hexene copolymer and shall comply with the applicable requirements as specified in ASTM D3350 providing a cell classification of 355434C and simultaneously be as specified in ASTM D 1248 for Type 111 Category 5, Grade P34, Class C, DR 9, PE3408-200 PSI very high molecular weight, high density polyethylene plastic material. Polyethylene shall comply with the following:

i. Tubing shall have a working pressure at 200 PSI at 73.4 degrees F.

ii. All tubing furnished under these specifications shall conform to the following standards: AWWA C-901, ASTM D2239, ASTM D2737, ASTM D3350, ASTM D1248, ASTM F1248, ASTM D 1693, ASTM D2837 and ASTM D3140.

iii. Polyethylene tubing surfaces shall be mirror smooth, and shall be free from bumps and irregularities. Materials must be completely homogeneous and uniform in appearance.

iv. Tubing dimensions and tolerances shall correspond with the values listed in AWWA C901 with a dimension ratio (DR) of 9.
v. Tubing shall be fully labeled at intervals of not more than 5 feet with brand name and manufacturer, the nominal size, PE 3408, the word "Tubing" and DR9, PC 200 AWWA C901, and the seal, or mark, of the testing agency.

vi. 2" tubing shall be used for both 1-1/2" and 2" meter sets.

b. Copper Tubing shall be type "K" and shall conform to AWWA Standard C800 Section A.2 and ASTM Specification B 88.

c. Joints for polyethylene or copper tubing shall be of the compression type utilizing a totally confined grip seal and coupling nut. Stainless steel tube stiffener insert shall also be used for tubing services. Other type joints may be considered for specific installations upon submission of specifications and approved by the Engineer.

F. Casing Pipe

1. Casing pipe for water services shall be black iron or galvanized steel and shall conform to ANSI/AWWA C800 Section A.6 and ASTM Specification A 120 or Sch 80 PVC.

2. Casing ends shall be sanded smooth and sealed using a polyurethane expandable foam.

G. Curb Stops/Meter Valves

1. Valves shall be ball type, of bronze construction in accordance with ASTM Specification B62 valves shall be closed bottom design and resilient O-ring sealed against external leakage at the top. The ball shall be fluorocarbon coated brass and shall be held in position by and seal off against seats of Buna-N rubber that are held securely in place with epoxy adhesive. Valves shall be water-tight against flow in either direction. The waterways shall be no smaller than the normal size of the valve and shall be smooth, with no abrupt changes in size to create resistance to flow. The stem that turns the ball shall exert no other force on it except to open or close the ball and shall be held securely in place by means of a bronze ring. The seal around the stem shall consist of two "O" rings. Each valve shall have a substantial T-head for the operation of opening and closing with a quarter turn of a standard slotted wrench. The stops or lugs for controlling the motion of the T-head shall be enclosed and properly positioned to the line up the waterways through the ball with the water passage through the valve body.
H. Corporation Stops

1. Corporation stops shall be manufactured of brass alloy in accordance with ASTM Specification B62 latest revision. Corporation stops shall be ball valve type with quarter turn operation.

2. Inlet thread shall be AWWA taper thread in all sizes in accordance with AWWA Standard C800 latest revision. Outlet connections shall have a compression type fitting as specified in Section C, Part I.

I. Service Saddles

1. Shall be as specified in Section 2-19.

3.04 CLEANING AND TESTING

A. The Contractor shall perform hydrostatic testing of all water distribution systems, as set forth in the following, and shall conduct said tests in the presence of representatives from the City or other authorized agencies, with two (2) days advance notice provided. Hydrostatic tests shall be conducted on all newly laid pressure pipes, fire hydrants and valves, including all service lines to the curb stops. Air testing of pressure pipe will not be permitted under any circumstance. The Contractor shall furnish all necessary equipment and material, make all taps, and furnish all closure pieces as required.

1. Piping and appurtenances to be tested shall be within sections between valves, unless alternate methods have received prior approval. Testing shall not proceed until restraining devices are installed. All piping shall be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. The Owner shall provide calculations and information to prove that the required velocity can be achieved or provide a method for pigging the main.

2. Water for filling and testing shall be furnished as specified in Section 2. The Contractor shall furnish and install all necessary pumps, piping, and fittings, including the corporation stop, to connect the section under test to the source of water. The test pump shall be a centrifugal or gear pump producing a steady pressure free of pulsation. The City will furnish a suitable meter for measuring the flow of water into the line.

3. Hydrostatic testing shall be performed at 150 psi for a period of not less than two (2) hours. If during the test the integrity of the tested line is in question, the City may require a six (6) hour pressure test. Testing shall be in accordance with the applicable provisions as set forth in Section 4 of AWWA Standard C-600. The hydrostatic tests for acceptance shall only
be conducted after the trenches have been completely backfilled and compacted as specified.

4. The procedure for conducting the test will be that each section of pipe to be tested will be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made and appropriate valves installed to ensure bleeding of all air from the main and services. If defective pipe, fittings, valves, or hydrants are discovered, all such items shall be removed and replaced by the Contractor with sound material and the test repeated until satisfactory results are obtained. The allowable rate of leakage for the piping shall be less than the number of gallons per hour determined by the following formula:

$$L = \frac{SD(P)^{1/2}}{133,200}$$

L = allowable leakage in gallons per hour

S = length of pipe tested, in lineal feet (maximum length 2000 feet for calculation).

D = nominal diameter of the pipe in inches

P= average test pressure maintained during the leakage test in pounds per square inch gauge, (minimum 150 psi). Pressure loss during test shall not exceed 5 psi.

5. The testing procedure shall include the continued application of the specified pressure to the test system, for the 2-hour period, by way of a pump taking supply from a container suitable for measuring water loss. The amount of loss shall be determined by measuring the volume displaced from said container. Should the test fail, necessary repairs shall be accomplished by the Contractor and the test repeated until it is within the established limits. The Contractor shall furnish the necessary labor, water, pumps, gauges, and all other items required to conduct the required water distribution system testing and perform necessary repairs. The Contractor shall provide, to the satisfaction of the City, proof of calibration of all test equipment.

3.05 DISINFECTION

A. Following pressure testing, the Contractor shall disinfect all sections of the water distribution system, and receive approval thereof from the appropriate agencies,
prior to placing in service. In addition, any part of the City’s water system which has been out of service for repair, alteration, or replacement shall be disinfected. Two (2) days advance notice shall be provided to the City before disinfecting procedures start. The disinfection shall be accomplished in accordance with the applicable provisions of AWWA Standard C-651, "Disinfecting Water Mains", and all appropriate approval agencies.

B. A suitable chlorinator shall be used to inject chlorine into the lines. All connections required for the introduction of chlorine into the water lines shall be made by the Contractor. Chlorine and water shall be introduced at one end and shall be allowed to flow slowly through the lines to the other end where it shall be removed and disposed of at the Contractor's expense.

C. The concentration of chlorine introduced shall be at least 50 mg/l in the water flowing from the line, and a chlorine residual of not less than 25 mg/l remains in the water in the pipe after 24 hours. Chlorine may be applied as a liquid chlorine (gas-water mixture), or a mixture of water calcium hypochlorite. The Contractor shall assume the responsibility for safe handling of chlorine, and shall meet the requirements of OSHA and other regulatory agencies for the safe handling of chlorine. Maximum distance between sampling points shall be as follows:

<table>
<thead>
<tr>
<th>Type of Main</th>
<th>Sampling Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission Mains</td>
<td>Every 1,500 ft.</td>
</tr>
<tr>
<td>Distribution Mains</td>
<td>Every 1,000 ft.</td>
</tr>
<tr>
<td>Isolated Mains</td>
<td>Less than 1,000 ft. 2 sample points</td>
</tr>
</tbody>
</table>

D. Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe at its extremity until the replacement water throughout its lengths shows, upon test, the chlorine measurement not in excess of that normally carried in the system. After flushing, water samples shall be collected on two (2) successive days from the treated piping systems, as directed by the City, and shall show acceptable bacteriological results. The Contractor is responsible for coordinating with the City, who shall collect and test samples from the water main. Contractor shall provide assistance to the City for collection of the samples. Samples shall be taken from each main or section of main to be placed into service where designated by the HRS before being placed into service.

E. Should the initial treatment result in an unsatisfactory bacterial test, the original chlorination procedure shall be repeated by the Contractor until satisfactory results are obtained.

END OF SECTION
1. All materials and construction under this project shall be in strict accordance with the requirements of the City of North Miami Beach Engineering Department (NMB) and/or Dade County Public Works Department (DCPWD) and/or the Florida Department of Transportation (FDOT) and shall conform to the standards and specifications available and on file with the department. As a minimum requirement, the standards of the AWWA shall apply.

2. Minimum cover over water mains shall be 3'-0" unless specific written exception is issued or required by an authorized representative of NMB.

3. Detector tape shall be installed 18' above the centerline of water mains and services.

4. All water main line valves shall be installed complete with 10' riser pipes and No. 3 valve boxes. Fire hydrants and service valves shall be installed complete with 6' riser pipes and No. 2 valve boxes.

5. All water meters up to 2" will be installed by department personnel providing the appropriate charges have been pre-paid. Provision of service pipes, backflow preventers, valves and meter or pits will be in accordance with construction plans and specifications approved by NMB.

6. Fire hydrant requirements (number and location) shall be as required by the Dade County Fire Department or the appropriate fire agency with installations in accordance with NMB standards.

7. Contractor MUST call the NMB Inspection Division and all other applicable permitting agencies to arrange for a Pre-Construction Meeting at least 72 hours prior to proposed start of construction.

8. NMB personnel will inspect all facilities approved by the Engineering Department. All other requirements of the permitting agency shall be in accordance with their standards and requirements.

9. Work performed under this project will not be considered as complete until final acceptance of the system by the department and until the following documents are received and approved by NMB:

   * Easements, if required (whether by deed or plat suitably recorded)
   * Contractor's Waiver and Release of Lien
   * Absolute Bill of Sale
   * Contractor's Letter of Warranty (i.e. Letter Agreement)
   * Contractor's Maintenance Bond (for 1 year)
   * As-Built 3 ml mylar 24" x 36" showing specific locations, depths, etc. of all water facilities as located by a licensed surveyor, along with two (2) prints of the "As-Built" which have been signed and sealed by a registered surveyor or Engineer of record and endorsed by the Contractor in accordance with NMB standards.

10. All new connections from existing NMB mains to be inspected by NMB forces prior to backfill.

11. The Contractor shall be responsible for verifying all locations, dimensions, elevations and the locations of all underground structures and utilities prior to the start of construction. The locations shown on the plans are not guaranteed accurate or correct by the known utility companies.

12. Thrust blocks shall be provided at all bends, tees, and plugs in accordance with NMB standard details.

13. All new fittings at reaction points shall be fitted with megadug retainer glands or approved equal, meeting NMB requirements. All valves are to be restrained with retainer glands.

14. Pipe installation, cleaning, flushing, testing, and disinfecting, as per NMB and State of Florida Department of Health and Rehabilitative Services Standards for the installation of water mains by customer donation projects.

15. Preliminary cleaning of all water mains 12" and larger to be accomplished by use of a poly-plug per NMB standards.

16. The Contractor is responsible for the cost of inspections for any construction activities occurring outside normal working hours (8:00 a.m. to 5:00 p.m.) Saturdays and Sundays and holidays excluded and arrangements for inspections outside normal working hours must be made a minimum of 48 hours in advance of the construction activity.

17. All trenches to be over-excavated a minimum of 6" to provide for installation of rock bedding in accordance with NMB Standards.

18. Surface restoration, pavement replacement, sidewalk replacement, trench backfilling and compaction shall comply with the applicable current NMB, DCPWD and FDOT Standards.

19. All gate valves to be resilient seat per AWWA-C509.

20. Where field conditions require, as determined by NMB, the water main shall be polyethylene encased in accordance with AWWA-C105.

21. The Contractor shall be responsible for providing NMB with HRS Letter of Clearance to Place a Public Drinking Water Facility Into Service. The Engineer of record shall provide NMB with a signed and sealed pressure test report certifying pressure test results.

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CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

POTABLE WATER MAINS
GENERAL NOTES

<table>
<thead>
<tr>
<th>Date</th>
<th>Revisions</th>
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<tr>
<td>Date: July 2000</td>
<td>Scale: N.T.S.</td>
<td>Dwg: F101b</td>
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GENERAL NOTES & SPECIFICATIONS FOR WATER MAIN INSTALLATIONS

DADE COUNTY D.E.R.M. NOTES

1. A horizontal distance of 10 feet shall be maintained between water and sewer mains. When a 10 feet horizontal distance criteria cannot be met due to an existing underground facility conflict, the sewer shall be constructed of ductile iron pipe with mechanical joints.

2. A vertical distance of at least 18 inches shall be maintained between any water and sewer mains. The sewer shall be ductile iron single 20 feet length centered on the crossing if the minimum vertical distance is less than 18 inches or the sewer is installed above the water main regardless of separation).

3. In highly congested areas, where either water or sewer facilities are existing and the separation requirements cannot be met, special consideration may be given subject to a complete evaluation of existing and proposed conditions.

4. The contractor shall verify nature, depth, character of existing underground utilities prior to start of construction.

NOTE: WHEN WATER CROSSES SEWER

1. Force mains must have an 18-inch vertical separation form water lines. No exceptions.

2. Sewer lines, including laterals, must have 18 inch vertical clearance between water mains and/or 6 inches minimum clearance if sewer line is DIP and has no joints within 10 feet of intersection (i.e. one 20 ft. joint DIP centered on intersection). Storm drainage lines are exempt if DIP water main separation of 6" is maintained and both pipes have no joints within 10 feet of intersection.

TRENCH PROTECTION

Trench excavation protection shall be accomplished as required by the provisions of Part 1926, Subpart P, Excavations, Trenching and Shoring of the Occupational Safety and Health Administrations Standards and Interpretations.
NOTES:
1. WHEN VALVE IS NOT LOCATED IN PAVEMENT, PLACE A WHITE PAVEMENT REFLECTOR MARKER IN THE DRIVE LANE, ADJACENT TO THE VALVE.
2. USE U.S. FOUNDRY #7630 VALVE BOX AND EXTENSION (MDWASD #3) FOR ALL OTHER VALVE APPLICATIONS.
3. FOR USE ON 2-INCH THROUGH 10-INCH PIPELINES.
4. RESILIENT SEAT AND OTHER RUBBER TYPE PARTS SHALL BE FORMED OF A SYNTHETIC ELASTOMER WHICH IS CORROSION AND CHLORAMINE RESISTANT.
5. OPERATOR EXTENSION SHAFT SHALL BE PROVIDED WHEN OPERATING NUT IS MORE THAN 48" BELOW TOP OF VALVE BOX.
NOTES:

1. WHEN WATER VALVE IS NOT LOCATED IN PAVEMENT, PLACE A WHITE PAVEMENT REFLECTOR MARKER IN THE DRIVE LANE, ADJACENT TO THE VALVE.

2. OPERATOR EXTENSION SHAFT SHALL BE PROVIDED WHEN OPERATING NUT IS MORE THAN 48" BELOW TOP OF VALVE BOX, OR AS REQUIRED BY THE CITY.

3. VALVE MANUFACTURER, TYPE, SIZE, CLASS AND NUMBER OF TURNS SHALL BE STAMPED INTO TOP OF CENTERING PLATE IN LETTERS AND NUMERALS NOT LESS THAN 3/8" HIGH.

4. ALL VALVES TO BE RESTRAINED WITH MEGALUG RETAINER GLANDS OR APPROVED EQUAL.

5. ALL B.F.V. SHALL CONFORM TO A.N.S.I./A.W.W.A. C-504 CLASS 150-B STANDARDS.

6. B.F.V. SHALL HAVE A MECHANICALLY RETAINED BODY SEAT.

7. B.F.V. NUT TO BE ON NORTH OR WEST SIDE OF MAIN WHEREVER POSSIBLE.

8. B.F.V. SHALL BE USED ON WATER MAINS 12-INCH AND LARGER.
NOTES:
1. ABOVE DETAIL IS BASED ON 2" COMBINATION AIR/VACUUM RELEASE VALVE, CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES. VALVE SIZES TO BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY PRIOR TO INSTALLATION.
2. THE MINIMUM DIMENSION FROM TOP OF PIPE TO FINISHED GRADE SHALL BE 4.0 FEET.
3. ARV VAULT WALLS TO BE COATED INSIDE AND OUTSIDE WITH 16 MIL. THK. APPROVED COATING.
4. LIFT HOLES ARE TO BE SEALED WITH MORTAR INSIDE AND OUTSIDE AFTER INSTALLATION. ALL OPENINGS SHALL BE SEALED WITH WATERPROOF, EXPANDING GROUT.
5. VALVES TO BE EQUIPPED WITH THREADED VENT PIPE THAT DIRECTS VENT DOWNWARD.
6. VAULT SHALL NOT REST ON PIPE. ALLOW 9" MIN. SEPARATION.
NOTES:

1. ABOVE DETAIL IS BASED ON 2\" COMBINATION AIR/VACUUM RELEASE VALVE, CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES. VALVE SIZES TO BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY PRIOR TO INSTALLATION.

2. THE MINIMUM DIMENSION FROM TOP OF PIPE TO FINISHED GRADE SHALL BE 4.0 FEET.

3. ARV VAULT WALLS TO BE COATED INSIDE AND OUTSIDE WITH 16 MIL. THICK APPROVED COATING.

4. VALVE SHALL BE SUPPORTED TO VAULT WALL.

5. LIFT HOLES ARE TO BE SEALED WITH MORTAR INSIDE AND OUTSIDE AFTER INSTALLATION. ALL OPENINGS SHALL BE SEALED WITH WATERPROOF, EXPANDING GROUT.

6. VALVES TO BE EQUIPPED WITH THREADED VENT PIPE THAT DIRECTS WENT DOWNWARD.
NOTE:
1. THE ASSEMBLY MUST BE INSTALLED WITH MINIMUM HORIZONTAL CLEARANCE OF 18" MIN.-30" MAX. FREE FROM OBSTRUCTIONS IN ALL DIRECTIONS.
2. THE BACKFLOW PREVENTION ASSEMBLY SHALL BE ON THE APPROVED LIST OF FOUNDATION FOR CROSS CONNECTION CONTROL UNIVERSITY OF CALIFORNIA. CONTRACTOR TO PROVIDE MANUFACTURERS CERTIFICATION OF U.S.C. APPROVAL.
3. ALL BACKFLOW PREVENTION ASSEMBLIES 3" AND SMALLER SHALL BE FACTORY ASSEMBLED INCLUDING SHUT OFF VALVE AS REQUIRED BY U.S.C. FOUNDATION FOR CROSS CONNECTION CONTROL STANDARDS. ON DEVICES 4" AND LARGER SHUT OFF VALVE MAY BE REMOVED FOR SHIPPING AND FIELD REINSTALLED.
4. BACKFLOW PREVENTION ASSEMBLIES SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION APPROVED BY CITY OF NORTH MIAMI BEACH PUBLIC UTILITIES. LOCATIONS INSIDE BUILDING OR WITH OTHERWISE RESTRICTED ACCESS WILL NOT BE APPROVED.
5. GUARDPOSTS OR PROTECTIVE ENCLOSURE MAY BE REQUIRED DEPENDING ON SITE CONDITIONS.
6. INSTALL ADJUSTABLE PIPE SUPPORTS WHERE INDICATED. SUPPORT (TYP.) WILL NOT BE REQUIRED ON INSTALLATIONS 2" AND SMALLER. ADJUSTABLE PIPE SADDLE SUPPORT SIZED TO FIT CURVATURE OF DOUBLE DETECTOR CHECK VALVE ASSEMBLY AND WITH GALVANIZED STEEL PIPE AND FLOOR FLANGE. ATTACH FLOOR FLANGE TO CONCRETE SLAB W/GALVANIZED EXPANSION BOLTS.
7. PAINT ALL ABOVE GROUND DUCTILE PIPING, FITTINGS AND VALVES.
8. ALL PIPE AND FITTINGS 2" AND SMALLER SHALL BE SCHEDULE 40 GALVANIZED STEEL PIPE WITH GALVANIZED MALLEABLE IRON THREADED FITTINGS. BALL VALVES SHALL REPLACE GATE VALVES AS SHOWN.
9. ALL PIPE FITTINGS LARGER THAN 4" SHALL BE CEMENT- LINING DUCTILE IRON WITH FLANGED FITTINGS FOR ABOVE GROUND USE. MECHANICAL JOINT FITTINGS SHALL BE USED UNDERGROUND WITH RESTRAINED JOINTS AND THRUST COLLARS.
10. MICALUGS, OR EQUAL, CAN BE USED IN PLACE OF RESTRAINED JOINTS ON ALL UNDERGROUND DUCTILE IRON PIPING (4" AND LARGER).
11. ALL EXPOSED METALLIC THREADS SHALL BE PAINTED WITH BITUMIN T APPL I CAT I ON. ALL OUTLETS SHALL BE PLUGGED WITH BRASS PLUGS. ALL ABOVE GROUND PIPING AND EQUIPMENT, EXCEPT FOR BRASS & STAINLESS STEEL PORTIONS, SHALL BE FINISHED WITH BLUE ENAMEL PAINT (KOP-COAT 0508 LEAD-FREE).
NOTE:
1. THE ASSEMBLY MUST BE INSTALLED WITH MINIMUM HORIZONTAL CLEARANCE OF 30" FREE FROM OBSTRUCTION IN ALL DIRECTIONS AND SHALL BE ACCESSIBLE TO THE CITY AT ALL TIMES.
2. THE BACKFLOW PREVENTION ASSEMBLY SHALL BE ON THE APPROVED LIST OF FOUNDATION FOR CROSS CONNECTION CONTROL, UNIVERSITY OF SOUTHERN CALIFORNIA. CONTRACTOR TO PROVIDE MANUFACTURERS CERTIFICATION OF U.S.C. APPROVAL.
3. GUARDPOST OR PROTECTIVE ENCLOSURE MAY BE REQUIRED DEPENDING ON SITE CONDITIONS.
4. ALL EXPOSED METALLIC THREADS SHALL BE COATED.
3' x 3' x 6" THICK CONCRETE SLAB OR SIDEWALK FLAG. (SEE NOTE 1)

(4) TRAFFIC POSTS
SEE NOTES 1 AND 2

GATE VALVE
THRUST BLOCK/RESTAINED
MECH JOINT TEE

R/W. OR EASEMENT
SEE NOTE 4

6'-0"
VARES

HYDRANT OPERATING NUT
PUMPER NOZZLE FACING ACCESS R/W

HOSE NOZZLE

COMPACTED BACKFILL
6" PIPE (MIN)
(SEE NOTE 5)
UNDISTURBED SOIL
12"
6" BEDDING ROCK
M J ANCHORING COUPLING
(SEE NOTE 3)

AS REQ'D.

CONC VALVE BOX PAD
CAST IRON VALVE BOX

6" RESILIENT SEAT GATE VALVE (SEE FIG 115)

NOTES:
1. HYDRANT GUARDS TO BE 4" DIAMETER GALVANIZED STEEL PIPE FILLED WITH CONCRETE AND TO BE PLACED AT LOCATION AS REQUESTED BY THE CITY.
2. OMIT REAR GUARDS IN LOCATION WHERE SIDEWALKS EXIST.
3. USE MECHANICAL JOINT RETAINER GLAND CLOW MODEL NO. F1058, MEGA-LUGS OR APPROVED EQUAL.
4. HYDRANT SETBACK SHALL BE SET TO A DISTANCE OF 7-FT MAXIMUM AND 4-FT MINIMUM FROM THE EDGE OF PAVEMENT OR CONFORM TO D.O.T. REQUIREMENTS WHERE APPLICABLE.
5. SERVICE LINES FOR FIRE HYDRANTS TO BE SIZED TO ALLOW A MINIMUM OF 20 PSI RESIDUAL PRESSURE AT THE HYDRANT UNDER FIRE FLOW CONDITIONS.
6. TWO BLUE REFLECTIVE PAVEMENT MARKERS FOR IDENTIFICATION OF THE HYDRANT AND ITS VALVE LOCATION SHALL BE INSTALLED ON THE CENTER OF THE ADJACENT PAVED DRIVE LANE TO THE HYDRANT; MARKERS SHALL BE SPACED 1-FT APART, PERPENDICULAR TO THE ROAD CENTERLINE.
7. NO GUARDPOST ALLOWED IN DOT RIGHTS-OF-WAY.

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

FIRE HYDRANT ASSEMBLY DETAIL

Date: Nov. 2000  Scale: N.T.S.  Dwg: F103  Fig: 335

Date  Revisions  Appr. by
NOTES:

1. GUARD POSTS OR PROTECTIVE ENCLOSURE MAY BE REQUIRED DEPENDING ON SITE CONDITIONS.
2. DOUBLE CHECK DETECTOR ASSEMBLY SHALL BE FACTORY-ASSEMBLED, INCLUDING BYPASS METER.
3. BACKFLOW PREVENTER ASSEMBLIES SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION APPROVED BY THE CITY OF NORTH MIAMI BEACH PUBLIC UTILITIES. LOCATIONS INSIDE BUILDINGS OR WITH OTHERWISE RESTRICTED ACCESS WILL NOT BE APPROVED.
4. ALL JOINTS TO BE FLANGED OR RESTRAINED WITH MEGALUG RETAINER GLANDS.
5. ALL EXPOSED PIPING SHALL BE PAINTED OSHA SAFETY RED, "KOPPERS--VERMILLION 314", OR APPROVED EQUAL.
6. NO ELECTRICAL EQUIPMENT OR TAMPER SWITCH SHALL BE PLACED ANYWHERE ON ASSEMBLY.
7. 15/16" GALVANIZED WELDED LINK CHAIN (SUPPLIED BY CONTRACTOR) & PADLOCK (TO BE PROVIDED BY CITY NMB). CHAIN SHALL BE SECURED WITH PADLOCK (TO BE LOCKED BY CITY NMB) TO BOTH WHEELS ON EITHER SIDE OF DOUBLE CHECK DETECTOR ASSEMBLY.
8. REDUCED PRESSURE DETECTOR ASSEMBLY SHALL BE USED FOR HIGH HAZARDOUS APPLICATION (NEAR BODIES OF WATER).
9. THE ASSEMBLY MUST BE INSTALLED WITH MINIMUM HORIZONTAL CLEARANCE OF 18", FREE FROM OBSTRUCTIONS IN ALL DIRECTIONS.
10. THE BACKFLOW PREVENTION ASSEMBLY SHALL BE ON THE APPROVED LIST OF FOUNDATION FOR CROSS CONNECTION CONTROL, UNIVERSITY OF CALIFORNIA. CONTRACTOR TO PROVIDE MANUFACTURERS CERTIFICATION OF U.S.C. APPROVAL.
11. ALL BACKFLOW PREVENTION ASSEMBLIES SHALL BE FACTORY ASSEMBLED INCLUDING SHUT OFF VALVE AS REQUIRED BY U.S.C. FOUNDATION FOR CROSS CONNECTION CONTROL STANDARDS.
NOTE:

1. THE ASSEMBLY MUST BE INSTALLED WITH MINIMUM HORIZONTAL CLEARANCE OF 18”, FREE FROM OBSTRUCTIONS IN ALL DIRECTIONS.

2. THE BACKFLOW PREVENTION ASSEMBLY SHALL BE ON THE APPROVED LIST OF FOUNDATION FOR CROSS CONNECTION CONTROL, UNIVERSITY OF CALIFORNIA. CONTRACTOR TO PROVIDE MANUFACTURERS CERTIFICATION OF U.S.C. APPROVAL.

3. ALL BACKFLOW PREVENTION ASSEMBLIES SHALL BE FACTORY ASSEMBLED INCLUDING SHUT-OFF VALVE AS REQUIRED BY U.S.C. FOUNDATION FOR CROSS CONNECTION CONTROL STANDARDS.

4. BACKFLOW PREVENTION ASSEMBLIES SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION APPROVED BY CITY OF NORTH MIAMI BEACH PUBLIC UTILITIES. LOCATIONS INSIDE BUILDINGS OR WITH OTHERWISE RESTRICTED ACCESS WILL NOT BE APPROVED.

5. GUARDPOSTS OR PROTECTIVE ENCLOSURE ARE RECOMMENDED DEPENDING ON SITE CONDITIONS.

6. ALL ABOVE-GROUND PIPING TO BE FLANGED.

7. INSTALL ADJUSTABLE PIPE SUPPORTS WHERE INDICATED.

8. 4 INCH SIZE FOR ILLUSTRATIVE PURPOSES ONLY
NOTES:
1. ALL EXPOSED METALLIC THREADS TO BE PAINTED WITH BITUMASTIC PAINT.
2. CONCRETE SLAB REQUIRED FOR SECTIONAL VAULTS ONLY
3. DOMESTIC SERVICES 1”, 2” AND 4”

TYPICAL FIRE SERVICE CONNECTION TO MAIN
N.T.S.

TYPICAL FIRE & DOMESTIC WATER CONNECTION TO MAIN
N.T.S.
1. POLYETHYLENE SERVICE LINE TO BE CONTINUOUS FROM CORPORATION STOP TO METER, NO COUPLINGS ARE PERMITTED.
2. KINKED OR CRIMPED PIPE AND/OR TUBING SHALL BE REJECTED.
3. SERVICE LINES SHALL BE 3" COVER IN STATE D.O.T. RIGHTS-OF-WAY CONTINUOUSLY TO METER BOX. (SEE DETAIL NO. 119C).
4. SERVICES SHALL HAVE 2" COVER IN TRAFFIC AREA AND 18" COVER IN NON-TRAFFIC AREA (CITY NMB & MIAMI-DADE CTY. RIGHTS-OF-WAY).
5. WRAP NON-METALLIC SERVICE LINE WITH 10 GAUGE COPPER WIRE OR METALLIC DETECTOR TAPE.

NOTE:

1. POLYETHYLENE SERVICE LINE TO BE MUELLER OR SEAL 110 OR APPROVED EQUAL PER SPECIFICATIONS.
   DIRECT TAP TO BE UTILIZED FOR IRON WATER MAINS OF 8" AND LARGER.
   * USE TAPPING SADDLE (ALL STAINLESS STEEL OR EPOXY-COATED DUCTILE IRON W/ STAINLESS STEEL STRAPS) FOR:
      1. IRON WATER MAINS OF 6" OR SMALLER.
      2. A.C. WATER MAINS.
      3. PVC WATER MAINS.

   COPPER CORPORATION STOP TO BE MUELLER OR SEAL 110 OR APPROVED EQUAL PER SPECIFICATIONS.

   1. CASING TO BE GALVANIZED, BLACK IRON OR SCHEDULE 80 PVC.
   2. CASING PIPE TO BE 2" I.D. FOR 1" SERVICE, 3" I.D. FOR 2" SERVICE.
   3. CASING TO EXTEND A MINIMUM OF 2" BEYOND EDGE OF PAVEMENT.
   4. CASING TO BE SEALED AT BOTH ENDS W/ POLYURETHANE EXPANDABLE FOAM OR EQUAL.
   5. CASING TO BE SOLID AT JOINTS—NO OPEN JOINTS UNDER STREET.
NOTE:
1. POLYETHYLENE SERVICE LINE TO BE CONTINUOUS FROM CORPORATION STOP TO METER, NO COUPLINGS ARE PERMITTED, EXCEPT WHEN 90° BEND USED, AS SHOWN ABOVE.
2. KINKED OR CRIMPED PIPE AND/OR TUBING SHALL BE REJECTED.
3. SERVICE LINES SHALL BE 3' COVER IN STATE D.O.T. RIGHTS-OF-WAY CONTINUOUSLY TO METER BOX.
4. WRAP NON-METALLIC SERVICE LINE WITH 10 GAUGE COPPER WIRE OR METALLIC DETECTOR TAPE.
NOTE:
1. 5"x 5" SQUARE CONCRETE SLAB TO SURROUND METER VAULT WHEN INSTALLED IN NON-TRAFFIC AREA.
2. ALL MATERIALS TO BE SUPPLIED BY CONTRACTOR EXCEPT METER & HARDWARE BETWEEN CURB STOP & DOWNSTREAM COUPLING, AS NOTED.
3. REDUCING BUSHINGS FOR 5/8" & 3/4" METER INSTALLATIONS (SUPPLIED BY CITY OF NORTH MIAMI BEACH).
4. EXCEPT IN D.O.T. STATE ROAD, MIN. 36" COVER.
NOTE:
1. METER BOX SHALL BE SURROUNDED BY A 6' x 6' SQUARE Poured CONCRETE SLAB.
2. ALL MATERIALS TO BE SUPPLIED BY CONTRACTOR EXCEPT METER & COMPRESSION PAK-LOK (2), AS NOTED.
3. USE 5" BRASS NIPPLES (2) FOR 2" METER INSTALLATION: 1 1/2" x 2" REDUCING BUSHING (2) FOR 1 1/2" METER INSTALLATION.
4. EXCEPT IN D.O.T. STATE ROAD, MIN. 36".
5. NIPPLES TO BE INSTALLED PER MFG'ER RECOMMENDATIONS ON COMPRESSION PAK-LOKS.

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

TYPICAL 1 1/2" & 2"
SERVICE & METER INSTALLATION

Date: July 2000 Scale: N.T.S. Dwg: F122 Fig: 361
NOTE:
1. ONLY 5/8" METERS TO BE INSTALLED IN DUAL METER VAULT.
2. 5' x 5' SQUARE CONCRETE SLAB TO SURROUND METER VAULT IN NON-TRAFFIC AREA.
3. ALL MATERIALS TO BE SUPPLIED BY CONTRACTOR EXCEPT METER & HARDWARE BETWEEN CURB STOP & DOWNSTREAM COUPLING, AS NOTED.
4. EXCEPT IN D.O.T. STATE ROAD, MIN. 36" COVER REQUIRED.
Piping Designation:

1. 3" or 4" Reduced Pressure Backflow Assembly
2. 3" or 4" Meter to be supplied by contractor.
3. 3" or 4" Strainer
4. MegaFlange Flange Adapter, 2100 Series by Edna Iron Sales, Inc.
5. 6"x4" reducing 90 or 6"x3" reducing 90
6. 6" Dip (PExPE) Length as Required
7. 3" or 4" x 20" Lg Dip (FLG x PE)
8. 3" or 4" x 12" Lg Dip (FLG x FLG) W/2" Blow-off
   (2" x 4" Nipple W/2" Ball Valve)
9. 6"x6" Tee (Mj x Mj Dip), Restrained.
10. 6" - 90° Bend (Mj x Mj Dip), Restrained.
11. 6" x Req. Length Dip (FLG x PE)
12. Gate Valve with Hand Wheel
13. Class 250 Dip, Restrained As Required.
14. 6" Conc. Slab W/3 Bars, 12" OC / EW.
15. Wrap Pipe W/40 Lbs. Felt.

General Notes:

A. The assembly must be installed with a minimum horizontal clearance of 18", free from obstructions in all directions.
B. The backflow prevention assembly shall be on the approved list of foundation for cross connection control, University of California. Contractor to provide manufacturer's certification of U.S.C. Approval.
C. All backflow prevention assemblies shall be factory assembled including shut-off valve as required by U.S.C. Foundation for cross connection control standards.
D. Backflow prevention assemblies shall be installed in an accessible location approved by City of North Miami Beach Public Services Dept. Locations inside buildings or with otherwise restricted access will not be approved.
E. Guardposts or protective enclosure are required depending on site conditions.
F. All above-ground piping to be flanged.
G. Install adjustable pipe supports where indicated.

City of North Miami Beach
Public Services Department
Reduced Pressure Backflow Assembly
W / Above-Ground Meter Installation

Date: Nov. 2000  Scale: N.T.S.  Dwg: F342  Fig: 364

Date  Revisions  Appr. by
NOTES:
1. PIPE JOINT COMPOUND SHALL BE APPLIED TO MALE THREADS ONLY.
2. COAT ALL EXPOSED THREADS WITH BITUMASTIC BEFORE BACKFILLING.
3. 2" TOP IN BOTTOM OF PLUG.
4. PLYWOOD AND CONCRETE TO HAVE A HEIGHT EQUAL TO THE DIAMETER OF THE PIPE.

BEARING AREA =
(TEST PRESSURE/150) x
(2000/SOIL BEARING STRESS)
x (TABLE VALUE)

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

TYPICAL FLUSHING OUTLET VALVE

Date: July 2000  Scale: N.T.S.  Dwg: F117A  Fig: 375
A CORPORATION STOP SHALL BE INSTALLED WITH A LENGTH OF COPPER TUBING EXTENDING ABOVE THE GROUND. THE TUBING SHALL BE INSTALLED WITH A 180° BEND AND A VALVE.

3/4 " VALVE

FINISHED GRADE

WATER MAIN

CORPORATION STOP

3/4 " COPPER TUBING OR PVC PIPE, AS APPROVED BY O.E.S.

STAINLESS STEEL DOUBLE STRAP SERVICE SADDLE

NOTES:

SAMPLING POINTS SHALL BE LOCATED AND LATER REMOVED AS REQUIRED BY MIAMI–DADE COUNTY HEALTH DEPARTMENT. CORPORATION STOP SHALL BE REMOVED AND SADDLE PLUGGED WITH A BRASS FITTING.
SANITARY GRAVITY SEWERS
SECTION 4
SANITARY GRAVITY SEWERS

4.01 GENERAL

A. This section includes general technical criteria for the design and installation of sanitary gravity wastewater systems.

B. The Owner shall be responsible for all materials furnished, stored and installed until the date of substantial completion. The Owner shall replace, at the Owner's expense, all material found to be damaged or defective. The Owner shall, if requested by the City, furnish certificates, affidavits of compliance, test reports, or samples for any of the materials proposed for installation in the work. All materials delivered to the project site for installation are subject to random testing for compliance with the designated specifications.

C. The Engineer of Record shall submit signed, sealed and dated design calculations with the Drawings. Calculations shall show that the proposed system will have sufficient hydraulic capacity to transport all design flows.

D. Where the depth of cover over the crown of the pipe is less than three (3) feet or more than fifteen (15) feet, the design requirements shall be established by the City on a project basis.

4.02 DESIGN STANDARDS

A. Design and Construction shall comply with the applicable requirements as established by the FDEP, Miami-Dade County, this Manual, the criteria set forth in the most recent edition of "Recommended Standards for Wastewater Facilities (Ten States Standards)."

B. Gravity sewers shall be located in dedicated rights-of-way or utility easements. Whenever possible, sewers shall be located under pavement in dedicated rights-of-way. All sewers located outside of dedicated rights-of-way shall require a 20-foot easement. Additional easement widths shall be provided when the pipe size and/or depth of cover so dictate. Gravity sewers shall not be located along side or rear lot lines.

C. The sewer system design shall be based on full ultimate development as known or projected. The average daily flow (ADF) from domestic units shall be calculated at the minimum rate of 100 gallons per capita per day or 350 gallons per day per ERC, whichever is greater. Flow requirements from commercial, industrial, institutional, or other special development areas shall be established using Chapter 23 of the City’s Code of Ordinances, 2500 gpd/acre or as established by the City, depending on the density of development.
D. In general, the peak factors provided in Table 4-1 shall be applicable for the range of average daily flow rates indicated (million gallons per day - MGD), unless larger values are required for specific conditions or prior approval is received for modification thereof.

<table>
<thead>
<tr>
<th>Flow Range, MGD-ADF</th>
<th>Peak Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 to 0.10</td>
<td>4.0</td>
</tr>
<tr>
<td>0.10 to 0.25</td>
<td>3.5</td>
</tr>
<tr>
<td>0.25 to 1.00</td>
<td>3.0</td>
</tr>
<tr>
<td>1.00 to 4.00</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Note: Special analysis shall be made for flows beyond 4.0 MGD-ADF or peak factors less than 2.5.

E. Sanitary sewers shall be sized to provide ample capacity for the required ultimate population/development peak flow rates. The minimum allowable size for any sewer, other than service connections, shall be 8 inches in diameter. All sewers shall be designed at slopes providing minimum velocities of not less than 2 feet per second when flowing full or half-full. Said computation shall be based on Manning's Equation, using a roughness coefficient (“n”) of 0.012 for polyvinyl chloride (PVC) pipe and 0.013 for ductile iron pipe (DIP) material, unless justifiably approved otherwise. In general, the following minimum slopes, provided in table 4-2, shall be maintained.

<table>
<thead>
<tr>
<th>Sewer Diameter (Inches)</th>
<th>Minimum Slope (Feet per 100 Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0.40</td>
</tr>
<tr>
<td>10</td>
<td>0.28</td>
</tr>
<tr>
<td>12</td>
<td>0.22</td>
</tr>
<tr>
<td>15</td>
<td>0.15</td>
</tr>
<tr>
<td>18</td>
<td>0.12</td>
</tr>
<tr>
<td>21</td>
<td>0.10</td>
</tr>
<tr>
<td>24 and larger</td>
<td>0.08</td>
</tr>
</tbody>
</table>

F. Sewers shall be installed with straight alignment and grade between manholes, with manhole spacing not to exceed 400 feet.

1. All sanitary sewers shall initiate and terminate at manholes.
2. Sewers of different sizes shall always join at manholes with no size conversions between manholes. Where different sizes join, the pipes shall be placed at elevations where the invert of the downstream pipe is 0.1 feet lower than the lowest invert of pipe elevation. If the entrance pipe elevation exceeds 2.0 feet above the effluent sewer, outside drop manhole connections shall be provided. Inside manhole drops shall not be permitted.

3. Flow direction changes in excess of 90 degrees shall not be included in sewer alignments. When directional changes exceeding 45 degrees occur, an extra flow line elevation drop (0.1 feet) across manholes shall be provided.

4. Where design velocities greater than ten (10) feet per second are attained, special provisions shall be provided for sewer protection.

5. The minimum cover over gravity sewers shall be no less than 36 inches calculated from the finished grade.

6. All sewer extensions for future connections shall terminate at a manhole, and include a plugged bell section of pipe three (3) feet outside the manhole.

7. Main drain and backwash systems for pools and spas, and storm drain systems shall not connect to the Sanitary Gravity Sewer.

G. Special care shall be exercised in design and installation to provide adequate bedding for the type of pipe used, taking into consideration trench width and depth, superimposed loadings above-grade and the material below trench grade. Pipe loading capabilities shall be computed in accordance with established design criteria and special supporting bedding or facilities shall be provided as required.

H. Service Lateral installation shall be as shown on Service Lateral Details, including the Wye Branches installed in the sewer main at the point of connection; and the service pipe and required fittings extended to the property line, perpendicular to said line, terminating with stoppered ends. The minimum service pipe size shall be six (6) inches in diameter and not more than 50 feet in length for single or double connections. Service laterals shall not be allowed to discharge into sanitary manholes. Service laterals shall have a minimum slope of 1/8 inch per foot. Where no curb exists or is planned, locations shall be adequately marked by placing a tab or disk at the edge of the pavement.

I. Clean-outs shall be provided and brought to final grade at the property line or easement line for all sewer laterals. Clean-outs shall not be located in
driveways. One (1) six-inch diameter clean out shall be installed for each service connection.

J. No wastewater service lateral shall parallel adjoining lots, run between neighboring property lines, or come through the rear of the property’s lot line in order to provide utility service, unless otherwise approved by the City.

4.03 MATERIAL REQUIREMENTS

A. Pipe and fittings for gravity sewers shall be PVC, manufactured from polyvinyl chloride resin conforming to ASTM D1784. PVC pipe ranging from 6 to 15 inches shall meet the requirements for ASTM D3034, SDR 35. PVC pipe with a diameter greater than 18 inches shall meet ASTM F679, SDR 35. For gravity mains buried deeper than 15 feet, the SDR shall be 26. The joints shall be integral bell elastometric gasket joints manufactured in accordance with ASTM D3212 and ASTM F477.

B. Manholes shall be precast concrete as detailed herein. Alternate manhole materials and designs shall receive prior approval. The minimum inside diameter of manholes shall be 48 inches for sewer sizes 24 inches in diameter or less. For sewers larger than 24 inches, the minimum inside diameter shall be 60 inches. A minimum access cover diameter of 24 inches shall be provided.

1. Precast reinforced manholes shall be in accordance with ASTM Designation C478, with preformed flexible plastic joint sealer conforming to Federal Specification SS-S-0021 (GSA-FSS).

2. Precast manholes shall be constructed with a precast monolithic base structure as shown on the Standard Details. The minimum thickness shall be 8-inches.

3. Concrete for manholes shall be Type II sulfide resistant, 4,000 psi at 28 days. Barrel, top and base sections shall have tongue and groove joints. All jointing material shall be cold adhesive preformed gaskets, conforming to FDOT Article 942-2.

4. Manhole sections shall be cured by an approved method for at least 28 days prior to coating and shall not be shipped until at least two (2) days after having the exterior coated.

5. The interior/exterior surfaces of all manholes shall be protected by the application of two (2) coats of epoxy, KOP-COAT Bituminastic 300-M or equal. The first coat shall be red and the second coat black. Each coating shall have a minimum dry film thickness of 16 mils. Exterior surfaces shall receive two (2) coats of KOP-COAT Bituminastic 300-M or equal
with a minimum dry film thickness of 16 mils. Surface preparation and paint application shall comply with the manufacturer’s recommendations.

6. Where additional pipe connections or modification of existing factory-made openings are required on new or existing precast concrete manholes, all cutting relative thereto shall be performed only by a power driven abrasive wheel or saw. It is specifically noted that such connections to existing manholes shall be caulked watertight with non-shrinking grout.

C. Manhole frames and covers shall be gray cast iron conforming to ASTM Designation A48, Class 30. Castings shall be true to pattern in form and dimensions and free from pouring faults and other defects which would impair their strength, or otherwise make them unfit for service intended. The seating surfaces between frames and covers shall be machined to fit true. Casting patterns shall conform to those shown or indicated on the Standard Drawings. Covers shall be marked with the word "SANITARY SEWER." No plugging or filling will be allowed. Lifting or pick holes shall be provided.

1. Frames and covers shall be fully bedded in mortar to the correct finish grade elevation, with adjustment brick courses placed below, for precast manholes.

2. Frames shall be suitable for the future addition of cast iron rings for upward adjustment of top elevation.

3. All manhole frames and covers shall be traffic bearing to meet AASHTO H-20 loadings.

4.04 CLEANING AND TESTING

A. The Contractor shall perform testing of all sanitary gravity sewers, and shall conduct said tests in the presence of representatives from the City with two (2) days advance notice provided. No more than 1,000 feet or 3 manhole to manhole runs may be tested at one time. As part of this process the installed sewers shall be "lamped" between manholes or other structures in order to ascertain that they are clear and to correct alignment. The concentricity of the lamp image received shall show, from each end, a full circle of light.

B. Both infiltration and exfiltration tests shall be performed on the gravity line.

1. The allowable limits of infiltration, or exfiltration, or leakage, shall not exceed a rate of 50 gallons per inch of internal pipe diameter per mile of pipe per 24 hours with no allowance for laterals or manholes or in conformance with Chapter 24 of the County Code by Ordinance 86-42,
whichever is more stringent. Duration of all tests shall be a minimum of 2 hours.

2. Prior to testing for infiltration, the system shall be pumped out so that normal infiltration conditions exist at the time of the testing.

3. The exfiltration test will be conducted by filling the portion of the system being tested with water to a level and the crown of any service lateral which will provide a minimum difference in elevation between the test water level and the crown of any service lateral connected to the test portion of two (2) feet; or in the event there are no service laterals in the test portion, a minimum difference in elevation between the crown of the highest portion of the sewer and the test water level of five (5) feet.

4. Should the test fail, necessary repairs shall be accomplished by the Contractor and the test repeated until the results are within the established limits. The Contractor shall furnish the necessary labor, water and all other items required to conduct the required testing and shall perform the necessary system repairs required to comply with the specified test.

C. Maximum ring deflection of PVC pipe under load shall be limited to 5.5% of the vertical internal pipe diameter. A Line Mandrel/ Pipe Deflection Gauge shall be utilized to determine maximum ring deflection, all in accordance with ASTM D2321.

D. The installed sewers shall undergo television inspection at two (2) times. The first shall be prior to final acceptance by the City and the other shall be just prior to the one (1) year anniversary of City acceptance. The television inspections shall be performed in accordance with The National Association of Sewer Service Companies "Recommended Specifications For Sewer Collection System Rehabilitation." Videotapes and inspection logs shall be provided to the City for each inspection. If either inspection reveals cracked, broken or defective pipe or pipe misalignment resulting in vertical sags in excess of one (1) inch, the Contractor shall be required to repair or replace the pipeline. Owner shall retain the services of a Registered Professional Engineer to certify the results of the video inspection. Prior to repair or replacement of failed sewer pipe, the method of repair or replacement shall be submitted to the City for approval. Pressure grouting shall not be considered an acceptable method of repair.

END OF SECTION
GENERAL NOTES & SPECIFICATIONS FOR GRAVITY SEWER INSTALLATIONS

1. All materials and construction under this project shall be in strict accordance with the requirements of the City of North Miami Beach Engineering Department (NMB) and/or Dade County Public Works Department (DCPWD) and/or the Florida Department of Transportation (FDOT) and shall conform to the standards and specifications available and on file with the department. As a minimum requirement, the standards of the Ten State Standards shall apply.

2. Minimum cover over main lines shall be 3'-0" unless specific written exception is issued or required by an authorized representative of NMB.

3. Detector tape shall be installed 18' above the centerline of main lines and services.

4. Contractor MUST call the NMB Inspection Division and all other applicable permitting agencies to arrange for a Pre-Construction Meeting at least 72 hours prior to proposed start of construction.

5. NMB personnel will inspect all facilities approved by the Engineering Department. All other requirements of the permitting agency shall be in accordance with their standards and requirements.

6. Work performed under this project will not be considered complete until final acceptance of the system by the department and until the following documents are received and approved by NMB:
   - Easements, if required (whether by deed or plat suitably recorded)
   - Contractor’s Waiver and Release of Lien
   - Absolute Bill of Sale
   - Contractor’s Letter of Warranty (i.e. Letter Agreement)
   - Contractor’s Maintenance Bond (for 1 year)
   - As-Built 3 ml mylar 24" x 36" showing specific locations, depths, etc. of all water facilities as located by a licensed surveyor, along with two (2) prints of the "As-Built" which have been signed and sealed by a registered surveyor or Engineer of record and endorsed by the Contractor in accordance with NMB standards.

7. All new connections from existing NMB lines to be inspected by NMB forces prior to backfill.

8. The Contractor shall be responsible for verifying all locations, dimensions, elevations and the locations of all underground structures and utilities prior to the start of construction. The locations shown on the plans are not guaranteed accurate or correct by the known utility companies.

9. Pipe installation, cleaning, flushing, and testing, as per NMB Standards for the installation of gravity sewer by customer donation projects.

10. The Contractor is responsible for the cost of inspections for any construction activities occurring outside normal working hours (8:00 a.m. to 5:00 p.m.) Saturdays and Sundays and holidays excluded and arrangements for inspections outside normal working hours must be made a minimum of 48 hours in advance of the construction activity.

11. All trenches to be over-excavated a minimum of 6" to provide for installation of rock bedding in accordance with NMB Standards.

12. Surface restoration, pavement replacement, sidewalk replacement, trench backfilling and compaction shall comply with the applicable current NMB, DCPWD and FDOT Standards.

13. Where field conditions require, as determined by NMB, the ductile iron lines shall be polyethylene encased in accordance with AWWA-C105.

DADE COUNTY D.E.R.M. NOTES

1. A horizontal distance of 10 feet shall be maintained between water and sewer mains. When a 10 feet horizontal distance criteria cannot be met due to an existing underground facility conflict, the sewer shall be constructed of ductile iron pipe with mechanical joints.

2. A vertical distance of at least 18 inches shall be maintained between any water and sewer mains, including laterals. The sewer shall be ductile iron single 20 feet length centered on the crossing if the minimum vertical distance is less than 18 inches or the sewer is installed above the water main regardless of separation.

3. In highly congested areas, where either water or sewer facilities are existing and the separation requirements cannot be met, special consideration may be given subject to a complete evaluation of existing and proposed conditions.

4. The contractor shall verify nature, depth, character of existing underground utilities prior to start of construction.

TRENCH PROTECTION

Trench excavation protection shall be accomplished as required by the provisions of Part 1926, Subpart P, Excavations, Trenching and Shoring of the Occupational Safety and Health Administrations Standards and Interpretations.

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CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

GRAVITY SEWER MAINS
GENERAL NOTES

Date: July 2000  Scale: N.T.S.  Dwg: F101  Fig: 400

Date  Revisions  Appr. by
NOTE:
MINIMUM STEEL: WWF 3X6X3W
OR: LONGITUDINAL STEEL:
13-#3'S@12"O.C.
CIRCUMFERENTIAL STEEL:
#4'S@6"O.C.

PLAN

CAST IRON MANHOLE FRAME AND COVER U.S.
FOUNDRY NO. 420C OR APPROVED EQUAL.
ORIENT ON C OF STREET WHERE POSSIBLE
(SEE MANHOLE FRAME AND COVER DETAIL)

4" MIN

MORTAR AS REQUIRED
FINISH GRADE

ADJUST TO GRADE WITH MIN. OF 3
AND MAX OF 5 COURSES OF BRICK
MASONRY (NO EXCEPTIONS)

WATERTIGHT "SEWERGUARD"
MANHOLE INSERT

ALL JOINTS TO BE GROUTED
INSIDE AND OUTSIDE

TWO (2) COATS OF
KOPPERS 300-M, ONE
(1) RED AND ONE (1)
BLACK, SHALL BE
APPLIED TO OUTSIDE
(TYP ALL MANHOLES)
16 MIL. DFT

3/4" ROCK BEDDING

SECTION

PRECAST CONCENTRIC MANHOLE CONE

MANHOLES SHALL BE
DESIGNED PER ASTM
C-478 AS A MINIMUM;
DEVIATIONS REQUIRE
ENGINEER'S SEAL.

FORM SMOOTH GROUT INVERT

SEE MANHOLE CONNECTION DETAIL

6" MIN

6 - #4'S@12"O.C.E.W.

NOTE:
1. 3' OF FIRST WALL SECTION
   SHALL BE CAST MONOLITHICALLY
   WITH BOTTOM SECTION
2. INTERIOR COATING PER SECTION
4.03

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

CONCENTRIC PRECAST MANHOLE DETAIL
(6'-0" AND UNDER)

Date: July 2000  Scale: N.T.S.  Dwg: F200  Fig: 405
NOTE:
MINIMUM STEEL: WWF 3X6X3W
OR: LONGITUDINAL STEEL:
13-#3'S@12"O.C.
CIRCUMFERENTIAL STEEL:
#4'S@6"O.C.

CAST IRON MANHOLE FRAME AND COVER U.S.
FOUNDRY NO. 420C OR APPROVED EQUAL.
ORIENT ON 6 OF STREET WHERE POSSIBLE
(SEE MANHOLE FRAME AND COVER DETAIL)

FINISH GRADE

MORTAR AS REQUIRED

PLAN

4" MIN

PRECAST CONCENTRIC MANHOLE CONE

MANHOLES SHALL BE DESIGNED PER ASTM
C-478 AS A MINIMUM;
DEVIATIONS REQUIRE
ENGINEER'S SEAL.

8"

WATERTIGHT "SEWERCLOD"
MANHOLE INSERT

ALL JOINTS TO BE GROUTED
INSIDE AND OUTSIDE

TWO (2) COATS OF
KOPPERS 300-M, ONE
(1) RED AND ONE (1)
BLACK, SHALL BE
APPLIED TO OUTSIDE
(TYP ALL MANHOLES)
16 MIL. D.F.T

3/4" ROCK BEDDING

SEE MANHOLE
CONNECTION DETAIL

FORM SMOOTH
GROUT INVERT

4'-0"

OVER 6'-0"

6" MIN

6 - #4'S@12"O.C.E.W.

NOTES:
1. 3' OF FIRST WALL SECTION
   SHALL BE CAST MONOLITHICALLY
   WITH BOTTOM SECTION
2. INTERIOR COATING PER SECTION
   4.03

6" MIN

SECTION

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

CONCENTRIC PRECAST MANHOLE DETAIL
(OVER 6'-0")

Date: July 2000
Scale: N.T.S.
Dwg: F200a
Fig: 406
NOTES

1. ALL DETAILS AND SPECIFICATIONS FOR STANDARD MANHOLES ARE APPLICABLE EXCEPT FOR REFERENCES TO DROP ASSEMBLY.

2. THE PRECAST BASE SHALL EXTEND FULLY UNDER THE DROP ASSEMBLY.

3. MASONRY CONSTRUCTION ABOVE THE EXTENDED PRECAST BASE, IF FILLED WITH CONCRETE, IS PERMISSIBLE.

4. BRICK AND CONCRETE RUBBLE ARE PERMITTED AS FILLER IN DROP ENCASEMENT.

5. DROP CONNECTIONS SHALL BE REQUIRED WHENEVER AN INFLENT INVERT IS LOCATED 2.0 FEET OR MORE ABOVE THE MAIN INVERT CHANNEL. DROP CONNECTIONS SHOULD NOT BE DESIGNED FOR LESS THAN A 2.4 FOOT DROP.

6. SOLVENT TYPE JOINT PVC FITTINGS MAY BE UTILIZED IN THE DROP ASSEMBLY ONLY.
STANDARD PRECAST MANHOLE PIPE CONNECTION

NOTES:
1. THE CITY MAY APPROVE ALTERNATE WATER TIGHT CONNECTION DETAILS FOR CONNECTION OF 24" DIAMETER PIPES AND LARGER.
2. AN OUTSIDE DROP CONNECTION SHALL BE REQUIRED FOR ALL INFLUENT PIPES WHICH HAVE AN INVERT 2' OR MORE ABOVE THE MANHOLE BOTTOM.
STANDARD DROP DETAIL

NOTES:
1. DROP PIPE AND FITTINGS SHALL BE OF EQUAL SIZE AND MATERIAL AS THE INFLUENT SEWER.
2. AN OUTSIDE DROP CONNECTION SHALL BE REQUIRED FOR ALL INFLUENT PIPES WHICH HAVE AN INVERT 2' OR MORE ABOVE THE MANHOLE INVERT.
NOTES:
1. INVERT CHANNELS TO BE CONSTRUCTED FOR SMOOTH FLOW WITH NO OBSTRUCTIONS.
2. SPILLWAYS SHALL BE CONSTRUCTED BETWEEN PIPES WITH DIFFERENT INVERT ELEVATIONS PROVIDING FOR SMOOTH FLOWS.
3. CHANNELS TO BE FORMED IN ALL MANHOLES TO ACCEPT T.V. CAMERA.
4. WHEN DIRECTIONAL CHANNELS EXCEEDING 45-DEGREES OCCUR, AN EXTRA FLOW LINE ELEVATION DROP OF 0.10-FT ACROSS THE MANHOLE SHALL BE PROVIDED.
5. CHANNELS FOR FUTURE CONNECTIONS (STUBS) SHALL BE CONSTRUCTED, FILLED WITH SAND AND COVERED WITH 1" OF MORTAR.
U.S. FOUNDRY TYPE #420-C
FRAME AND COVER
(OR APPROVED EQUAL)

2 - NON PENETRATING
PICK HOLES

PLAN

22 3/4"

2"

22 15/16"

20 5/8"

7"

24 3/4"

6"

36"

ELEVATION

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

SANITARY MANHOLE COVER

Date: July 2000  Scale: N.T.S.  Dwg: F203  Fig: 425
CAST IRON HANDHOLE COVER, USF 7610 OR EQUAL, MARKED "SEWER"

CONCRETE COLLAR

2" MIN. 6" MAX.

UNPAVED

PAVED

45° ELBOW

45° WYE

1-24" JOINT

UNDISTURBED SOIL

PLUG OR CONTINUE AS SHOWN ON THE PLANS

NOTES:

1. CLEAN-OUT SHALL BE 6-INCH, MINIMUM.
1. Clean-out shall be installed by the builder in accordance with standard plumbing code.
2. Locate single lateral as close to lot line as possible, 25' maximum.
3. Invert of service lateral shall not enter sewer main below spring line.
4. Service laterals shall have a minimum 18" of cover between R/W tie-in and building.
5. Indent curb with 'S' at each sewer service location.
6. Rotate bends as required to align service branch with the service pipe.
7. All service lateral locations shall be approved by the City.

Refer to applicable pipe foundation.
NOTES:
1. CLEAN-OUT SHALL BE INSTALLED BY THE BUILDER IN ACCORDANCE WITH STANDARD PLUMBING CODE.
2. LOCATE SINGLE LATERAL AS CLOSE TO LOT LINE AS POSSIBLE, 25' MAXIMUM.
3. INVERT OF SERVICE LATERAL SHALL NOT ENTER SEWER MAIN BELOW SPRING LINE.
4. SERVICE LATERALS SHALL HAVE A MINIMUM 18" OF COVER BETWEEN R/W TIE-IN AND BUILDING.
5. INDENT CURB WITH "S" AT EACH SEWER SERVICE LOCATION.
6. ROTATE BENDS AS REQUIRED TO ALIGN SERVICE BRANCH WITH THE SERVICE PIPE.

REFER TO APPLICABLE PIPE FOUNDATION.
WASTEWATER FORCE MAINS

SECTION 5
SECTION 5  
WASTEWATER FORCE MAINS

5.01 GENERAL

A. This Section includes the general requirements for design and installation of wastewater force main systems.

B. The Owner shall be responsible for all materials furnished, stored and installed until the date of substantial completion. The Owner shall replace, at the Owner's expense, all material found to be damaged or defective. The Owner shall, if requested by the City, furnish certificates, affidavits of compliance, test reports, or samples for any of the materials proposed for installation in the work. All materials delivered to the project site for installation are subject to random testing for compliance with the designated specifications.

C. The Engineer shall submit signed, sealed and dated design calculations for all wastewater force main projects. The calculations shall show that the force main will have sufficient hydraulic capacity to transport all design flows.

5.02 DESIGN STANDARDS

A. The Owner shall comply with the applicable design and installation requirements as established by the FDEP, Miami-Dade County, this Manual, and the most recent edition of "Recommended Standards for Wastewater Facilities (Ten States Standards)."

B. Force main systems shall be of adequate size to efficiently transmit the total ultimate peak operational flows applied by the connected wastewater pumping station(s). Consideration should be given to possible future connecting pumping stations and this probability shall be reviewed by the City's representatives. Force main flow velocity shall not be less than 2.5 feet per second or more than eight (8) feet per second.

1. The force main system design shall be based on full ultimate development as known or projected. The average daily flow (ADF) from domestic units shall be calculated at the minimum rate of 100 gallons per capita per day or 350 gallons per day per ERC, whichever is greater. Flow requirements from commercial, industrial, institutional, or other special development areas shall be established using Chapter 23 of the City's Code of Ordinances.

2. Friction losses through force mains shall be based on the Hazen-Williams formula. Calculations shall be based on the "C" values specified in Section 6.
3. The force main and fittings, including all restrained joint fittings shall be designed to withstand one and one-half times the system operating pressures, but not less than 100 pound per square inch (psi).

4. Force mains shall not terminate directly into a gravity sewer line. Force mains should enter a manhole built with a proper channel.

5. Hydraulic modeling of the wastewater system shall be performed to demonstrate the capacity of the force main system and the results shall be provided to the City for review and acceptance. See Section 6. The model to be used must be acceptable to the City.

6. The Owner may be required to make improvements to the City’s collection system to maintain capacity downstream of the development.

7. Force mains shall be located in dedicated rights-of-way or utility easements. When installed in rights-of-way, force mains shall maintain a consistent alignment with respect to the centerline of the road. All force mains located outside of dedicated rights-of-way shall require a minimum 20-foot easement.

8. The standard minimum cover for wastewater force main systems shall be three (3) feet from the top of the pipe to finished grade. Where waterways, canals, ditches or other cuts are crossed, the top of pipe shall be a minimum of five (5) feet below the design cross section, with a one (1) foot concrete slab, placed 3.5 feet above the main. The pipe material shall meet appropriate AWWA Standards for use in submerged conditions. Valves and air release valves shall be provided at both ends of the crossings. It shall be the responsibility of the Owner to obtain applicable regulatory permits, including dredge and fill permits. Additionally, approved utility crossing signs shall be placed on the pipe alignment at each side of the canal.

9. Wastewater force mains that are installed in the vicinity of pipe lines designated to carry potable water shall meet the horizontal and vertical separations specified in the "Recommended Standards for Wastewater Facilities" (Ten State Standards).

10. Where the force main profile is such that air pockets or entrapment could occur, provisions for automatic air release shall be provided.

11. Valves shall be installed on all subsidiary force mains at the point of connection to the major main, in order to isolate said pipeline for maintenance. Where force mains are to be extended, valves shall be placed at the future connection point to preclude line shut-down at the time of extension. At future connection branches or ends, the valves shall
be restrained and facilitate said connection without system shut-down. On straight runs of force mains, valve spacing shall not exceed 1,000 feet.

5.03 MATERIAL REQUIREMENTS

A. Pipe used for force main systems shall be either PVC or DI pipe, as follows:

| Polyvinyl Chloride Pipe (Below Grade) | 4" through 12" |
| Ductile Iron Pipe | 8" or larger |

1. All PVC pipe shall be manufactured in accordance with AWWA Standard C-900. The PVC pipe shall have a minimum working pressure of 150-psi and a dimension ratio (DR) of 18. All DI pipe shall conform to ANSI/AWWA A21.51/C-151.

2. All DI pipe shall have a minimum Pressure Class as identified in Section 2 of this Manual, unless a higher class pipe is specifically required by the City. Ductile iron fittings less than 8-inches shall be lined with Kop-Coat Bituminastic 300-M, 16 mils minimum dry film thickness.

3. All sewer ductile iron pipe and fittings of 8-inch nominal diameter and above shall be lined with ceramic epoxy lining.

   a. All ductile iron pipe and fittings shall be delivered to the application facility without asphalt, cement lining or other lining on the interior surface or the first 6 inches on the spigot end of the pipe exterior.

   b. The only ceramic epoxy material approved at this time is a high build multi-component Amine cured Novalac epoxy, Protecto 401, by Vulcan Painters, Inc. of Bessemer, AL 35021. This material will be considered as a standard for ceramic epoxy linings. Any request for a substitution of material, must meet the following criteria and be accompanied by certification of the following test results:

      i. Have a minimum five year demonstrable history of successful use as a lining material in sanitary sewer applications.

      ii. Be a two or multi-component, Amine cured, Novalac epoxy.

      iii. A permeability rating of 0.13 perms when tested according to Method A of ASTM E96 "Test Method for Water Vapor
Transmission of Materials", Procedure A with a test duration of thirty days.

iv. The following test must be run on coupons from factory lined ductile iron pipe:

1) 25% Sulfuric Acid @ 125°F - No effect after 300 days.
2) 3% Sulfuric Acid @ 125°F - No effect after 60 days.
3) 5% Sodium Hydrochlorite @ 77° - No effect after 60 days.
4) Tap Water @ 114° - No effect after 300 days.
5) 5% Sodium Acid Sulfate @ 77° - No effect after 30 days.

c. A statement from the manufacturer attesting to the fact that at least 20% of the volume of the lining contains quartz pigment. Pigments must be equal in chemical attack resistance, film strength reduction and have been used with the epoxy during the entire submitted history of the lining.

d. A statement concerning recoatability and repair to the lining which shows the material to equal the performance of the approved product in these respects.

e. Ceramic Epoxy Lining Application:

i. The lining shall be applied by a competent firm with a successful history of applying linings to the interior of ductile iron pipe and fittings.

ii. Prior to abrasive blasting, the entire area which will receive the protective compound shall be inspected for oil, grease, etc. Any areas where oil, grease or any substance which can be removed by solvent, shall be solvent cleaned using the guidelines outlined in SSPC-1 Solvent Cleaning. After the surface has been made free of grease, oil or other substances, all areas to receive the protective compounds shall be abrasive blasted using compressed air nozzles with sand or grit abrasive media. The entire surface to be lined shall be stuck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering annealing oxide may be left on the surface. Any area where rust reappears before coating must be reblasted to remove all rust.
iii. **After the surface preparation and within 8 hours of surface preparation, the interior of pipe and fittings shall receive a minimum forty (40) mils dry film thickness of the protective lining. No lining shall take place when the substrate or ambient temperature is below 40 degrees Fahrenheit. The surface also must be dry and dust free. If flanged ends are included in the Project, the linings must not be used on the face of the flange; however, full face gaskets must be used to protect the ends of the pipe. The 40-mil system shall not be applied in the gasket grooves.**

iv. **Due to the tolerances involved, the gasket area and exterior of the spigot end for 6 inches back from the end of the spigot must be coated with six (6) mils minimum, ten (10) mils maximum of Protecto Joint Compound. This coating shall be applied by brush to ensure coverage. Care should be taken that the coating is smooth without excess buildup in the gasket groove or on the spigot end. All material for the gasket groove and spigot end shall be applied after the application of the lining as specified in Part C of these specifications.**

v. **The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case, shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printed literature. The time between coats shall never exceed that time recommended by the lining material manufacturer. No material shall be used for lining which is not indefinitely recoatable with itself without roughening the surface.**

f. **Inspection and Certification:**

i. **All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC-PC-2 Film Thickness Rating.**

ii. **The interior lining of all pipe and fittings shall be tested for pinholes with a nondestructive 2,500 volt test.**

iii. **Each pipe joint and fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on the date.**
iv. The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified, and that the material was applied as required by the specification.

g. Procedures for Sealing Cut Ends and Repairing Field Damaged Areas:

i. Remove burrs caused by field cutting of ends or handling damage and smooth out the edge of the lining if rough.

ii. Remove all traces of oil, grease, asphalt, dust, dirt, etc.

iii. Areas of loose or damaged lining associated with field cutting the pipe shall be repaired, if approved by the City, as recommended by the pipe manufacturer.

B. All PVC pipe shall have integral bell push on type joints conforming to ASTM D3139. Joints for DI pipe and fittings shall be push-on or mechanical type joints conforming to ANSI/AWWA A21.11/C-111, unless otherwise required by the City. Flanged joints, if required, shall conform to ANSI B16.1-125 lb.

C. Pressure piping fittings and other items requiring restraint, shall be braced with restraining assemblies. The restraining devices shall conform to Section 2 of this Manual, "General Construction Requirements," and shall be designed for the maximum test pressure condition (testing).

D. For Surface Water Aerial Crossings, Flanged DI pipe, minimum Class 350, shall be used. The above-ground pipe shall be coated as specified in Section 2 for above-ground pipe lines. Structural supports shall be provided as required by the Engineer to prevent overturning and settlement. The impact of flood waters and debris shall be considered and the bottom of the pipe shall be placed no lower than that specified by SFWMD Standards or one (1) foot above the 100 year flood elevation, whichever is greater.

E. Expansion joints shall be provided between the aerial and buried sections of pipe. Underground valves shall be provided at both ends of the crossing so that the section can be isolated for testing or repair. The valves shall be easily accessible and not subject to flooding. An automatic air release valve shall be installed at the high point of the crossing. Appropriate guards shall be installed at both ends of the crossing to prevent pipe access to the public. When the aerial crossing is accomplished by attachment to a bridge or drainage structure, the Owner shall meet all requirements of the agencies that own or have jurisdiction over such structures.
It shall be the responsibility of the Owner to obtain all applicable regulatory permits.

F. Subaqueous crossings shall be designed using ball and socket type pipe joints, class 350.

G. Where pipes are to extend into or through structures, flexible joints shall be provided at the wall face.

H. Extra protection shall be provided for underground DI pipe and fittings within areas of severe corrosive soil conditions. This shall be accomplished by the installation of polyethylene encasement as specified in AWWA C-105 through the area of concern. The soil-test evaluation to determine the necessity for extra protection in suspect areas shall be as set forth in ANSI Standard A21.5.

I. Force main valves shall be non-lubricated eccentric plug valves and comply with AWWA C-504 and C-507. Minimum pressure rating of valves 4 inches through 12 inches shall be 175 psi, valves 14 inches through 54 inches shall be 150 psi. Valve bodies shall be cast iron ASTM A 126, Class B. Port areas for all valves shall be 100 percent of the full pipe area. Resilient plug facings shall be of Hycar, Nitrile Butadiene rubber or Neoprene.

1. Valve ends shall be flanged joint for above ground and mechanical joint for underground installation.

2. Valve body seats shall have a welded-in overlay of not less than 90 percent nickel for all parts which come in contact with the plug face. Packing shall be adjustable and replaceable without removing the valve from service with the body pressurized to its full rated pressure. Bearings shall be permanently lubricated 316 stainless steel in both upper and lower journals in accordance with AWWA Standard C-507. The valve supplied shall have drip tight shut off with flow in either direction at the full pressure rating of the valves. All exposed nuts, bolts, springs and washers on buried and on above ground outdoor service valves shall be 316 stainless steel. No hollow pins will be allowed

3. Valves shall be furnished with permanently lubricated stainless steel or oil-impregnated bronze upper and lower plug stem bushings. Valve shaft seals shall be adjustable.

4. Operation of all valves 10-inches or larger, and smaller sizes in exposed locations which require handwheels or chainwheels, shall be by approved gear actuators, equipped with position indicators and stops, and shall be furnished by the valve manufacturer. Gear actuators for buried or submerged installations shall be furnished with sealed enclosures. Valves shall be equipped with actuating nuts, cast iron handwheels or chain
operators, with galvanized steel chains, as appropriate for the installation and type of operator.

J. Sewage automatic air-release valves shall be of the type that automatically releases accumulated air, gas or vapor under pressure during system operation and shall be to meet the intended conditions. The internal mechanism shall be the compound lever type to permit the valve to open under pressure to vent pockets of entrapped air, gas or vapor as they accumulate. The compound mechanism shall be activated by a stainless steel concave float to lift the Buna-N needle or orifice button to control the air release orifice. Lineage shall be stainless steel. The air release valves shall be designed for a minimum working pressure of 150 psi. The valves shall be supplied with a bronze isolated shut-off ball valve, blow-off valve and a quick disconnect backflushing connection with shut-off valve. The valve shall have a cast iron body and cover, stainless steel internal mechanisms and teflon coated inner lining.

5.04 TESTING

The Owner shall perform hydrostatic and leakage testing of all wastewater force mains, as set forth in the following, and shall conduct said tests in the presence of representatives from the City and/or other authorized agencies with two (2) days advance notice provided.

A. Piping and appurtenances to be tested shall be within sections between valves or adequate plugs, all with prior approval. Testing shall not proceed until restraining devices are installed. All piping shall be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While the piping is being filled with water, care shall be exercised to permit the escape of air from extremities of the test section with additional release cocks provided, if required.

B. Hydrostatic testing shall be performed at 150 percent of the maximum operating pressure of the tested system, of the connected sewage pump shut-off pressure, or at 100 psi, whichever is greater. The testing procedure shall continue for an uninterrupted period of not less than two (2) hours. Testing shall be in accordance with the applicable provisions as set forth in Section 4 of AWWA Standard C-600. The allowable rate of leakage shall be the lesser amount of either that specified by Chapter 24 of the County Code of Ordinances or be less than the number of gallons per hour determined by the following formula:

\[
L = \frac{SD(P)^{1/2}}{133,200}
\]

where:

\[
L = \text{allowable leakage in gallons per hour}
\]
S = length of pipe tested, in linear feet (maximum length is 2,000 feet for calculation)

D = nominal diameter of the pipe in inches

P = test pressure required during the leakage test in pounds per square inch, gauge min 100 psi. Pressure loss during test shall not exceed 5 psi.

C. The testing procedure shall include continuous application of the specified pressure to the test system, for the two (2) hour period, by way of a pump taking supply from a container suitable for measuring water loss. The amount of loss shall be determined by measuring the volume displaced from said container.

D. Should the test fail, necessary repairs shall be accomplished by the Contractor and the test repeated until it is within the established limits. The Contractor shall furnish the necessary labor, water, pumps, gauges and all other items required to conduct the required wastewater force main testing, and shall perform the necessary system repairs required to comply with the specified hydrostatic test.

END OF SECTION
GENERAL NOTES & SPECIFICATIONS FOR FORCE MAIN INSTALLATIONS

1. All materials and construction under this project shall be in strict accordance with the requirements of the City of North Miami Beach Engineering Department (NMB) and/or Dade County Public Works Department (DCPWD) and/or the Florida Department of Transportation (FDOT) and shall conform to the standards and specifications available and on file with the department. As a minimum requirement, the standards of the Ten State Standards shall apply.

2. Minimum cover over force mains shall be 3’-0” unless specific written exception is issued or required by an authorized representative of NMB.

3. Detector tape shall be installed 18’ above the centerline of force mains and services.

4. All force main line valves shall be installed complete with 10’ riser pipes and No. 3 valve boxes.

5. All materials and construction under this project shall be in strict accordance with the requirements of the City of North Miami Beach Public Utilities Department.

6. Utility personnel will inspect all facilities approved by this utility. All other requirements of the permitting agency shall be in accordance with their standards and requirements.

7. Contractor MUST call the NMB Inspection Division and all other applicable permitting agencies to arrange for a Pre-Construction Meeting at least 72 hours prior to proposed start of construction.

8. NMB personnel will inspect all facilities approved by the Engineering Department. All other requirements of the permitting agency shall be in accordance with their standards and requirements.

9. Work performed under this project will not be considered as complete until final acceptance of the system by the department and until the following documents are received and approved by NMB:
   * Easements, if required (whether by deed or plat suitably recorded)
   * Contractor’s Waiver and Release of Lien
   * Absolute Bill of Sale
   * Contractor’s Letter of Warranty (i.e. Letter Agreement)
   * Contractor’s Maintenance Bond (for 1 year)
   * As-Built 3 mi mylar 24” x 36” showing specific locations, depths, etc. of all water facilities as located by a licensed surveyor, along with two (2) prints of the "As-Built" which have been signed and sealed by a registered surveyor or Engineer of record and endorsed by the Contractor in accordance with NMB standards.

10. All new connections from existing NMB mains to be inspected by NMB forces prior to backfill.

11. The Contractor shall be responsible for verifying all locations, dimensions, elevations and the locations of all underground structures and utilities prior to the start of construction. The locations shown on the plans are not guaranteed accurate or correct by the known utility companies.

12. Thrust blocks or restrained pipe joints shall be provided at all bends, tees, and plugs in accordance with NMB standard details.

13. All new fittings at reaction points shall be fitted with megacyl retainer glands or approved equal, meeting NMB requirements. All valves are to be restrained with retainer glands.

14. Pipe installation, cleaning, flushing, and testing, as per NMB Standards for the installation of force mains by customer donation projects.

15. Preliminary cleaning of all force mains 12” and larger to be accomplished by use of a poly-pig per NMB standards.

16. The Contractor is responsible for the cost of inspections for any construction activities occurring outside normal working hours (8:00 a.m. to 5:00 p.m.) Saturdays and Sundays and holidays excluded and arrangements for inspections outside normal working hours must be made a minimum of 48 hours in advance of the construction activity.

17. All trenches to be over-excavated a minimum of 6” to provide for installation of rock bedding in accordance with NMB Standards.

18. Surface restoration, pavement replacement, sidewalk replacement, trench backfilling and compaction shall comply with the applicable current NMB, DCPWD and FDOT Standards.

19. All valves to be in accordance with NMB Standards.

20. Where field conditions require, as determined by NMB, the force main shall be polyethylene encased in accordance with AWWA-C105.

21. The Engineer of record shall provide NMB with a signed and sealed pressure test report certifying pressure test results.

DADE COUNTY D.E.R.M. NOTES

1. A horizontal distance of 10 feet shall be maintained between water and sewer mains. When a 10 feet horizontal distance criteria cannot be met due to an existing underground facility conflict, the sewer shall be constructed of ductile iron pipe with mechanical joints.

2. A vertical distance of at least 18 inches shall be maintained between any water and sewer mains. The sewer shall be ductile iron single 20 feet length centered on the crossing if the minimum vertical distance is less than 18 inches or the sewer is installed above the water main regardless of separation.

3. In highly congested areas, where either water or sewer facilities are existing and the separation requirements cannot be met, special consideration may be given subject to a complete evaluation of existing and proposed conditions.

4. The contractor shall verify nature, depth, character of existing underground utilities prior to start of construction.

TRENCH PROTECTION

Trench excavation protection shall be accomplished as required by the provisions of Part 1926, Subpart P, Excavations, Trenching and Shoring of the Occupational Safety and Health Administrations Standards and Interpretations.

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

FORCE MAINS
GENERAL NOTES

Date: July 2000  Scale: N.T.S.  Dwg: F101a  Fig: 500

Date  Revisions  Appr. by
CONCRETE (30" SQUARE)
M.D. WASD. No. 3 VALVE BOX & LID
(U.S.F. #7630 OR APPROVED EQUAL)

SET TOP OF VALVE BOX TO FINISHED GRADE
CONCRETE COLLAR SEE FIG. 111
FINISHED GRADE

U.S. FOUNDRY #7630 VALVE BOX AND EXTENSION (MDWASD #3)

2" SQ. WRENCH NUT

ADAPTER
M.J. PLUG VALVE
WASTEWATER FORCE MAIN

VALVE BOX SHALL REST ON BEDDING ROCK NOT ON VALVE OR PIPE AND SHALL BE CENTERED ON OPERATING NUT

6" BEDDING ROCK

ALL VALVES TO BE RESTRAINED

NOTE:

WHEN PLUG VALVE IS NOT LOCATED IN PAVEMENT, PLACE A GREEN PAVEMENT REFLECTOR MARKER IN THE DRIVE LANE, ADJACENT TO THE VALVE.

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

PLUG VALVE AND BOX DETAIL

Date: July 2000  Scale: N.T.S.  Dwg: F204  Fig: 505
NOTES:

1. ABOVE DETAIL IS BASED ON 2" COMBINATION AIR/VACUUM RELEASE VALVE, CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES. VALVE SIZES TO BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY PRIOR TO INSTALLATION.

2. THE MINIMUM DIMENSION FROM TOP OF PIPE TO FINISHED GRADE SHALL BE 4.0 FEET.

3. ARV VAULT WALLS TO BE COATED INSIDE AND OUTSIDE WITH 16 MIL. THK. APPROVED COATING.

4. LIFT HOLES ARE TO BE SEALED WITH MORTAR INSIDE AND OUTSIDE AFTER INSTALLATION. ALL OPENINGS SHALL BE SEALED WITH WATERPROOF, EXPANDING GROUT.

5. WASTEWATER VALVES TO BE EQUIPPED WITH THREADED VENT PIPE THAT DIRECTS VENT DOWNWARD.

6. VAULT SHALL NOT REST ON PIPE. ALLOW 9" MIN. SEPARATION.
NOTES:

1. ABOVE DETAIL IS BASED ON 2" COMBINATION AIR/VACUUM RELEASE VALVE, CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES. VALVE SIZES TO BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY PRIOR TO INSTALLATION.

2. THE MINIMUM DIMENSION FROM TOP OF PIPE TO FINISHED GRADE SHALL BE 4.0 FEET.

3. ARV VAULT WALLS TO BE COATED INSIDE AND OUTSIDE WITH 16 MIL. THICK APPROVED COATING.

4. VALVE SHALL BE SUPPORTED TO VAULT WALL.

5. LIFT HOLES ARE TO BE SEALED WITH MORTAR INSIDE AND OUTSIDE AFTER INSTALLATION. ALL OPENINGS SHALL BE SEALED WITH WATERPROOF, EXPANDING GROUT.

6. VALVES TO BE EQUIPPED WITH THREADED VENT PIPE THAT DIRECTS WENT DOWNWARD.
WASTEWATER PUMPING STATIONS

SECTION 6
SECTION 6
WASTEWATER PUMPING STATIONS

6.01 GENERAL

A. This section includes the general requirements for the design and installation of wastewater pumping stations including low pressure grinder pump stations. All such pump stations shall be submersible duplex or triplex type pump stations. All design calculations and plans for wastewater pumping stations shall be signed, sealed and dated by a professional engineer registered in the State of Florida. Only pumps and equipment listed in Appendix A shall be allowed.

B. The Owner shall be responsible for all materials furnished, stored and installed until the date of substantial completion. The Owner shall replace, at the Owner's expense, all material found to be damaged or defective. The Owner shall, if requested by the City, furnish certificates, affidavits of compliance, test reports, or samples for any of the materials proposed for installation in the work. All materials delivered to the project site for installation are subject to random testing for compliance with the designated specifications.

C. The Engineer of Record shall submit signed, sealed and dated design calculations with the Drawings. Calculations shall show that the facilities will have sufficient hydraulic capacity to transport all design flows.

6.02 DESIGN STANDARDS

A. General

1. The Owner shall comply with the applicable requirements established by the FDEP, Miami-Dade County, this Manual, and the criteria provided in the most recent edition of "Recommended Standards for Wastewater Facilities" (Ten State Standards).

2. The wet well structure shall provide a capacity sufficient to allow a minimum of thirty (30) minutes between successive starts with one (1) pump out of service. Low water levels shall provide a minimum of one foot of pump submergence to preclude pump inlet vortexing and air-binding. Operational maximum or high water levels shall not exceed one (1) foot below the invert elevation of the lower influent pipe.

3. Buoyancy calculations verifying that adequate provisions have been made to prevent wet well flotation shall be submitted. These calculations shall assume that the wet well is empty and groundwater is at finished grade.
4. Prior to accepting the pump station, the owner shall submit for City approval an Operation and Maintenance Manual to include the following:

a. A layout block diagram showing location of different components attached to the control panel.

b. The performance curves for the pump submitted must show that it will operate generally in the center part of the curve and not approach either upper or lower extreme.

c. An electrical schematic and wiring diagram including a parts schedule containing information on type, model and rating of components.

B. Wastewater Pumping Stations shall be designed for the total ultimate development flow from all contributory areas. Said contributions shall include the immediate gravity system, subsidiary sources, and known or projected future development within the designated station service area. The design average daily flow shall be computed at the unit rates set forth herein. The maximum required pumping capability shall be the product of selected peak factors times the cumulative average daily flow (ADF) from the total service area. In general, the factors, provided in Table 6-1, shall be applicable for the range of flow contributions indicated (million gallons per day - average daily flow: MGD-ADF), unless larger values are required. In general, no more than one (1) pump station per quarter section (160 acres) shall be allowed.

1. Pump Selection:

a. For pumping stations with a maximum flow demand of 1,500 gpm or less, a minimum of two (2) pumping units shall be provided. Where the peak design flow exceeds 1,500 gpm, three (3) or more units shall be included in the facility. All pumps shall be identical within a given pump station.

b. The selected sewage pump system shall have the minimum capability of pumping the design peak flow, at the maximum computed system total dynamic head (TDH) requirements with one pumping unit out of service. Pumps shall be capable of meeting all system hydraulic conditions without overloading the motors.

c. Head-Capacity curves shall be prepared for the proposed pumping system in order to determine the various operational conditions. Hydraulic computations shall be in accordance with good engineering practice with pipe friction loss calculated by the
Hazen-Williams formula using standard friction factors based on the material utilized. Pump curves for the proposed pump shall be included with head-capacity curves for City review. Hydraulic Modeling shall be run and results provided to the City for review and acceptance. The system head-capacity analysis shall provide the following and be subject to review by the City:

i. Hydraulic Modeling of wastewater pump stations shall be performed to demonstrate the pumping capacity and the results shall be provided to the City for review and acceptance. Model runs shall be conducted using the following Hazen-Williams Friction factors:

- PVC Pipe:
  - C= 160
  - C= 140
  - C= 110

- Ductile Iron Pipe:
  - C = 150
  - C = 120
  - C = 90

ii. Modeling of system operation under peak flow conditions shall be performed with the proposed pump station and all the other pump stations on the force main in operation. Under this condition the proposed station shall achieve fifty percent (50%) of its design flow.

iii. Modeling of the system operation under minimum flow conditions shall be performed with this station on only, with only one pump running.

2. Wet wells shall be ventilated with not less than one (1) 4-inch diameter open vent pipe.

3. The wastewater pump stations shall be provided with a water service for washdown. The pump station water system shall be provided with a City approved reduced pressure backflow preventer.

4. All pump stations shall be provided with an emergency pump-out connection and an emergency power receptacle as specified herein. Pump stations with pumping capacity of 1,500 gpm and greater shall be provided with onsite emergency power generation.
5. Wastewater pump station parcels shall be a minimum of 30 feet x 30 feet and shall not be located within 100 feet of the top of the bank of any water body. Pumping stations shall be installed on off-the-right-of-way, readily accessible sites, and shall have adequate area provided for operation and maintenance of the facility. The site shall be readily accessible to maintenance vehicles during all weather conditions. All facilities (structural, mechanical and electrical) shall be constructed a minimum of one (1) foot above the 100-year flood elevation.

6. The Owner shall dedicate the pump station site free of encumbrances by warranty deed or plat to the City. All pump station sites shall be fenced and landscaped.

C. Low pressure grinder pump stations shall be sized to pump 150% of the flow as calculated using fixture unit in accordance with the South Florida Building Code.

<table>
<thead>
<tr>
<th>Flow Range, MGD-ADF</th>
<th>Peak Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 to 0.10</td>
<td>4.0</td>
</tr>
<tr>
<td>0.10 to 0.25</td>
<td>3.5</td>
</tr>
<tr>
<td>0.25 to 1.00</td>
<td>3.0</td>
</tr>
<tr>
<td>1.00 and greater</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Note: Special analysis shall be made for flows beyond 2.0 MGD-ADF and peak factors less than 2.5 may be considered if substantiated by extensive data.

6.03 MATERIAL REQUIREMENTS

A. Piping Systems:

1. For pipes 6" or longer passing through structural walls, wall pipes shall be installed where the location is below the surface of the ground or at any point where water levels will exceed the installed pipe elevation. Sleeves with watertight caulking shall be suitable at other locations or pipe sizes.

2. In order to provide for expansion and contraction or to expedite installation and maintenance, flexible connections (flanged coupling adapters, expansion joints, couplings, etc.) shall be provided.
B. Valves:

1. Check Valves
   a. Check valves 4" or larger shall be cast iron body, bronze mounted, stainless steel hinge pin, outside lever and spring operated, single disc swing non-slam type, and equipped with removable inspection covers and shall meet the requirements of AWWA C-500. The ends shall be 125-pound ANSI B16.1 flanges. The units shall be rated for 175-psi minimum working pressure and shall permit a full flow area equal to that of the connecting pipe. Valves shall be constructed to allow the disc and body seat to be easily removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight. If pump shutoff exceeds 70 feet, then an air-cushioned assembly shall be installed. All exposed nuts, bolts, washers and springs on buried and on above ground outdoor service valves shall be 316 stainless steel.
   b. Check valves 3" or smaller shall be a heavy duty spring, all rubber flapper type check valve with cast iron body. A flat set stainless steel spring, integrally molded into the Buna N rubber flapper, shall be furnished in order to prevent collection of debris in the check valve. All fasteners shall be stainless steel.

2. Isolation Valves
   a. Valves four (4) inches and larger shall be eccentric plug type of the non-lubricated type and comply with AWWA C-504 and C-507. Minimum pressure rating of valves 4 inches through 12 inches shall be 175 psi, valves larger than 12 inch shall be 150 psi. Valve bodies shall be cast iron ASTM A 126, Class B, in compliance with AWWA C 504 and C-507. Port areas for all valves shall be 100 percent of the full pipe area.
      i. Resilient plug facings shall be of Hycar, Nitrile Butadiene rubber or Neoprene.
      ii. Valve ends shall be flanged joint for above ground or mechanical joint for underground installation. Valve body seats shall have a welded-in overlay of not less than 90 percent nickel for all parts, which come in contact with the plug face. Packing shall be permanently lubricated 316
stainless steel in both upper and lower journals in accordance with AWWA Standard C-507. The valve supplied shall have drip tight shut-off with flow in either direction at the full pressure rating of the valves. All exposed nuts, bolts, springs and washers on buried and on above ground outdoor service valves shall be 316 stainless steel. No hollow pins will be allowed.

iii. Valves shall be furnished with permanently lubricated stainless steel or oil-impregnated bronze upper and lower plug stem bushings. Valve shaft seals shall be adjustable.

iv. Operation of all valves 10-inches or larger shall be by approved gear actuators, equipped with position indicators and stops, and shall be furnished by the valve manufacturer. Gear actuators shall be furnished with sealed enclosures. Valves shall be equipped with actuating nuts, cast iron handwheels or chain operators, with galvanized steel chains, as appropriate for the installation and type of operator.

b. Valve 3" or smaller shall be ball type of polyvinyl chloride and shall have seals made of Niton and seats of Teflon. PVC shall be Type 1, Grade 1 polyvinyl chloride conforming to ASTM D1785, latest revision.

C. For pump stations over 2 h.p., Emergency Pump Connections shall be provided for emergency auxiliary pumping and shall be coupled to the discharge main through a fitting with valving as required for making a dead hook-up. The connection pipe shall be DI of suitable size, but in no case less than 4-inches in diameter.

D. Surge control valves, or other approved systems shall be provided for all wastewater pumping stations where hydraulic conditions indicate the necessity.

E. Wastewater Pumps and Motors:

1. Submersible Pumps.

   a. The wastewater pumping units shall be capable of handling raw, unscreened wastewater and shall be capable of passing a sphere of at least three (3) inches in diameter.
b. ASTM Type 316 stainless steel dual slide rails shall be provided for each pump.

c. The Impellers shall be constructed of cast iron, ASTM Type A536.

d. The pump shaft shall be of Series 300 or 400 stainless steel. The shaft and bearings shall be adequately designed to meet the maximum torque required for start-up or operating conditions and minimize vibration and shaft deflection.

e. Each pump shall be fitted with a ASTM Type 304 stainless steel lifting chain of adequate strength.

f. Pump Motors: All motors shall be built in accordance with the latest NEMA, IEEE, ANSI, and AFBMA Standards where applicable. Pump motors shall have cooling characteristics suitable to permit continuous operation in totally, partially, or non-submerged conditions. The pump shall be capable of running continuously in a non-submerged condition under full load without damage, for extended periods. Motors of 25 horsepower and below shall be 230/460 volt, 3-phase, and motors greater than 25 horsepower shall be 460 volt, 3-phase. All pump motors shall be designed with a 1.15 service factor and shall not be less than five (5) horsepower unless approved. Pumps shall be capable of meeting all pump curve conditions without exceeding the motor's rated horsepower.

g. Pump Control Panel:

i. The control panel shall respond to Mercury float switches to automatically start and stop pumps. Should the “pump on” regulator fail, the float system shall keep the station in operation and provide a visual indication of the regulator failure.

A float and an alarm at high wet well levels shall be provided. The control panel shall operate all electrical submersible pumps at the power characteristics stipulated. The control function shall provide for the operation of the lead pump under normal conditions. If the incoming flow exceeds the pumping capacity of the lead pump, the lag pump shall automatically start to handle this increased flow. As the flow decreases, the pumps shall be cutoff at the specified elevation. The pumps shall alternate positions...
as lead pump at the end of each cycle. A failure of the
alternator shall not disable the pumping system.

ii. The pump control panel shall be housed in a NEMA 4X,
ASTM Type 304, 14 gauge stainless steel enclosure with
30 percent extra mounting space for additional equipment
and for enlarging pump motors. The enclosure shall have
provisions for padlocking the door and a dead front inner
door unit for mounting controls. All exterior hardware and
hinges shall be stainless steel. In addition, there shall be
affixed to the interior side of the exterior door both a
nameplate and a 10 inch by 12 inch pocket for log sheet
storage. The nameplate is to be removable for replacement
in the event a pump upgrade is performed. The nameplate
shall contain the following information: voltage, phase,
rated horsepower, speed, date manufactured, pump and
control panel manufacturer's name, address and telephone
number, pump data, including impeller data, operating
point and head, KW, and amps at the operating point and at
least two (2) other points on the pump curve.

iii. The power supply to the control panel shall be either 240
volt, 3-phase, 4-wire or 480 volt, 3-phase, 4-wire. Minimum service shall be 100 amp. Single phase power
shall not be accepted. Fusible safety service main
disconnects with current limiting fuses shall be installed at
all stations.

iv. Circuit Breakers:

a. Main Breakers: The panel shall have an inter-lock
system between the normal power main breaker and
the emergency breaker to ensure only one (1)
breaker in the "on" position at a time. Both
breakers shall be equal in size.

b. Circuit Breakers: All circuit breakers shall be
heavy-duty molded-case breakers. The handle on
the circuit breakers shall be operational through the
inner door.

v. Each pump shall be protected by a 3-pole motor circuit
protector. The motor circuit protector shall be operated by
a toggle-type handle and shall have a quick-make, quick-
break over-center switching mechanism that is mechanically trip-free from the handle so that the contacts cannot be held closed against a short circuit and abnormal currents which cause the motor circuit breaker to trip. Tripping shall be clearly indicated by the handle automatically assuming a position midway between the normal "on" and "off" positions. All latch surfaces shall be ground and polished. All poles shall be so constructed so that they open, close, and trip simultaneously. The motor circuit protector must be completely enclosed in a high-strength glass polyester-molded case. Ampere ratings shall be clearly visible. Contacts shall be of non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes. A manual push-to-trip button shall be provided for manual exercising of the trip mechanism. Each pole of these motor circuit protector's shall provide instantaneous short circuit protection by means of an adjustable magnetic-only element.

vi. The panel shall contain a motor starter for each pump installed. The motor starter shall be across the line magnetic starter with individual overload protection on each lower leg with reset installed through the inner door unit. Selector switches shall be installed on the face of the inner door unit. Selector switch shall be a heavy-duty oil-tight "Hand-Off-Automatic" three (3) position switch to control the operation mode of each pump motor starter.

vii. Emergency Power Receptacle: The control panel shall have an external mounted generator receptacle, namely, a Russell Stohl 100-amp Model JRS1044FR.

viii. All power wires shall be THW or THWN 75-degree stranded copper conductors and shall be appropriately sized for the given load application. All control circuit wire shall be type THW, stranded wire type. All wiring within the enclosure shall be neatly routed by the use of slotted wiring duct with snap-on type covers. Wiring on the rear of the inner door shall be neatly bundled with nylon ties and include sufficient loop across the hinges to prevent wire damage,

ix. Terminal points of all terminal strips shall be permanently identified. All terminal numbers and identifying
nomenclature shall correspond to and be shown on the electrical diagrams. All wiring shall be permanently shown on the electrical drawings. Control terminal blocks shall be of the clamp screw type, rated for 600 volts. Amperage rating shall accommodate the control circuit amperage. An additional 30 space terminal strip shall be installed in the cabinet for future use, with RTU equipment.

x. All circuit breakers, control switches, indicator pilot lights, and other control devices shall be identified with permanently affixed legend plates and lamicoid-type engraved nameplates.

xi. A surge protector shall be included and wired to protect motors and control equipment from lightning-induced line surges. All surge protectors shall be Underwriters Laboratories (UL) approved and installed per the respective power company’s requirements and manufacturer’s specifications. Surge protectors shall be attached to the main disconnects.

xii. Elapsed time meters shall be 115 volt non-reset type and shall totalize pump running time in hours and tenths of hours to 99999.9 hours.

xiii. On the face of the inner door unit, there shall be installed a 15 amp, 120 volt, duplex convenience receptacle. It shall be provided with its own single pole, 15 amp circuit breaker for protection. Ground fault interrupt type shall be required.

2. Grinder Pumps

a. The pump shall have an integrally built in grinder unit and submersible type motor. Solids shall be fed in an upflow direction to the grinder mechanism with no obstructions below the grinder inlet. The grinder unit shall be capable of cutting solid material found in normal domestic sewage, including reasonable amounts of foreign objects, such as wood, plastic, glass, rubber, sanitary napkins, disposable diapers and panty hose into a fine slurry that will pass freely through the pump, service line and force main.

b. Pump grinder assembly shall consist of a single rotating grinder impeller and a single stationary-shredding ring mounted directly
below the pump volute inlet. Grinder impeller shall thread onto the shaft, and locked in place with a locking screw and washer. Shredding ring shall be held in place by a steel-retaining clamp. Both shredding ring and grinder shall be removable without dismantling pump. No adjustment of the grinder assembly shall be necessary for proper grinder operation. Multiple grinder assemblies requiring initial or periodic axial adjustment shall not be considered equal. Grinder impeller and shredding ring shall be made of 440°C stainless steel hardened to 58-60 Rockwell.

c. Pump impeller shall be of recessed type to provide an open, unobstructed passage through the volute. The impeller shall have pump out vanes on the backside to keep solids from lower seal and reduce pressure at the seal faces. The impeller shall be of 85-5-5-5 bronze and shall be threaded onto the shaft.

d. All castings shall be of high tensile strength ductile iron. Castings shall be treated with phosphate and chromate rinse and to be painted before machining and all machined surfaces exposed to sewage water to be re-painted.

e. Motor stator windings shall be of the open type with NEMA class B insulation good for 130°C (266°F) maximum operating temperature. The winding housing will be filled with clean high dielectric oil that lubricates bearings and seals and transfers heat from the windings to the outer motor shell. Stator shall be heat shrunk into the housing for proper alignment and superior heat transfer. Bolted in stators which may not be properly aligned and have inferior heat transfer capabilities shall not be considered equal. Air filled motors not having the superior heat transfer capabilities of oil filled motors shall not be considered equal. Motors shall have three (3) bearings. Upper and lower ball bearings shall support the motor rotor. Upper ball bearing shall handle the radial and thrust loading, lower ball bearing shall handle radial loading, and lower sleeve bearing shall handle all radial shock loading due to the grinding action. Ball bearings shall be designed for a minimum L10 life of 50,000 hours. A heat sensing thermostat shall be imbedded in the top of the windings and be connected in series with the motor starter coil located in the control panel. In the event that winding temperatures exceed 105°C (221°F) for any reason, the thermostat shall open, shutting down the pump. The thermostat shall reset automatically when temperatures return to a safe operating level. The common motor, pump, and grinder shaft shall be 416 stainless steel.
impeller shall thread onto shaft, locked in place by a lock screw and washer arrangement. Three phase pumps shall have two (2) sensors.

f. Motor shall be protected by two (2) mechanical shaft seals mounted in tandem with an oil filled chamber between the seals for lubricating the seal faces and providing a buffer zone to protect the motor in the event of an outer seal leakage. Seal faces shall be carbon and ceramic lapped to a tolerance of one light band. Lower seal faces of tungsten carbide are optional. All metal parts and springs for the seals shall be 18-8 stainless steel. A double electrode is to be mounted in the lower end of the seal chamber to detect any water leakage into the chamber. Electrode is to be connected to a red signal light in the control panel. This indicator shall not cause the motor to stop, but merely indicates leakage so that the pump seal can be serviced before the motor is damaged.

g. All fasteners used in the assembly of the pumps shall be 302 stainless steel.

h. Motor power cord shall be SOW/SOWA type four conductor of with a length of feet. Motor control cords to be 18/5 SOW/SOWA five conductor. Each cable shall be provided with a green ground wire to be in accordance with local and national electric codes.

i. The cable entry system will consist of three (3) separate seals. A rubber grommet that seals both outer cable jackets shall be clamped onto the cords by an end holding cap. An O-ring shall seal the end holding cap to the bottom half of the cord cap. Both cables shall have individual conductors stripped and potted into the motor end cap with an epoxy potting compound. Potting compound shall prevent wicking of water into the motor in the event that the outer cable jacket is damaged. Cords shall be able to withstand a pull of 300 pounds without loosening or losing seal integrity.

j. The pumps shall be installed on a lift out rail system. One rail system is required for each pump. Discharge piping shall be minimum 1-1/4" NPT. All lift-out rail castings shall be treated and painted as specified for the pumps. An upper grade plate shall be attached to the pump to support lift-out fitting and guide the pump on the rails. The rails are to be a minimum of 3/4" stainless steel pipe. An adjustable top rail support and mounting bushing shall be attached to the basin cover or cover frame. Rail systems which
require that the pump have legs to provide additional support of the pump weight, resulting in tangling of trash around the pump legs will not be acceptable.

k. Pump on, off, and alarm levels shall be controlled by four (4) mercury tube float switches. Switches shall consist of a mercury tube switch sealed in a corrosion-resistant polypropylene housing with a minimum of 18 gauge, 2-wire, SJOW/A jacketed cable. The cable shall be of sufficient length to reach the junction box with no splices. The level controls shall be suspended from a stainless steel bracket so that adjustment or replacement may be done without the use of any tools. Level controls shall be UL/CSA listed.

1. Control panel enclosure shall be NEMA 3R type 304 14 gauge stainless steel size 24 "h x 24"w x 10'd minimum with a fully gasketed and hinged outer door, rainshield, and provisions for padlocking. The enclosure shall be equipped with an inner deadfront door fabricated of T5052-H32 aluminum steel. Circuit breakers shall be mounted through the door. The following components shall be provided as a minimum:

- main circuit breaker
- emergency circuit breaker
- emergency generator receptacle (reverse service) with mating plug
- pump circuit breakers (2)
- IEC-rated motor starters (2) with thermal overload elements
- control circuit breaker
- 15 amp duplex GFI receptacle
- phase monitor
- lightning arrestor
- surge capacitor
- duplex alternator (with mode switch)
- external high water alarm light with horn, test and silence
- h-o-a selector switches for each pump (30mm)
- run lights for each pump (30mm)
- elapsed time meters for each pump
- oil seal fail indicating lights (neon)
- 24V float circuit operation with 30mm push-to-test level lights (includes 120x24v transformer with fused primary and secondary)
All internal wiring shall be neatly bundled and color-coded with color code identification delineated on inner door. All control wiring shall be 14 gauge type THHN. Power wiring shall be rated for applicable currents and sized in accordance with NEC requirements.

A wiring diagram with wire number identification shall be fastened permanently to the inside of the enclosure. A detailed bill of materials with manufacturer name and part number shall be included with the wiring diagram.

Panel shall bear the label of a third-party testing agency and shall be manufactured to the requirements of UL Standard 508.

Panel shall be UK listed in accordance with UL Standard for Safety 508A.

m. Wet well shall be molded of fiberglass reinforced polyester resin of the lay-up and spray technique to assure that the interior surface is smooth and resin-rich. The vault shall have a minimum wall thickness of 1/4". The vault walls shall be designed to withstand a wall collapse based on the assumption of hydrostatic-type loading by back-fill with a minimum density of 120 pounds per cubic foot. The vault wall laminate shall be constructed to withstand or exceed two times the assumed loading for any depth of vault. The vault bottom shall be of sufficient thickness to withstand applicable hydrostatic uplift pressure with a safety factor of two. The center deflection of the empty vault bottom shall be less than 3/8" (elastic deflection). A fiberglass anti-flotation collar shall be molded on the bottom of the basin.

Covers for basins shall have an access opening properly sized for pump installation and removal. Covers shall be constructed of non-skid aluminum thread-plate with a minimum thickness of 1/4". Covers shall be bolted to the basin with stainless steel cap screws. Stainless steel nuts shall be embedded in the upper flange of the fiberglass basin for corrosion resistance and to prevent turning.

6.04 TOOLS AND SPARE PARTS
A. One (1) set of all special tools required for normal operation and maintenance shall be provided. All such tools shall be furnished in a suitable steel tool chest complete with lock and duplicate keys.

B. Spare parts shall be properly packaged and labeled for easy identification without opening the packaging and suitably protected for long term storage under humid conditions. The manufacturer shall furnish the following spare parts for each pump supplied:

1. One (1) upper bearing.
2. One (1) lower bearing.
3. One (1) set of upper and lower shaft seals.
4. One (1) set of "O-Rings" or gaskets required for replacement of bearings and seals.
5. One (1) impeller wear ring.
6. One (1) shaft sleeve, if applicable.
7. One (1) cable cap, if applicable.
8. One (1) influent debris cage.

6.05 INSTALLATION AND TESTING

A. A factory representative knowledgeable in pump operation and maintenance shall inspect and supervise a test run at the pumping station. A minimum of one (1) working day shall be provided for the inspection and testing. Additional time made necessary by faulty or incomplete work or equipment malfunctions shall be provided as necessary to meet the requirements in this Manual at no additional cost to the City. A minimum of 48 hours written notice shall be given to the City to witness the field test(s). Upon satisfactory completion of the test run, the factory representative shall issue a manufacturer’s certificate.

B. Warranty: The products shall be guaranteed to be free from defects in material and workmanship under normal use and service for a period of 18 months after start-up.

END OF SECTION
NOTES:
1. DESIGN ENGINEER SHALL PROVIDE A SCALED (1" = 20' MIN.) SITE SPECIFIC DETAIL.
2. SITE PLAN TO INCLUDE BENCH MARK AND NORTH ARROW.
3. 10' WIDE CONCRETE/ASPHALT DRIVE IN ACCORDANCE WITH CITY DRIVEWAY STANDARDS.
4. LANDSCAPE THE SITE PER CITY CODE.
5. PROVIDE 5 FT. LANDSCAPE AREA AROUND SITE PERIMETER PER LDC.
NOTES:
1. USE RAMNEK & NON-SHRINK GROUT IN ACCORDANCE W/ STD MH SPECIFICATIONS.
2. EXTERIOR OF WETWELL, VALVE VAULT AND ALL PIPING TO RECEIVE (2) COATS KOPPERS BITUMASTIC 300M, 8-10 MILS DFT/COAT OR EQUAL. 1ST COAT RED, 2ND COAT BLACK. INTERIOR COATING SHALL BE PER SECTION 4.03.
3. TYPE II REINFORCED CONCRETE; 4,000 PSI. PER ASTM C-478 MIN.
4. SEE PLAN FOR CORRECT ORIENTATION OF PIPES, VENT AND OTHER FIXTURES.
5. ALL HARDWARE INSIDE & OUTSIDE OF WET WELL & VALVE PIT TO BE STAINLESS STEEL (TYPE 304).
6. ENGINEER SHALL SUPPLY BUOYANCY CALCULATIONS.
7. PUMP AND HARDWARE SHALL BE INSTALLED PER MANUFACTURE'S RECOMMENDATIONS.
8. LIFT STATION STRUCTURES DEEPER THAN 20 FT. SHALL BE DESIGNED BY ENGINEER OF RECORD.
INSTALLATION NOTES

1. PANEL, TELEMETRY BOX, METER, JUNCTION BOX AND 120 VOLT TRANSFORMER ARE TO BE MOUNTED ON STAINLESS STEEL STRUTS, WITH STAINLESS STEEL FASTENING DEVICES, AND SHALL BE SUPPORTED BY TWO POSTS, MIN. FOUR (4) INCH DIAMETER PIPE OR MIN. FOUR (4) INCH SQUARE TUBE (ALUMINUM OR STAINLESS STEEL) CAPPED AT THE TOP. PAINT BELOW GRADING SUPPORTS WITH ASPHALTUM PAINT TO FOUR (4) INCHES ABOVE GRADE.

2. PANEL MUST BE NOT CLOSER THAN 36 INCHES OR FARTHER THAN 48 INCHES FROM WET WELL OPENING MEASURED FROM THE FRONT OF THE PANEL.

3. THE RADIO MONITOR SHALL BE MOUNTED IN ITS OWN CABINET ON THE RIGHT SIDE OF THE PANEL. RADIO TO MATCH PALM BEACH COUNTY'S SYSTEM INCLUDING RUN TIME TRANSMITTED. LIVE TEST OF THE TELEMETRY SYSTEM MUST BE DONE AND APPROVED AT THE LIFT STATION START-UP. ANTENNA AND CABLE SHALL BE PART OF THE RADIO SYSTEM. ANTENNA SHALL BE SEPARATELY GROUNDED TO THE GROUND ROD OF THE STATION.

4. FABRICATE ANTENNA FROM 21 FEET LENGTH OF 2" DIAMETER SCHEDULE 40 GALVANIZED STEEL PIPE. PAINT LOWER THREE (3) FEET WITH ASPHALTUM PAINT, CAP THE TOP OF PIPE.

5. RUN 3/4 INCH RIGID GALVANIZED CONDUIT UP THE MAST FOR THE ANTENNA CABLE TO WITHIN 16 INCHES OF THE TOP. RUN SECOND 3/4 INCH CONDUIT UP THE MAST FOR ALARM AND FLOOD LIGHTS AS SHOWN. USE STAINLESS STEEL UNISTRUT AND CLAMPS TO HOLD CONDUITS TO THE MAST.

6. MOUNT FLOOD LIGHT AND FLASHING RED LIGHT ON THE ANTENNA MAST AT TEN (10) FEET AND EIGHT (8) FEET ABOVE GRADE. LIGHTS SHIPPED LOOSE WITH PANEL.

7. CONDUIT TO THE POWER COMPANY SERVICE POINT SHALL BE RIGID GALVANIZE WITH ASPHALTUM PAINT ON ALL FITTINGS AND ON ALL RISERS TO 12 INCHES ABOVE GRADE, WIRING FROM THE METER CAN TO THE PANEL SHALL BE RIGID GALVANIZED CONDUIT ENTERING THE BOTTOM OF THE PANEL. ALL WIRE SHALL BE COPPER. HIGH LEG ON 240 VOLT SHALL BE TAPED ORANGE AND PUT ON CENTRAL TERMINAL IN PANEL AND RIGHT TERMINAL IN METER.

8. PROVIDE TWO (2) - THREE (3) INCH CONDUITS PVC SCHEDULE 80 WITH SWEEP BENDS, FROM THE JUNCTION BOX TO THE WET WELL.

9. RUN PUMP MOTOR CABLES IN TWO (2) - TWO (2) INCH CONDUITS AND FLOAT CABLES IN THIRD. SUPPORT PUMP CABLES WITH STAINLESS SPLIT BASKET KELLUM (OR EQUAL) GRIPS ON S.S. THIMBLE RACK. ALL HARDWARE IN THE WET WELL AND ALL FASTENERS SHALL BE STAINLESS STEEL. CABLES SHALL BE CONTINUOUS FROM THE JUNCTION BOX TO THE MOTORS OR FLOATS. SUPPORT CABLES ENTERING THE JUNCTION BOX WITH SPLIT PVC STRAIN RELIEF BUSHINGS.

10. WHEN CONNECTIONS ARE COMPLETE IN THE JUNCTION BOX, COAT THE TERMINAL BLOCKS AND WIRE ENDS WITH PROTECTIVE COMPOUND, NO-OXIDE OR EQUAL, TO PREVENT CORROSION.

11. PROVIDE RIGID GALVANIZED CONDUITS FROM THE PANEL TO THE RTU, TO 120 VOLT TRANSFORMER, AND TO THE LIGHTS. ALL CONDUITS ENTER BOTTOM OF THE PANEL. SEAL ALL CONDUITS WITH DUCT SEAL TO KEEP OUT MOISTURE.

12. PAINT PVC PIPES, CONDUITS AND ANY PARTS NOT STAINLESS OR ALUMINUM WITH TWO (2) COATS OF ALUMINUM PAINT.

13. TEST AS FOLLOWS, PUMP SUPPLIERS FIELD TEST MAN MUST BE PRESENT TO CONDUCT TESTS.
   A. MEGGER MOTORS, MOTORS SHALL BE 20 MEGOHMS OR MORE TO GROUND, DO NOT MEGGER LOW VOLTAGE CONTROLS.
   B. CHECK VOLTAGE, CHECK PUMP ROTATION, RECORD VOLTAGE AND AMPS UNDER LOAD.
   C. DEMONSTRATE PROPER OPERATION OF ALL CONTROLS.
   D. CONDUCT DRAWDOWN TESTS AS REQUIRED.
   E. CHECK OPERATION WITH OWNER’S PORTABLE GENERATOR CHANGE WIRE CONNECTIONS IN THE PANEL TO GIVE CORRECT ROTATION.

14. TEST AND DEMONSTRATE PROPER OPERATION OF THE RADIO TELEMETRY SYSTEM. SUPPLIER'S FIELD REPRESENTATIVE SHALL MOUNT AND CONNECT THE ANTENNA AND MAKE THE FINAL CONNECTIONS TO THE SYSTEM.
FRONT VIEW
(Door shown open)

NAMEPLATES:
PL1/SS1 – PUMP NO. 1
PL2/SS2 – PUMP NO. 2
PL3 – HIGH LEVEL ALARM
PB1 – ALARM SILENCE
NCB – NORMAL POWER
ECB – EMERGENCY POWER
CB1 – PUMP NO. 1
CB2 – PUMP NO. 2
CB3 – CONTROL POWER
CB4 – GFI RECEPTACLE

NOTES:
1) PANEL SHALL BE BUILT TO U.L. SPECIFICATIONS
   AND SHALL BEAR THE U.L. LABEL
2) GENERATOR RECEPTACLE SUPPLIED LOOSE
   FOR SEPARATE MOUNTING.
3) PANEL SHALL BE NEMA 4X

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

DUPLEX CONTROL PANEL ENCLOSURE
DEAD FRONT LAYOUT

Date: July 2000
Revisions
Appr. by
NOTE
1. 6' ABOVE 100-YEAR FLOOR ELEV.

A GRADE
B INFUXNT INVERT 0.0 FT NGVD
C ALARM 4.0 FT NGVD
D LAG PUMP "ON" 0.2 FT NGVD
E LEAP PUMP "ON" 0.2 FT NGVD
F PUMPS "OFF" 0.2 FT NGVD
G WET WELL INVERT -32 FT NGVD
H WET WELL DIAMETER 36 IN
J DISCHARGE DIAMETER 1/14 IN
K GUIDE RAIL DIAMETER 18 IN
L FORCE MAIN DIAMETER 1/2 IN
M FORCE MAIN COVER 36 IN
N DISCHARGE PIPE C/L 18 IN
P OPENING 16 IN
Q OPENING 24 IN
R PANEL C/L 60 IN
S INFUXNT DIAMETER 4 IN
1. All materials and construction under this project shall be in strict accordance with the requirements of the City of North Miami Beach Engineering Department (NMB) and/or Dade County Public Works Department (DCPWD) and/or the Florida Department of Transportation (FDOT) and shall conform to the standards and specifications available and on file with the department. As a minimum requirement, the standards of the Ten State Standards shall apply.

2. Minimum cover over mains shall be 3'-0", 2'-0" for service lines, unless specific written exception is issued or required by an authorized representative of NMB.

3. Detector tape shall be installed 18' above the centerline of mains and services.

4. All valves shall be installed complete with 10' riser pipes and No. 3 valve boxes. Fire hydrants and service valves shall be installed complete with 6' riser pipes and No. 2 valve boxes.

5. Pressure sewer main shall be of PVC (C-900) for 4" and 6" sizes; PVC (Schedule 40) for 3" and smaller sizes and for service lines, or polyethylene per specifications.

6. All fittings for 6" shall be polyethylene lined, cast iron or ductile iron, class 250 and shall be fitted with retaining glands at reaction points that are 45 degrees or greater in addition to concrete thrust blocks. All fittings for 3" and smaller shall be PVC (Schedule 40), solvent cement-connected or polyethylene per specifications and shall be thrust blocked at all reaction points.

7. Contractor MUST call the NMB Inspection Division and all other applicable permitting agencies to arrange for a Pre-Construction Meeting at least 72 hours prior to proposed start of construction.

8. NMB personnel will inspect all facilities approved by the Engineering Department. All other requirements of the permitting agency shall be in accordance with their standards and requirements.

9. Work performed under this project will not be considered as complete until final acceptance of the system by the department and until the following documents are received and approved by NMB:
   * Easements, if required (whether by deed or plat suitably recorded)
   * Contractor’s Waiver and Release of Lien
   * Absolute Bill of Sale
   * Contractor’s Letter of Warranty (i.e. Letter Agreement)
   * Contractor’s Maintenance Bond (for 1 year)
   * As-Built 3 mi mylar 24" x 36" showing specific locations, depths, etc. of all water facilities as located by a licensed surveyor, along with two (2) prints of the "As-Built" which have been signed and sealed by a registered surveyor or Engineer of record and endorsed by the Contractor in accordance with NMB standards.

10. All new connections from existing NMB mains to be inspected by NMB forces prior to backfill.

11. The Contractor shall be responsible for verifying all locations, dimensions, elevations and the locations of all underground structures and utilities prior to the start of construction. The locations shown on the plans are not guaranteed accurate or correct by the known utility companies.

12. Thrust blocks shall be provided to all bends, tees and plugs in accordance with NMB standard details.

13. Pipe installation, cleaning, flushing, and testing, as per NMB and State of Florida Standards for the installation of pressure sewer by customer donation projects.

14. The Contractor is responsible for the cost of inspections for any construction activities occurring outside normal working hours (8:00 a.m. to 5:00 p.m.) Saturdays and Sundays and holidays excluded and arrangements for inspections outside normal working hours must be made a minimum of 48 hours in advance of the construction activity.

15. All trenches to be over-excavated a minimum of 6" to provide for installation of rock bedding in accordance with NMB Standards.

16. Surface restoration, pavement replacement, sidewalk replacement, trench backfilling and compaction shall comply with the applicable current NMB, DCPWD and FDOT Standards.

17. The Engineer of record shall provide NMB with a signed and sealed pressure test report certifying pressure test results.

DADE COUNTY D.E.R.M. NOTES

1. A horizontal distance of 10 feet shall be maintained between water and sewer mains. When a 10 feet horizontal distance criteria cannot be met due to an existing underground facility conflict, the sewer shall be constructed of ductile iron pipe with mechanical joints.

2. A vertical distance of at least 18 inches shall be maintained between any water and sewer mains. The sewer shall be ductile iron single 20 feet length centered on the crossing if the minimum vertical distance is less than 18 inches or the sewer is installed above the water main regardless of separation.

3. In highly congested areas, where either water or sewer facilities are existing and the separation requirements cannot be met, special consideration may be given subject to a complete evaluation of existing and proposed conditions.

4. The contractor shall verify nature, depth, character of existing underground utilities prior to start of construction.

TRENCH PROTECTION

Trench excavation protection shall be accomplished as required by the provisions of Part 1926, Subpart P, Excavations, Trenching and Shoring of the Occupational Safety and Health Administrations Standards and Interpretations.

CITY OF NORTH MIAMI BEACH
PUBLIC SERVICES DEPARTMENT

LOW PRESSURE SEWER SYSTEM
GENERAL NOTES

Date: Sept 2001 Scale: N.T.S. Dwg: F348a Fig: 631

Date Revisions Appr. by
STORMWATER MANAGEMENT
SECTION 7

STORMWATER MANAGEMENT

7.01 GENERAL

A. General Criteria

1. Delegated Jurisdiction:
   All stormwater drainage systems shall be designed in accordance with the requirements of the following agencies and publications:
   
   b. Miami-Dade County Department of Environmental Resource Management (DERM).

2. Statutory Criteria:
   
   d. Other statutory criteria as set forth by the agencies and publications in Section 7.01, A.1.

3. Enforcement:
   
   All criteria and standards set forth or referenced by this document shall apply to all areas of new development or significant redevelopment as determined by the City, pursuant to City and or County ordinances, and pursuant to City standards and practices.

B. Stormwater Pollution Abatement and Water Quality Considerations

1. Purpose:
   
   A direct result of development is the alteration of natural pervious ground surfaces with the addition of pavement and building impervious surface.
source of pollution (associated with run-off from impervious surfaces) is introduced with the development of land, as well as a lowering of the groundwater table underneath the impervious surfaces due to changes in the groundwater recharge characteristic for the site. It becomes important to lessen or abate the amount of pollutants being discharged from a developed site, to limit the degradation of water quality below state and local standards.

2. Statutory Criteria:

a. The quality of stormwater discharged to a receiving surface water body must meet standards as set forth in Chapters 62-3, 62-4, and 62-302 F. A. C.

b. The quality of stormwater discharged to ground water must meet standards as set forth in chapter 62-550, F. A. C.

c. Other applicable statutory criteria are set forth in Chapters 62-520 and 62-522, F. A. C.

3. Water Quality Treatment Volumes:

Volumetric requirements for water quality considerations shall conform to SFWMD criteria, “Basis of Review for ERP Applications”, Section 5.2.

4. Use of Natural Depression Areas and Water Bodies:

Natural areas (excluding wetlands), and existing water bodies may be used for water quality treatment purposes only if environmental water quality and public use of considerations are not violated.

5. Use of Wetlands and Environmentally Sensitive Areas:

Wetlands and environmentally sensitive areas may not be used for water quality treatment purposes. Water quality criteria must be satisfied prior to discharging any excess runoff to these areas.

6. Underground Exfiltration Systems:

Underground exfiltration systems may be utilized for water quality treatment purposes, and shall be designed to meet all applicable water quality criteria (volumetric requirements). The system design shall be based on test data for the site, and shall incorporate a minimum safety factor of two (2).
a. Exfiltration systems shall conform to the most stringent SFWMD, Miami-Dade County Public Works, and Miami-Dade County DERM criteria, and to City standards set forth in this document.

b. Systems may be provided with an emergency overflow into a surface water body provided the water quality treatment requirements are met prior to discharging. Such connections must be approved by the applicable agency or agencies having jurisdiction over the water body.

C. Flood Management

1. Purpose:

The intent of flood management criteria is to protect public and private property from flooding, and to protect public health and welfare. Consideration will be given to extent and duration of flooding before and after new development and redevelopment to specific site characteristics, to the characteristics of adjacent watersheds and of the ultimate receiving facility(ies), and to the impact of regional water policy on the site.

2. Flood Plain Encroachment:

No net encroachment into the 100-year, 3-day (72-hour) flood plain will be allowed. Full compensation for flood plain encroachment will be required.

3. Flood Protection of Building:

Building floors shall be above the 100-year, 3-day (72-hour) flood elevation established for the area, based on the highest elevation, established by the following:

a. City of North Miami Beach
b. Miami-Dade County Public Works Department
c. Federal Flood Insurance Rate Maps
d. Other approved methodology

4. Flood Protection for Roads and Parking Lots:

The most stringent design criteria for flood limits and design storm frequencies as set forth by the following agencies shall be utilized:

a. Miami-Dade County Public Works Department
b. SFWMD

5. Attenuation of Peak Stormwater Discharge Rates:

The peak flow rates leaving a developed site shall be less than or equal to pre-development discharge rate resulting from the 25-year, 24-hour design storm event. The goal is to ensure that downstream lands are not adversely impacted from upstream development during large storm events.

6. Water Quantity:

Surface off-site discharge volumes are limited to volumes not causing adverse impacts to existing off-site properties, and which do not exceed historic discharge volumes. A design storm event of 25-year frequency and 3-day (72-hour) duration.

a. All systems providing outfall to a natural depression area, water body, or wetland must insure that proper treatment is provided prior to discharging excess runoff by satisfying all applicable water quality regulations.

b. Gravity drainage wells will be permitted for use in those developed urban areas incapable of meeting the applicable flood control criteria by any other means. Wells must be designed according to specific criteria set forth by Miami-Dade County DERM and in this document. In all cases, all applicable water quality regulations must be met prior to discharging excess runoff to any gravity well.

7.02 STORM WATER SYSTEM DESIGN AND CONSTRUCTION CRITERIA

A. General

All new drainage systems or modifications to existing drainage systems, shall conform to the most stringent criteria as set forth by SFWMD, Miami-Dade County Public Works Department, and Miami-Dade County DERM for the specific type of system used. Where applicable, more stringent City of North Miami Beach criteria set forth in this document shall be applied.

B. Stormwater Runoff Computations

1. Methodologies:

Peak discharge rate and discharge volume computations should consider the duration, frequency, and intensity of rainfall, the antecedent moisture conditions, upper soil zone and surface storage, time of concentration,
tailwater conditions changes in land use or land cover, and any other changes in topographic and hydrologic characteristics. Large systems should be divided into sub-basins, according to artificial or natural drainage divides, to allow for more accurate simulations of actual field conditions and responses. Examples of accepted methodologies for computation of runoff are as follows:


b. Rational Method may be used for urban areas with relatively small watersheds, and as approved by the City.

c. Other hydrograph methods approved by the City on an individual basis.

2. Time of Concentration:

Calculations shall be performed in accordance with USDA SCS TR-55 methodology or other acceptable methodology as approved by the City.

3. Soils Investigation:

A certified soils report prepared by a licensed Geotechnical Engineer is required for all projects. The report shall include detailed soil boring information and SHWT estimates, as well as water table elevation at the time of the investigation. Soil permeability tests shall be included where applicable and as required elsewhere in this Document.

4. Upper Soil Zone Storage and Surface Storage:

The upper soil zone storage and surface storage capacities will have an effect on the pre-development and post-development peak discharge rates and discharge volumes, and should be considered in these computations.

a. Soil zone storage at the beginning of a storm should be estimated based on the site conditions per the soils investigation performed for the project. Credit will only be given for storage above the SHWT elevation. At a minimum, all systems shall be designed assuming an antecedent moisture condition (AMC) of II. In no case should the soil storage used in the computation exceed the difference between the maximum soil water capacity and the field capacity for the soil above any impervious layer or seasonal ground water table.
b. Surface storage, including that available in wetlands and low-lying areas, shall be considered as depression storage. Depression storage shall be analyzed for its effect on peak discharge and the time of concentration.

5. Credit for Seepage:

Credit for stormwater seepage during the design storm will not be allowed unless accompanied by supporting groundwater mounding calculations or applicable groundwater recharge calculations, and the use of sound engineering judgment.

6. Rainfall:

Average rainfall intensities and total rainfall values shall be obtained through a statistical analysis of historical long-term rainfall data or from sources or methods generally accepted. When applicable to the methodology utilized, rainfall patterns shall follow USDA-SCS, Type II distribution as modified for Florida. Examples of acceptable sources of rainfall data include:

a. USDA Soil Conservation Services, "Rainfall Frequency Atlas of Alabama, Florida, Georgia, and South Carolina for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 years" January 1978; Gainesville, Florida.


f. Other published data accepted by SFWMD or Miami-Dade County Public Works Department.

C. Collection, Conveyance and Disposal Systems

1. General Performance and Design Standards:
   a. Minimum Pipe Size Requirements:
i. All pipe sizes should be designed to produce a minimum flushing velocity (whenever possible) without producing velocities that cause erosion problems.

ii. The minimum pipe size to be used in any stormwater facility shall be 15”, regardless of velocity.

iii. Any pipe sizes less than those described are at the discretion of the City.

b. Clearance Requirements:

i. There shall be a minimum cover of 18” over all concrete pipes under flexible or rigid pavement. A minimum cover of 18” shall be maintained over all corrugated steel or aluminum pipe. Larger diameter culverts (greater than 54” in diameter) require additional cover as determined by the City.

ii. Refer to FDOT Roadway Design Standards Manual for minimum cover with respect to culvert diameter and material. Non-doweled rigid pavement shall require a minimum of 9” of compacted soil or base (98% AASHTO T-180) between the concrete and the top of pipe.

iii. All pipes, closed conduits, and structures that are subject to vehicular traffic shall be designed for H20 loading, with due regards to depth of cover.

c. Design Velocities: All pipes should be designed to produce flushing velocities of 2.5 Fps (3.0 desirable) and shall not exceed 10 Fps. All final outlet velocities must meet the requirements specified herein.

d. Stormwater Drainage Structures: This section includes standards for manholes, inlets, catch basins, and control structures (refer to Standard Detail 7-1).

i. Acceptable Structures: All drainage structures within public right-of-way or easements shall be standard FDOT types for inlets, manholes, and junction boxes unless special requirements require a unique structure design. Such instances will be reviewed on a case-by-case basis.

ii. Placement and Spacing of Manholes: Stormwater manholes shall in no instance be spaced no further than as given in
Table 7-1. Public drainage systems may require closer spacing subject to the review of the City.

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Max. Spacing (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 36”</td>
<td>300</td>
</tr>
<tr>
<td>&gt; 36”</td>
<td>400</td>
</tr>
</tbody>
</table>

### iii. Placement and Spacing of Inlets:
Inlets are to be spaced to provide adequate stormwater runoff evacuation to prevent unacceptable stormwater spreading into the roadway travel lanes.

1) The maximum distance for flow in a curb and gutter to the first point of removal for any roadway shall be 300 ft.

2) All low point (sump) location inlets shall be designed to intercept 100% of the design flow including bypass flow from upstream inlets.

3) All intermediary inlets (not at low points) shall be designed to intercept at least 80% of the design flow.

4) All roadway inlet structures and ditch bottom inlets within the R/W that are subject to vehicular traffic shall be set flush with finished grade.

2. Primary Drainage Systems:
   a. Physical standards:
      i. The minimum size pipe allowed in right-of-ways is 15” unless otherwise approved by the City.
      ii. All drainage pipes within right-of-way and easements shall be reinforced concrete pipe per F.D.O.T Standard Specifications for Road and Bridge Construction, latest edition, unless otherwise approved by the City.
      iii. Corrosive pipe materials will not be permitted within R/W where corrosive soil environments are suspected.
iv. Minimum pavement longitudinal grades and cross-sectional slopes required for adequate drainage are given in Section 8 and applicable standard details.

v. Driveway crossings, where necessary, shall have a minimum culvert diameter of 15”.

vi. Minimum cover over culverts within rights-of-way is 18” below pavement unless acceptable loading calculations supporting a lesser depth are submitted and approved by the City.

b. Hydraulic Gradeline Calculations: The Hydraulic Grade Line (HGL) through the storm sewer system shall be computed assuming full flow. The HGL for the storm sewer system shall be computed taking into consideration the design tailwater on the system and the energy losses associated with entrance into and exit from the system, friction through the system, and turbulence in the individual manholes / catch basins / junctions within the system.

c. Stormwater Spread into Roadway Travel Lanes: Inlets shall be spaced at specified intervals and at all low points, intersections and along continuous grades so as to prevent the spread of water from exceeding tolerable limits as determined by Miami-Dade County Public Works Department and FDOT. The tolerable limits for arterial and collector roadways are defined as approximately one-half of the traveled lane width. Acceptable tolerable limits for interior subdivision roadways are defined as a maximum of one (1) inch above the crown of the road.


e. Tailwater Conditions: The design of storm sewer systems shall consider the tailwater conditions in the receiving facility. Tailwater elevations shall be established from published sources when available, or from field investigations. Tailwater elevations shall correspond to the maximum stage reached in the facility for a storm equal to the design storm.

3. Private and Secondary Systems:

This includes minor drainage systems such as those serving parking lots and service roads, typically intended for public use on private property.
Easements are required for all such facilities so that the City may maintain or repair any facility affecting the general health or welfare of the public.

a. Physical Standards:
   i. The minimum pipe size shall be 15” unless otherwise approved by the City.
   ii. All drainage pipes within right-of-way and easements shall be reinforced concrete pipe per F.D.O.T Standard Specifications for Road and Bridge Construction, latest edition, unless otherwise approved by the City.
   iii. Corrosive pipe materials will not be permitted within R/W where corrosive soil environments are suspected.

b. Swale Drainage: These systems must meet the performance standards and requirements for the system, or sub-system when used as a component of a larger stormwater management system.

c. Roof Drainage: All roof drainage outlets shall be shown on the construction plans. The plans must give evidence that stormwater runoff from the building structure will be directed to the pond, inlet, or structure intended to receive the stormwater runoff for pre-treatment and disposal in accordance with design criteria. Roof drainpipes shall be no smaller than 6” in diameter.

d. Maximum flood limits and design storm frequencies for private and secondary systems shall be as specified by the Miami-Dade County Public Works Department.

e. Maintenance Entity: Private systems must be properly maintained. A maintenance entity must be designated prior to issuance of any new building permit by the City.

4. Canals:

Construction of new canals and ditches shall not be permitted unless approved by Miami-Dade County and SFWMD as art of a comprehensive master drainage plan for Miami-Dade County. In such cases, canals and ditches shall conform to specific design criteria as set forth by these agencies.

5. Exfiltration (Seepage) Systems:
Sub-surface exfiltration systems shall be used to accomplish the pollution abatement (water quality treatment) and groundwater recharge component of the stormwater management system. Such systems shall conform to the following design constraints and Standard Detail 7-2:

a. Provide sufficient capacity to treat the specified treatment volume of stormwater.

b. The invert of the exfiltration pipe must be a minimum of 6 inches above SHWT. This should be verified by providing a certified soils report indicating the SHWT or copies of acceptable published data.

c. The soil-permeability value, "K", must be indicative of the native soil. A certified soils report prepared by a licensed Geotechnical Engineer, will be required for all exfiltration systems.

d. The system shall be designed with a minimum safety factor of two (2).

e. Runoff filtering methods and devices such as open swales, pollutant-retardant baffles, and sediment and grease traps are required prior to the exfiltration process.

f. A filter fabric equivalent to Dupont "Typar" or Celenese "Mirafi" must be used to separate the system from adjacent natural soils.

g. A gravel envelope with a filter fabric wrap is recommended for all exfiltration designs.

h. Systems shall conform to more specific design criteria as set forth by SFWMD, Miami-Dade County Public Works Department and by Miami-Dade County DERM.

6. Overflow Discharge (Control) Structures:

a. All design discharges shall be through structural control facilities.

b. Structures shall be fixed and non-operable unless otherwise approved due to reasonable circumstances.

c. All discharges shall be controlled as required by the agency having jurisdiction over the receiving water body or existing storm sewer system, and by the City.

d. Discharge structures shall include a baffle, skimmer or other method or device designed to limit oils, greases, suspended sediment, and floating debris discharging to the receiving system.
7. **Drainage Wells:**
   a. Drainage wells for the disposal of excess stormwater runoff shall be permitted only when no other disposal alternative is available.
   b. Wells shall conform to criteria set forth by Miami-Dade County Public Works Department, Miami-Dade County DERM, and to Standard Detail 7-3.
   c. All well systems shall be equipped with a sediment trap basin equipped with a pollutant retardant baffle or similar device.
   d. The required pre-treatment volume per the applicable criteria set forth in this document shall be provided prior to discharging excess runoff to any drainage well.
   e. Well depths may vary between 75 and 125 feet.
   f. Wells shall have a minimum diameter of 24 inches.
   g. Once wells are installed, pumping tests will be required to verify the capacity of each well. Satisfactory proof of performance will be required for each well and well system.

8. **Stormwater Pumping Stations:**

   Stormwater pumping stations shall be permitted only as a part of a larger system for the collection, treatment, and disposal of stormwater runoff. Pumping stations will be reviewed on an individual basis at the discretion of the City.

9. **Erosion Protection:**

   a. **Performance Design Standards:** Erosion protection and earth stabilization is mandatory for all sites. The velocities generated by stormwater runoff shall not erode, washout, or otherwise affect the intended performance of the drainage system. Erosion and sediment control shall also be enforced during construction.
   b. **Acceptable Stabilization Practices:** Acceptable stabilization practices include but are not limited to:
      i. **Sodding/paving:** The method of ground stabilization will be selected based upon the anticipated design storm velocity of the facility or the steepness of slope.
Table 7-2
Maximum Channel Velocity / Slopes

<table>
<thead>
<tr>
<th>Stabilization Practice</th>
<th>Velocity</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed/Grass &amp; Mulched</td>
<td>0-2 Fps</td>
<td>&lt;2.0%</td>
</tr>
<tr>
<td>Sodded</td>
<td>2-4 Fps</td>
<td>2.0-5.0%</td>
</tr>
<tr>
<td>Paved or Fixed</td>
<td>&gt;4 Fps</td>
<td>&gt;5.0%</td>
</tr>
</tbody>
</table>

1) Maximum channel velocities and slopes are given in Table 7-2.

2) All swales are required to be completely sodded.

3) Ditches (canals), where applicable, are required to have sodded, or otherwise stabilized, side slopes from their top of bank to their normal water level.

4) All ponds, where applicable, are required to have sodded side slopes from top of bank to their normal level or dry bottom.

5) Pond dry bottoms, where applicable, may be seeded and mulched, or grassed and mulched, as an option to sodding.

ii. Culvert End-treatments: All culverts discharging to a stormwater management facility shall have appropriate end treatments. These structures are to prevent undermining of the pipe, and providing a readily maintainable entrance/exit for stormwater flow, free from vegetative overgrowth. Standard FDOT concrete headwalls and mitered-end sections are acceptable. Pour in-place collars may also be acceptable on smaller diameter pipes.

iii. Energy Dissipaters: Whenever stormwater is discharged from a pipe, flume, or other conveyance channel at a velocity sufficient to cause erosion, energy dissipation devices shall be employed.

iv. Splash Pads: Splash pads are required to stabilize the soil of all stormwater discharge structures with outlet velocities in excess of 2.5 Fps. Energy dissipaters may also be required in addition to splash pads.
c. Erosion & Sediment Control During Construction: Erosion and sediment shall be controlled during construction. This includes the prevention of erosion by the action of wind and water.

i. Inlet Protection: All inlets and catch basins shall be protected from sediment laden storm runoff until completion of all construction operations that contribute sediment to the inlet.

ii. Temporary Seeding: Areas exposed by construction for 30 days or more shall be seeded with a quick growing grass species, appropriate for that season, that will not compete with permanent grassing, and be applied at a rate of 30 lbs./acre.

iii. Temporary pavement shall conform to the requirements of Section 8.

iv. Adequate dust control measures shall be implemented.

10. Drainage Easements:

Drainage easements are required for all facilities that are maintained by the City of North Miami Beach or that serve the public, but are maintained by a private individual or association.

7.03 SUBMITTAL REQUIREMENTS

A. General

All projects that include construction of a new stormwater management system, or changes or modifications to an existing system, will be required to submit the materials described along with the permit application and fees to the City Building Department.

B. Required Submittals

1. Design Package:

a. Drainage Map(s): The Project Engineer shall include in the construction plans a master drainage map showing all existing and
proposed features. The map is to be prepared on a scale not to exceed 1”=100’. Listed below are the features that are to be included on the drainage map.

i. Drainage boundaries (divides), including all offsite areas draining to the proposed subdivision.

ii. Sufficient topographical information with elevations to verify the location of all ridges, streams, etc. (one-foot contour intervals).

iii. Highwater data on existing structures or water bodies upstream and downstream of the proposed system.

iv. Notes indicating sources of highwater data.

v. Notes pertaining to existing standing water, area of heavy seepage, or springs.

vi. Existing drainage features (ditches, roadways, ponds, etc.).

vii. System layout with horizontal and vertical controls.

viii. Drainage features including location of inlets, swales, ponding areas, etc.

ix. Delineation of drainage sub-areas.

x. Show retention / detention areas and ingress / egress areas for retention / detention facilities.

xi. General type of soils (obtain from soil survey of Miami-Dade County).

xii. FEMA flood hazard classification.

xiii. Description of current zoning and land use.

b. Recent aerial photograph delineating project at no smaller scale than 1”=400 ft.

c. Summary of design methodology, including a drainage description and supporting calculations in the form of a Drainage Report.
2. Drainage Report:
   a. The Drainage Report must include a narrative description of the following (when applicable):
      i. Project site and history.
      ii. Proposed improvements.
      iii. Existing drainage facilities.
      iv. Applicable design criteria.
      v. Design intent of proposed facilities.
      vi. Summary of calculation results and expected system performance after improvements. Demonstrate compliance with design criteria.
   
b. Sewer storm and stormwater management system design calculations shall include the following:
      i. Locations and types of structures.
      ii. Types and lengths of line.
      iii. Drainage sub-area tributary to each structure.
      iv. Runoff coefficient per sub-area.
      v. Time of concentration to structure.
      vi. Hydraulic gradient for the 5- or 10-year frequency storm event (zone 10).
      vii. Estimated receiving water (tailwater) elevation with sources of information, if available.
      viii. Diameters of pipe.
      ix. Outlet and other pipe velocities.

3. Permits:
Applicant shall submit copies of all applicable permits, including but not limited to those issued by the following agencies:

a. Miami-Dade County DPOR
b. Miami-Dade County DERM
c. SFWMD
d. US-COE
e. Any other local, state, or federal agency having jurisdiction.

4. As-Built Survey (Drawings):

As-built drawings certified by a licensed surveyor are required for all projects.

5. Easements:

Applicants shall submit legal documentation clearly identifying all easements to be granted to the City for the purposes of operating and maintaining a new storm water management system. The easement package shall include:

a. Legal description, signed and sealed.
b. Sketch of legal description, signed and sealed.
c. Legal document of dedication.
d. Any other applicable documentation.

END OF SECTION
RESTORATION
SECTION 8
RESTORATION

8.01 GENERAL

A. The cutting of streets or sidewalks for any purpose whatsoever is prohibited by the City except as delineated in Chapter 19 of the City of North Miami Beach Code of Ordinances.

B. All Roadways and Sidewalks cut or damaged during construction shall be repaired/replaced by the Contractor in accordance with Chapter 19 of the City of North Miami Beach Code of Ordinances, and as specified herein.

C. All existing castings, including valves boxes, junction boxes, manholes, handpoles, pull boxes, inlets and similar structures in the areas of trench restoration, pavement replacement and pavement overlay, or any other restoration work, shall be adjusted by the Contractor to bring them flush with the surface of the finished work.

8.02 REFERENCE STANDARDS

A. The Owner shall comply with the design, repair and construction standards as established in Chapter 19 of the City of North Miami Beach Code of Ordinances, this manual, FDOT Standard Specifications for Road and Bridge Construction and the Miami-Dade County Public Works Manual latest edition.

8.03 SIDEWALK RESTORATION

A. The sidewalk shall be replaced to the same width as the original sidewalk.

B. The concrete shall be Class I (3,000 psi in 28 days) in accordance with the FDOT Standard Specifications.

C. The Contractor shall provide all material, labor, forms, tools and equipment for restoration of the sidewalk. All sidewalk shall be 4-inches thick, 6-inches thick at driveways, to the widths required. The sidewalk finish shall match the original finish grade.

8.04 STREET RESTORATION

A. DAMAGE BY THE CONTRACTOR

1. The Contractor shall protect from damage by construction or construction related operations, all pavements, including all base courses and surface courses, within the work area.
2. Any base course or surface course beyond those limits, damaged as a result of the Contractor's operations, shall be restored in accordance with the applicable requirements of these Specification's to the satisfaction of the City, and to the satisfaction of the governing authority having jurisdiction over the work area.

3. Any damage to adjacent lanes of pavement will require the Contractor to resurface the entire lane width for a length, as approved by the City. When the damage amounts to 25 percent more in any one block (approximately 600 feet), the Contractor shall resurface the entire width of the lane in which the damage occurred for the entire block.

4. The Contractor is hereby notified that wherever the line for repaving for trenches extends one foot into the edge of the existing paving, he shall repave to this edge only. Full lane paving will not be required. Damage to the pavement beyond this line by the Contractor will require that he repave the full width.

5. In order to protect himself from being held liable for any existing damaged pavement, including detour routes, the Contractor is advised to notify in writing the authority having jurisdiction over the street where such defective pavement exists prior to proceeding with any work in the vicinity. A copy of all such notices shall be forwarded to the Department.

B. MATERIAL - GENERAL

1. The limerock base shall consist of either one or more 6-inch courses as required. The limerock must be obtained from local sources where the overburden was removed from the pits prior to mining operations. The limerock shall comply with the requirements of FDOT Specifications, Section 200 and Section 911 for Miami Oolite limerock, with a maximum size of the aggregate to be 1-1/2 inches.

2. Liquid Asphalt for Prime Coat shall be Asphalt Emulsion Prime (AEP) meeting the requirements of FDOT Specifications Section 916-4 and Section 300.

3. Liquid Asphalt for Tack Coat shall be Asphalt Emulsion Prime (AEP), conforming to the requirements of FDOT Specifications 916-4 and Section 300.

4. The materials and construction of asphaltic concrete patches and surface courses shall be Type S-1 Asphaltic concrete conforming to Sections 300, 331, and 916 of FDOT Specifications.

5. Sand cover material shall be clean and non-plastic, and shall be composed of hard durable grains, free from loam, roots, silt, clay, or rock particles.
and other deleterious substances. Local sand meeting such requirements may be used. Sand shall be subject to approval by the Department.

6. Flowable fill shall be used as backfill only when approved by the City and by the Engineer of Record. It shall be used for trenches, support for pie structures, culverts, utility cuts and other works where cavities exist and where firm support is needed for pavements and structural elements.

C. BITUMINOUS PAVING MATERIAL

Asphalt cement for asphaltic concrete mixes shall be Viscosity Grade AC-20, homogeneous, free from water and shall meet the requirements of FDOT Specifications, Section 916-1. Unless otherwise specified, all test samples required shall be supplied by the Contractor. For friction courses, in addition to meeting the above requirements, the bituminous material shall contain 0.5% of a heat-stable, anti-stripping additive from an approved source.

1. Asphaltic Concrete - Type S-I Mix shall meet the requirements of FDOT Specifications for type S-I Asphaltic Concrete, Sections 330, 331 and 916 of FDOT Specifications.

2. Asphaltic Concrete - Type I Mix shall meet the requirements of Miami-Dade County Public Works Department Specifications for Type I Asphaltic Concrete Surface Course, Section 133 of the Public Works Manual.

3. Asphaltic Concrete - Type III Mix for asphaltic concrete wearing surface overlay, both machine laid and standard (skin patch), shall meet the requirements of FDOT Specifications for Type III Asphaltic Concrete, Section 333-1 through Section 333-6.

4. Type V paving repairs shall consist of a machine-laid asphaltic concrete wearing surface overlay, which shall be a nominal one-inch thick asphaltic concrete, meeting the material requirements of Type I repairs.

5. Asphaltic Concrete - Type FC-1, FC-2, FC-3 and FC-4 shall meet the requirements of FDOT Specifications for Friction Courses, Sections 337-1 through 337-7.

6. Emulsified Asphalt for Slurry Seal Coat shall be of the slow-setting, mic ing type and shall be homogeneous, meeting the requirements of the Asphalt Institute, Grade SS-1 or SS-1h.

7. Liquid Asphalt for Sand and Asphalt Paving shall be asphalt cement, viscosity Grade AC-5 or emulsified asphalt, Grade RS-2 (anionic) conforming to the requirements of FDOT Specifications, Section 916-1 and 916-4, respectively.
8. Mineral Aggregate for Slurry Seal Coat shall consist of screened sand or limestone screenings or a mixture of sand and screenings plus not less than 3%, by weight, Type I or Type II Portland cement.

D. INSTALLATION - GENERAL

1. Permanent pavement repair shall be in accordance with the details shown in the Standard Details herein, with edges straight and parallel and patches rectangular in plan. Where trenches are located out of the existing pavement and damage occurs to the pavement, that pavement shall also be replaced by the Contractor.

2. Pavement markings removed or obliterated by the Contractor's operations shall be promptly replaced, in kind, to the satisfaction of the City or other authority having jurisdiction over the work area.

3. All equipment necessary for construction shall be on the job site in first class working class condition. Spilling or dropping of petroleum products is prohibited and all defective equipment shall be removed or replaced immediately. The Contractor shall be subject to all Miami-Dade County Department of Environmental Resources Management (DERM) regulations and clean up requirements.

4. The percentages of maximum density for subgrade and limerock base specified herein are minimum. Greater percentages of maximum density shall be obtained, if so required, by the governing authority having jurisdiction over the work location.

5. Asphaltic concrete mixtures shall be obtained only from plant which comply with the requirements of FDOT Specifications, Section 320 as applicable, using material specified herein, and producing the specified mixture. General construction requirements for all hot bituminous mixtures specified herein shall conform to FDOT Specifications, Section 330, as applicable.

6. Asphaltic concrete shall be laid only where the surface to be covered is intact, firm, cured and dry, and only when weather conditions are suitable. The temperature of the mixture at the time of spreading shall be within limits of Florida FDOT. No mixture shall be spread when the air temperature is less than 40 degrees Fahrenheit.

7. Any mixture caught in transit by a sudden rain may be laid at the Contractor's risk, if the base is in suitable condition. Under no circumstances shall asphaltic material be placed while rain is falling, or when there is water on the area to be paved.
8. Subgrade: Roadway subgrades shall be stabilized to a Limerock Bearing Ratio of not less than 40. Stabilizing shall be Type B as defined in Section 160 of the FDOT Specifications.

9. The limerock base shall be constructed in accordance with Sections 200 and 911 of the FDOT Specifications, to the thickness and width indicated on the approved Construction Drawings.

10. After spreading of the base material is completed, the entire surface shall be scarified and shaped so as to produce the exact grade and cross section after compaction. For double course base, this scarifying shall extend a depth sufficient to penetrate slightly the surface of the first course. The maximum depth of each lift shall be 6-inches.

11. When the material does not have the proper moisture content to insure the required density, wetting or drying shall be required. If the material is sufficient in moisture, water will be added and uniformly mixed in by diskling the base course to its full depth. If the material contains an excess of moisture, it shall be allowed to dry before being compacted. As soon as proper conditions of moisture are attained, the material shall be compacted to an average density not less than 98-percent maximum density as determined in more than one course, the density shall be obtained in each lift of the base.

12. During final compacting operations, if blading of any areas is necessary to obtain the true grade and cross section, the compacting operations for such areas shall be completed prior to making the density determination on the finished base.

13. The spreading, compacting and jointing the wearing surface shall be in accordance with Sections 330 and 331 of the FDOT Specifications to the thickness indicated on the Drawings.

E. TEMPORARY PAVING

1. Prior to commencing excavation, the asphalt surface shall be sawcut within the limits of the allowable trench width. Temporary paving will be required along the entire route where the original paved surface is removed. Unless otherwise approved by the City, temporary paving shall be placed the same day the trench is backfilled. The trench shall be backfilled up to a level 1-inch below the existing pavement surface and a temporary, cold mixed sand/asphalt pavement shall be constructed up to the level of the existing pavement surface. The liquid asphalt shall be Grade RC-70, conforming to the requirements of FDOT Specifications, Section 916-2. The sand shall conform to the requirements of FDOT Specifications, Section 902 for fine aggregate.
2. The cold mix is to be installed one block at a time, not crossing any intersection, or a maximum of 1,200 feet shall be completed before the Contractor may move forward with his excavation work. Backfill, compaction and temporary paving is to keep pace with the pipe installation.

3. Prior to completion of the work and within a maximum of 30 calendar days, the Contractor shall remove the 1-inch of cold mix and surplus backfill. He shall replace it with the specified compacted limerock base course and asphaltic within the specified working limits.

4. Unless otherwise approved by the City, temporary paving, shall be placed within twenty-four hours following the completion of backfilling.

END OF SECTION