

THE CITY OF BOYNTON BEACH

UTILITIES DEPARTMENT

UTILITIES ENGINEERING DESIGN HANDBOOK AND CONSTRUCTION STANDARDS

*Creating value for our customers and community by achieving excellence
in service, products and environmental quality*

PEOPLE - TEAMWORK - INNOVATION



January 2013



**UTILITIES ENGINEERING DESIGN HANDBOOK
AND
CONSTRUCTION STANDARDS**

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UTILITIES ENGINEERING DESIGN HANDBOOK
AND
CONSTRUCTION STANDARDS

FOR

THE CITY OF BOYNTON BEACH
UTILITIES DEPARTMENT

KOFI BOATENG
UTILITIES DIRECTOR

JANUARY, 2013

UTILITIES ENGINEERING DESIGN HANDBOOK & CONSTRUCTION STANDARDS

ARTICLE ONE – REQUIRED IMPROVEMENTS DIVISION

I. GENERAL PROVISIONS

- A. PURPOSE AND INTENT: The purpose and intent of the specific provisions of this Handbook document shall be applied and interpreted in a manner consistent with the City of Boynton Beach Utilities Department's (the Department) purpose and intent to:
1. Establish procedures and standards in support of the development of real estate;
 2. Aid in the coordination of land development in accordance with orderly physical patterns;
 3. Ensure provision of adequate utilities to support development, including provision of safe, convenient legal and physical access to the utilities; and
 4. Assure that necessary infrastructure improvements are being provided in accordance with acceptable standards for design and construction, and that associated rights and obligations have been established for the use and maintenance of said improvements.
- B. MINIMUM REQUIREMENTS: The requirements of this Handbook shall be deemed to be the minimum requirements necessary for the promotion of public health, safety and general welfare.
- C. BASIS: The standards set forth in this Handbook are intended to provide a basis for design and construction. Applicable Federal, State, County and City laws and regulations should be considered concurrently with this text. Any variation from these standards shall be approved in advance by the Department Director or his designated representative prior to construction.

The requirements of this document shall be applicable in all cases where the facilities being constructed or to be constructed shall be owned and/or operated and maintained by the Department. These requirements shall also be applicable to those portions of facilities which will lie within public right-of-way (ROW) of the Department's service area.

- D. STANDARDS AND RESPONSIBILITY FOR REQUIRED IMPROVEMENTS: All required improvements shall be designed pursuant to the standards and specifications as prescribed in this Handbook, the County Standards (if applicable), and the City's Code of Ordinances, as amended from time to time, in

II. RULES OF CONTRUCTION AND DEFINITIONS

A. RULES OF CONSTRUCTION AND DEFINITIONS:

In the construction of the language of this Handbook, the rules set out in this section shall be observed unless such construction would be inconsistent with the manifest intent of the City Commissioners as established in the Code of Ordinances. The rules of construction and definitions set out herein shall not be applied to any express provisions excluding such construction.

1. Generally:

- a) All provisions, terms, phrases and expressions contained in this Handbook shall be liberally construed in order that the true intent and meaning of the City of Boynton Beach Utilities Department as established may be fully carried out. Terms used in these requirements, unless otherwise specifically provided, shall have the meanings prescribed by the statutes of the State of Florida for the same terms.
- b) In the interpretation and application of any provision of this Handbook it shall be held to be the minimum requirements adopted for the promotion of the public health, safety, comfort, convenience and general welfare. Where any provision of this Handbook imposes greater restrictions upon the subject matter than a general provision imposed by the City's Code of Ordinances, the provision imposing the greater restriction shall be deemed to be controlling.

2. Text: In case of any difference of meaning or implication between the text of this Handbook and any figure, the text shall control.

3. And: All cases must apply.

4. Computation of time: Computation of time means the time within which an act is to be done. Time shall be computed by excluding the first and including the last day; if the last day is a Saturday, Sunday or legal holiday, that day shall be excluded.

5. Day: Day means a working weekday unless otherwise stated in reference to a violation. Violations shall be calculated on calendar days.

6. Delegation of authority: Whenever a provision appears requiring the head of the Department or some other City officer or employee to do some act

or perform some duty, it is to be construed to authorize the Department head or other officer to designate, delegate and authorize professional-level subordinates to perform the required act or duty unless the terms of the provision or section specify otherwise.

7. Gender: Words importing the masculine gender shall be construed to include the feminine and neuter.
8. Include: Use of “include” shall not limit a term to the specified examples, but is intended to extend its meaning to all other instances or circumstances of like kind or character.
9. May: May means permissive.
10. Month: Month means a calendar month.
11. Non-technical and technical words: Words and phrases shall be construed according to the common and approved usage of the language, but technical words and phrases and such others as may have acquired a peculiar and appropriate meaning in law shall be construed and understood according to such meaning.
12. Number: A word importing the singular number only may extend and be applied to several persons or things as well as to one person or thing. The use of the plural number shall be deemed to include any single person or thing.
13. Or: Either or both cases may apply.
14. Shall: means mandatory.
15. Tense: Words used in the past or present tense include the future as well as the past or present.
16. Week: Week means seven (7) calendar days.
17. Will: Will means the wish or purpose as carried out, or to be carried out.
18. Written: Written means any representation or words, letters or figures whether by printing or other form or method of writing.
19. Year: Year means a calendar year, unless a fiscal year is indicated or 365 calendar days is indicated.

B. DEFINITIONS:

Terms in this Handbook shall have the following definitions if not previously accepted in the Unabridged Dictionary of the English Language. Supplemental

definitions for specific technical terms should be defined at the reference location at which they first appear in this Handbook. If a conflict exist in terms of the supplemental definitions with these definitions, the specific definition for a specific applicable condition shall apply.

Those definitions that are marked with an asterisk (*) are identified and duplicated from the Land Development Regulations (LDR) [Part III of the City of Boynton Beach Code of Ordinances, Chapter 1, Article II.] and are incorporated herein to complete those terms associated with the engineering matters undertaken by this Division.

Absorption area means, the total surface area of the bottom of a drainfield.

Absorption bed means the drainfield system in which the entire contents are removed and replaced with filter material and distribution pipe.

Abutting property means lying immediately adjacent to and sharing a common property line with other property.

Access means a way to enter or exit a facility or property.

Access, legal means the principal means of access from a lot to a public street or to a private street over which a perpetual ingress and egress easement or right-of-way has been granted to the owners of any lot serviced by such street.

Access way means a non-dedicated area, which is permitted, for ingress or egress of vehicles or pedestrians. An access way is permitted to traverse a landscape buffer.

Acre means land or water consisting of forty-three thousand five hundred sixty (43,560) square feet.

Affidavit of waiver means a document evidencing the grant of an exception to the platting requirement or the required improvements installation requirement.

Agreement means a Development Agreement, public facilities agreement, or other binding agreement entered into between the applicant and the City of Boynton Beach or other service provided for the purpose of assuring compliance with the adopted level of service standards. The form of the Agreement may include, but not be limited to a Development Agreement pursuant to Sec. 163.3220, Fla. Stat.

Aisle (*) means the hard surface lanes in a parking lot which connect the parking stalls with a public or private street, alley or interior driveway.

Alley means a right-of-way providing a secondary means of access to property and is not intended to be used for principal traffic circulation.

Annular space means the space between two casings or between the outer casing and the wall of the well bore.

Antenna means the arrangement of wires or metal rods used in the sending or receiving of electromagnetic waves.

Antenna support structure means any structure, mast, pole, tripod or tower utilized for the purpose of supporting an antenna or antennas.

Antenna height means the overall vertical length of the antenna and antenna support structures above grade, or if such system is located on a building, then the overall vertical length includes the height of the building upon which the structure is mounted.

Applicant means the owner of record, the agent pursuant to an agent's agreement acceptable to the City Attorney or the mortgagor in the case of bankruptcy.

Approved means to think or judge favorably of, pronounce or consider agreeable to, or to confirm or sanction formally, the use of a product, diagram, schedule or other data specifically prepared for a specified project that has been approved by the Division or other authority having jurisdiction.

Approved equal or Approved or equal means that the designer, developer or contractor desires to submit a product, diagram schedule, method of construction or other data specifically prepared as a substitute that meets all of the base or material characteristics of the Division's specifications in place as currently established by the Division for the product, diagram schedule, generally accepted construction method or other specific data to which an alternate or substitution approval is being sought. The designer, developer or contractor will obtain the Division's approval of the proposed alternate or substitute product, diagram schedule, method of construction or other data specifically to be used on a specified project prior to ordering same or incorporating same into said project. See also Substitution.

Approved source, when used in reference to a manufacturer, an assembly point, or a point of connection, shall be a location, a manufactured component, item or assembly, or specific product that has been inspected, tested, and analyzed in accordance with accepted testing standards of the ASTM, AWWA, AASHTO, U/L, established building codes, etc., and found to be of a safe and sanitary quality for the intended purpose for which the approved source is referenced.

Architect means a person duly registered and licensed to practice architecture in the State of Florida.

Area of shallow flooding means a designated AO or VO Zone on the Flood Insurance Rate Map (FIRM); the base flood depth ranges from one (1) to three (3) feet; a clearly designed channel does not exist; the path of flooding is unpredictable and indeterminable; and velocity flow may be evident.

Area of special flood hazard means the land in the flood plain subject to a one (1) percent or greater chance of flooding in any given year.

Arterial street, see Street, arterial.

Asphalt or concrete plant means an establishment engaged in the manufacture, mixing or batching of asphalt, asphaltic concrete, cement or concrete products.

Automobile (*) means an automobile or motorcycle as defined by the rules of the Florida Department of Highway Safety and Motor Vehicles.

Base building line means a line horizontally offset from and running parallel to the centerline of a street from which setbacks from front yard, corner side yard, and lot standards are measured as set forth in the City's Land Development Regulations.

Base flood means the flood having a one (1) percent chance of being equaled or exceeded in any given year.

Beach means the zone of unconsolidated sand that extends landward from the mean low waterline to the place where there is a marked change in material or physio-graphic form, or to the line of permanent vegetation (usually the effective limit of storm waves). "Beach" is alternately termed "shore".

Benchmark means a relatively permanent material object, natural or artificial, bearing a marked point whose elevation above or below an adopted datum plan is known.

Best Management Practices (BMP) means practices which are a technologically and economically feasible means of preventing or reducing amounts of pollution generated by point and non-point sources to a level compatible with the element quality and quantity objectives of the City.

Bicycle path (*) means any road, path or way that is open to bicycle travel, which road, path or way is physically separated from motorized vehicular traffic by an open space or by a barrier and is located either within the highway right-of-way or within an independent right-of-way.

Block means a parcel of land entirely surrounded by streets, railroad right-of-way, parks or other public space or a combination thereof.

Boundary plat, see Plat, boundary.

Bridge (*) means a structure, including supports, erected over a depression or an obstruction, such as water or a highway or railway, and having a tract or passageway for carrying traffic as defined in Chapter 316, Fla. Stat., or other moving loads.

Building Official (*) means the official in charge of the Building Division or his authorized representative.

Bulkheads mean structures of concrete, wood, or other permanent material affixed to the land adjacent to a water management tract or other water body for the purpose of establishing a vertical surface at the waters edge and stabilizing the land behind the bulkhead; provided, however, that water control structures and end walls around outfalls and bridges shall not be considered bulkheads.

Capital drainage facilities means the planning of, engineering for, acquisition of land for, or the construction of drainage facilities necessary to meet the Level of Service (LOS) for Capital Drainage Facilities.

Capital facility costs means all cost directly associated with the acquisition, design, engineering, site preparation, construction and placement of a capital facility. It excludes operation and maintenance costs, and the repair, replacement, or renovation of existing capital facilities where the capital facility improvement does not add capacity.

Capital Potable Water Facilities means the planning of, engineering for, acquisition of land for, or the construction of potable water facilities necessary to meet the LOS for Capital Potable Water Facilities.

Capital Reclaimed Water Facilities means the planning of, engineering for, acquisition of land for, or the construction of reclaimed (or recycled) water facilities necessary to meet the goals and LOS established for Capital Reclaimed Water Facilities.

Capital Road Facilities means the planning of, engineering for, acquisition of land for, or the construction of roads on the Major Road Network System necessary to meet the LOS for Capital Road Facilities.

Capital Stormwater Facilities means the planning of, engineering for, acquisition of land for, or the construction of stormwater facilities necessary to meet the LOS for Capital Stormwater Facilities.

Capital Wastewater Facilities means the planning of, engineering for, acquisition of land for, or the construction of wastewater (sanitary) facilities necessary to meet the LOS for Capital Wastewater Facilities.

Catchment means a sub-area of a drainage basin, which contributes stormwater runoff by overland flow to a common collection point.

Certified documents (*) means drawings, estimates, warranties, etc. certified by a Florida registered architect, engineer and/or land surveyor guaranteeing that the documents are true, accurate and in compliance with all applicable laws, rules and regulations.

City means the City of Boynton Beach, a municipality established in the County of Palm Beach, State of Florida to be a political corporation under the name of the City of Boynton Beach pursuant to the Laws of Florida, 1947, Chapter 24398, Section 5.

City Engineer means a Florida licensed professional engineer in charge of the Boynton Beach Engineering Division.

City standards means standards as established by this Division as design criteria and incorporated into this Handbook, and/or adopted by Resolution by the City of Boynton Beach.

City street system (*) means the city street system of each municipality consisting of all local roads within that municipality, and all collector roads inside that municipality, which are not in the county road system.

Coastal construction means the carrying out of any activity within jurisdictional boundaries specified as a coastal protection area; to modify or improve site conditions including, but not limited to, building, clearing, filling, excavation, grading, removal or planting of vegetation; or the making of any material change in the size or use of any structure or the appearance of site conditions, or the placement of equipment or material upon such sites.

Coastal Protection Zone means an area of jurisdiction established by this section. This zone extends from the mean high waterline of the Atlantic Ocean to a line twenty-five (25) feet landward of the crest of the dune or the State of Florida Coastal Construction Control Line (CCCL), whichever is more landward.

Coastal high hazard area means the area subject to high velocity waters, including, but not limited to, hurricane wave wash or tsunamis. The area is designated on the Flood Insurance Rate Map (FIRM) as Zone VI-30.

CODE or Code means the Laws and Ordinances of the City of Boynton Beach, Florida, a municipality established under the Laws of Florida.

Collector street, see Street, collector.

Commission (*) means the City Commission of the City of Boynton Beach, Florida.

Condition of Approval means a condition imposed as part of, or associated with, the issuance of a valid City development order.

Cone of depression means an area of reduced water levels which results from the withdrawal of groundwater from a point of collective source such as a well, wellfield, or dewatering site. The area extent and depth of the depression is a function of the hydraulic properties of the aquifer, the pumpage rates and recharge rates.

Construction means the placement, assembly, erection, substantial repair, alteration or demolition of a building or structure on land, the placement of concrete, asphalt, similar materials on land, the grading or earthwork of land, or the placement of utility support systems below the surface of the land.

Construction plans (*) means certified documents from which a complete review and analysis can be made of all required improvements without research and/or additional data.

Construction work means any site preparation, assembly, erection, substantial repair, alternation, demolition or similar action to buildings or land, or the movement of composition of the land and the installation of utility support systems below the surface of the land.

Contaminant means any physical, chemical, biological or radiological substance or matter in water, soil or air, creating an adverse or hazardous condition.

Contiguous means, but is not limited to, lands separated only by streets, easements, pipelines, power lines, conduits, rights-of-way under ownership of the land owner of one of the subject parcels, a property owners association or a governmental agency, or a public utility. Contiguous means lots that share a common border.

Control device means the element of a discharge structure, which allows release of water under controlled conditions.

Control elevation means the lowest elevation at which water can be released through a control device.

Cost estimate (*) means a certified estimate of the cost of surveying, testing, all required improvements, supervision, profit and overhead.

County means Palm Beach County, Florida.

County road system (*) means the county road system of each county consists of all collector roads in the unincorporated areas and all extensions of such collector roads into and through an incorporated areas, all local roads in the unincorporated areas, and all urban minor arterial roads not in the State Highway System.

Covenant means a recordable instrument that runs with the land, binds the fee simple owner, heirs, successors, and assigns, and is recorded. It may include recorded Development Agreements or other agreements. Covenants may include the City and/or Palm Beach County as a party or intended beneficiary; shall recite the benefit intended; and shall include any terms or conditions under which it may be released.

Crest of the dune means the highest point in elevation of the dune.

Cross-connection means, any physical arrangement whereby any drinking water supply is connected, directly or indirectly, to any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture, or other device which contains or may contain contaminated water, sewage or other waste or liquid of unknown or unsafe quality, which may be capable of imparting contamination to the drinking water supply as the result of backflow. Bypass arrangements, jumper connections, removable sections, swivel or changeable devices and other temporary or permanent devices through which or because of which backflow could occur are considered to be cross-connections.

Crosswalk (*) means that part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway, measured from the curbs or, in the absence of curbs, from the edges of the traversable roadway. Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface.

Cul-de-sac means a dead-end street terminating in a circular vehicular turn-around.

Current standards (*) means documents, drawings, specifications, details, laws, rules, regulations, ordinances and the like in effect on the date an application or amended application, whichever is later, is presented for consideration.

Dead-end street, see Street, dead-end.

Decision/order means an administrative act of the City Commission, unless otherwise noted, constituting final administrative action consistent with their powers as described herein.

Department means the Public Works Department of the City of Boynton Beach, Florida, which has been assigned the responsibility of administering and enforcing the requirements of this Handbook through its Engineering Division.

Detention means the collection and temporary storage of stormwater runoff for the purpose of treatment and/or discharge rate control with subsequent gradual release directly to surface waters.

Developer means any person, including a governmental agency, undertaking any development.

Developer's agreement means an agreement entered into between the City, a service provider(s) and a person associated with the development of land pursuant to the terms of the Code.

Developer's engineer means a single engineering firm or a professional engineer registered in the State of Florida, and engaged by the developer to coordinate the

design and monitor the construction of the work required under the Land Development Regulations in the Code.

Development means the carrying out of any building activity or excavation operation, the making of any material change in the use or appearance of land, or the dividing of land into two (2) or more parcels. Development shall have the meaning given it in Section 380.04 Fla. Stat., pursuant to a development order or permit.

Development agreement (*) means an agreement entered into between a local government and a person in connection with the approval of a development order or permit including, but not limited to, a development agreement pursuant to Chapter 163.3220, Fla. Stat., or an agreement on a development order issued pursuant to Chapter 380.01, et. seq., Fla. Stat.

Development of regional impact means a specific type of development as defined in Chapter 380.06, Fla. Stat.

Development order (*) means any order granting, denying, or granting with conditions an application for a development permit. A development order becomes effective upon approval by the City Commission and issuance, in writing, by the City Attorney.

Development permit (*) means any permit for required improvements, building(s), zoning, rezoning, plat approval, certification, variance, or other action having the effect of permitting commencement of development as defined in Florida Statutes, Section 380.04, or any other official action or types of action by the City which, in the judgement of the City Manager, would permit the use or development of land similar to any of the listed actions.

Director of Development means the unit head of the City of Boynton Beach Department of Development.

Director of Planning and Zoning means the unit head of the City of Boynton Beach Planning and Zoning Division of the Development Department.

Director of Utilities means the unit head of the City of Boynton Beach Utilities Department.

Discharge structure means a structural device, constructed or fabricated from durable material such as concrete, metal or decay-resistant timber, through which water is released to surface water from detention.

Disposition, off-site means the transportation of excavated materials off the premises

Disposition, on-site means the on-premise use of extracted or excavated materials.

Disturbed excavated area means the total area altered by excavation activities.

Division means the Engineering Division of the Department of Public Works, or a specific division of another Department (i.e., Building Division of the Department of Development).

Domestic sewage means wastewater normally conveyed by drains and sewers, including, bath, toilet wastes, laundry and kitchen wastes from residential use and waste from other household plumbing fixtures.

Drain trenches means, for the purpose of stormwater dissipation, a drainfield installation in which the effluent from the trench drain system or other treatment receptacle is distributed in designed separate trenches, whether in series or parallel.

Drainage basin means a sub-area of a watershed, which contributes stormwater runoff to a watercourse tributary to the main receiving water.

Drainage easement, see Easement, drainage.

Driveway (*) means the paved area between a public street and private property intended to provide ingress and egress for vehicular traffic from the public streets or thoroughfare to a definite area of private property, or which connects parking aisles or provides access to parking aisles.

Dry detention/retention means detention or retention of water in a storage facility which is designed, constructed, and operated to limit the duration of ponding within the facility so as to maintain a normally dry bottom between rainfall events.

Dune means a hill or ridge of windblown sand and marine deposits lying landward of and adjacent to, the beach that is formed by natural and artificial processes.

Dune profile means the cross-sectional configuration of the dune.

Dwelling unit means one or more rooms designed, occupied or intended for occupancy as separate living quarters, with only one (1) kitchen plus sleeping and sanitary facilities provided within the unit, for the exclusive use of a single family maintaining a household. Specialized residences, such as accessory apartments for the elderly or handicapped, congregate living facility quarters, groom's quarters, migrant labor quarters or servant' quarters shall not be considered individual "dwelling units" in calculating the Equivalent Residential Connection (ERC), but the total population shall be calculated into the determination of the primary dwelling units ERC for property connection to the utility system.

Easement means any strip of land created by a subdivider or granted by the land owner, for public or private access, utilities, drainage, sanitation or other specified

uses having limitations, the title to which shall remain in the name of the land owner, subject to the right of use designated in the reservation of the servitude.

Easement, drainage means an easement establishing rights to collect, drain or convey surface water by means of natural or man-made facilities, including, but not limited to water bodies, water courses, canals, ditches, swales, storm sewers and overland flow. It also includes any fee interest of a governmental entity in land to collect, drain, or convey water.

Easement, lake maintenance means an expressed easement, created by plat dedication or other instrument of record, establishing access and use rights on or to the periphery of a water management tract for purposes of construction, maintenance, and repair of wet detention/retention facilities and appurtenance structures therein.

Easement, limited access means an easement adjacent to a street for the purpose of prohibiting vehicular access to the street from abutting property except at those locations specifically authorized by the City Commissioners.

Easement, public means an easement granted to a governmental entity, public agency, a utility or the public.

Easement, quasi-public means an easement granted to a property owners association in which the City or other public authorities have some beneficial interest.

Easement, utility means an easement established for the purpose of the installation, operation, repair, or maintenance of facilities and equipment used to provide utility services.

Easement holder or beneficiary means the grantee of an easement or persons directly benefiting from the existence of the easement.

Egress means exit.

Electrical power facility means a principal use of property for an electrical generation, or transmission voltage switching station.

Emergency means any unusual incident which results in immediate danger to the health, safety, welfare or resources of the residents of the City, including damages to, or the erosion of, any shoreline resulting from a hurricane, storm, or other such violent disturbance.

Emergency work means work necessary to restore land to a safe condition following a calamity, or work required to protect personnel or land from imminent exposure to danger.

Eminent domain proceedings mean either (1) those formal court initiated civil actions to acquire fee simple, easement, or right-of-way interest in land for governmental purposes, or (2) a voluntary conveyance of such in lieu of formal court initiated action.

Encroachment, vehicular means any protrusion of a motor vehicle outside of the boundaries of a vehicular use area into a landscape or other area.

Encumber means to reserve or earmark funds for a specific expenditure or an identified development.

Engineer means a person registered as a professional engineer in the State of Florida.

Engineering Division means the Engineering Division of the Department of Public Works of the City of Boynton Beach.

Excavate or excavation. The extraction of minerals from the earth necessary to (1) construct a single family dwelling; (2) support bona-fide agricultural production operations; (3) to implement a final site development plan; or (4) any act wherein the earth is cut into, dug, quarried, uncovered, removed, displaced or deliberately disturbed to create a temporary or permanent body of water, including the conditions resulting therefrom. Excavation includes the trenching requirements for the installation of utility systems in support of development. Excavation excludes agricultural plowing, site grading, dry retention/detention, demucking and canal dredging in preparation for construction.

Excavated surface area means the area created to construct a permanent or temporary body of water measured from outside edge of the excavated area to outside edge of excavated area (top of bank to top of bank).

Excavation, commercial, see Excavation, Type III-A and Type III-B.

Excavation, Type I-A means excavation necessary to create a pond to obtain fill for the construction of a single family dwelling or an accessory structure on a lot one (1) acre or greater in size, with an excavated surface area less than two-tenths (0.2) of an acre.

Excavation, Type I-B means excavation necessary for the creation of a pond or lake for the construction of a single family dwelling or accessory use on a lot two and one-half (2.5) acres or greater in size, with an excavated surface area in excess of two-tenths (0.2) of an acre but less than two (2.0) acres.

Excavation, Type II means excavation necessary to create a lake which is required to implement a development order for a final site development plan provided a minimum of 90% of the extracted material remains on-site.

Excavation, Type III-A means mining activity, primarily for commercial purposes, that extracts materials from the earth and may require limited on-site processing by using mobile crushers, sifters and conveyor systems. A Type III-A excavation activity shall not include the use of explosive devices or permanent structures or equipment used to process material.

Excavation, Type III-B means mining activity, primarily for commercial purposes, that extracts materials from the earth and may require extensive processing of the material on-site or off-site. The Type III-B excavation may involve the use of explosives and permanent heavy industrial structures or equipment to crush, sift and transport the material on site.

Exfiltration system means any gallery, perforated or “leaky” pipe or similarly designed structure which is used to dispose of untreated stormwater by allowing the routed water to percolate by subsurface discharge directly or indirectly into the groundwater.

Expressway (*) means a street shown or described as such according to the current or most recent functional classification contained in the City of Boynton Beach Comprehensive Plan, as adopted and amended.

External trip means any trip that either has its origin from or its destination to the development site and which impacts the major road network system.

FAC means the Florida Administrative Code.

FDEP means the Florida Department of Environmental Protection.

FDOT means the Florida Department of Transportation.

FDPR means the Florida Department of Professional Regulation.

Fence means an artificially constructed barrier of any material or combination of materials erected to enclosed or screen areas of land.

Fill or Filling means the placement of any material in, on, or over a jurisdictional wetland, or the placing of material removed from another area on and/or off site.

Final site plan means the most recent site plan approved by the City of Boynton Beach’s Planning and Zoning Board, and ratified by the City Commission.

Final subdivision plan means the most recent subdivision plan approved by the City of Boynton Beach’s Planning and Zoning Board, and ratified by the City Commission.

Flood or flooding means a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters;

or the unusual and rapid accumulation or runoff of surface waters from any source. Terms associated with flooding include:

1. Frequent, which means flooding which occurs more than once every two (2) years on the average;
2. Ten (10) year flood elevation, which means that flood elevation which has a ten (10) in one hundred (100) probability of being equaled or exceeded in any calendar year.

Flood Hazard Boundary Map (FHBM) means the official map of the City of Boynton Beach, produced by the Federal Emergency Management Agency or by Palm Beach County, where the boundaries of the areas of special flood hazard have been designated as Zone A.

Flood Insurance Rate Map (FIRM) means the official report and map provided by the Federal Emergency Management Agency that contains the flood contours for designated Zones AO, AV, A, B, & C.

Flood Insurance Study means the official report provided by the Federal Emergency Management Agency that contains flood profiles, as well as the Flood Hazard Boundary Map and the water surface elevation of the base flood.

Flood plain means the land area adjacent to the normal limits of a watercourse or water body, which is inundated during a flood event of specified magnitude or return period.

Floodway means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one (1) foot.

Floor means the top surface of an enclosed area in a building (including basement), i.e., top of slab in concrete construction or top of wood flooring in wood frame construction. The term does not include the floor of a garage used solely for parking vehicles.

Florida Statutes, Fla. Stat. or F.S. means the Laws of the State of Florida generated by the Legislative Branch of the state government enacted to regulate various activities within the State of Florida.

Frontage street (*) see Street, marginal access.

Functional classification (*) means the assignment of roads into systems according to the character of service they provide in relation to the total road network. Basic functional categories include arterial roads, collector roads and local roads which may be subdivided into principal, major or minor levels. Those levels may be additionally subdivided into rural and urban categories.

Functions means the role wetlands serve, including but not limited to flood storage, flood conveyance, ground water recharge and discharge, erosion control, wave attenuation, water quality enhancement and protection, nutrient removal, food chain support, wildlife habitat grounds for fishery species, and recreational values.

Government (*) means any direct agency of any federal, state, county or city government including schools and the U. S. Postal Service.

Grade, finished (*) means the average level of the finished surface of the ground adjacent to the exterior walls of the structure.

Grade line means the design profile grade line for the finish surface of a roadway, swale, water course or other hard surface area design to direct overland stormwater runoff to a variety of collection points in keeping with Best Management Practices.

Grade separated intersections (*) means the use of the term grade separated intersections shall mean any intersection wherein one road passes over another road by means of a bridge or an overpass.

Grassed parking means that portion of a development's required off-street parking requirement that meets the standards of Chapter 2 (Zoning), and Chapter 23 (Parking Lots) of the City's Land Development Regulations.

Grease trap means a watertight receptacle or reservoir receiving wastewater from a kitchen or other source containing grease.

Ground water means water beneath the surface of the ground within a zone of saturation where such water is at or above atmospheric pressure, whether within the voids between soil particles or within solution channels or fractures in rock.

Grubbing means removal of vegetation from land by means of digging, raking, dragging or otherwise disturbing the roots of the vegetation and the soil in which roots are located.

Guaranty means sufficient funds over which the City has control irrevocably committed by written instrument to secure complete performance of a contract for required improvements, condition of a Development Order or Utility Agreement.

Handicapped person has the meaning of Sec. 393.063(6) and Sec. 760.22(5)(a)(6) Fla. Stat.

Handicapped spaces means parking spaces designed, marked and reserved for exclusive use by persons properly registered as handicapped.

Hardstand means a paved or stabilized area where (heavy) vehicles are parked, or an open ground area having a prepared surface and used for the storage of materials.

Health hazard means, any condition, devise or practice in a water or sewer system or its operation which creates or may create an imminent or substantial danger to the health and well being of the consumer.

Hold Harmless means that a contractor shall indemnify and save harmless and defend the City, its agents, servants, and employees from and against any and all causes, claims, demands, actions, losses, liabilities, settlements, judgments, damages, costs, expenses, and fees (including without limitation, reasonable attorney's and appellate attorney's fees) of whatsoever kind or nature for damages to persons or property caused in whole or in part by any act, omission, or default of the City, its agents, servants, or employees arising from a contract between the contractor and the City or its performance. The contractor and the City will agree and covenant that the contractor has incorporated a stipulated fee into its contract with the City that has a specified additional indemnification, noting that it is both parties full intention that this provision shall be enforceable and said provision shall be in compliance with Florida Statute §725.06. See Appendix Exhibit "M", Hold Harmless Agreement.

Industrial waste means waste generated from commercial and industrial operations, other than agricultural, including but not limited to the processing, manufacturing, packaging, repair, maintenance or production of marketable goods. Construction and demolition debris shall be considered industrial waste.

Industrial wastewater means, wastewater generated by commercial or industrial establishments as a result of manufacturing, preparation, processing, or handling of materials, chemicals and/or food products, and from cleaning or washing operations. Laundromats, food service establishments, bakeries and car wash facilities are specifically included in this definition.

Ingress means entry.

Inspector (*) means a city employee working as an inspector under the authority and direction of the Director of Public Works or the City Engineer.

Intersection, see Chapter 316.003, Fla. Stat.

Inundation means the presence of water, in motion or standing, of sufficient depth to damage property due to the mere presence of water or the deposition of silt of which may be a nuisance, hazard or health problem.

Irrigation system means a system of pipes or other conduits designed to transport and distribute water to plants and ground cover.

Laboratory means a designated area or areas used for testing, research, experimentation, quality control, or prototype construction, but not used for repair or maintenance activities (excluding laboratory equipment), the manufacturing of products for sale, or pilot plant testing.

Lake, excavated means a body of water, excluding canals of conveyance, greater than one (1) acre in size or greater than six (6) feet in depth from (OWL) and which will remain open for longer than one hundred eighty (180) days. Multiple (more than one) bodies of water constructed on a parcel or parcels of property under common ownership or control shall be considered a lake when such water bodies have a combined surface area greater than one (1) acre.

Lake, excavated-existing means a lake constructed, under construction or to be constructed under permit of a jurisdictional agency prior to January 1, 2002.

Lake finger means that portion of a dead-end water body, which is less than fifty (50) feet in width, and longer than one and one-half (1.5) times its width, as measured from the point at which the dead-end water body is less than fifty (50) feet wide.

Lake maintenance easement, see Easement, lake maintenance.

Lake, mined means a lake created by the extraction of minerals from the earth for commercial purposes.

Land means the earth, water, and air, above, below, or on the surface, and includes any improvements or structures customarily regarded as land.

Land application means the application or disposal of effluent or sludge on, above or into the surface of the ground through spray irrigation, land spreading, or other methods.

Land development permit means, the permit issued by the City Engineer prior to commencement of construction of required improvements, and after the final record plat approval by the City.

Land Development Regulations (LDR) means Part III of the City of Boynton Beach Code of Ordinances which govern the development and improvement of lands lying in the jurisdiction of the city. Ordinances enacted by the City of Boynton Beach for the regulation of any aspect of development, and includes any zoning, rezoning, subdivision, health, environmental, or sign regulations controlling the development of land.

Legal access (*) means a dedicated and recorded right-of-way, or easement, excluding utility or drainage easements, affording perpetual ingress and egress from a subject property to a public thoroughfare.

Legal positive outfall means the permanently established connection of a stormwater discharge conveyance facility serving a development site to a watercourse or water body under the control and jurisdiction of one (1) or more public agencies, said connection being subject to all applicable agency permitting and approval requirements.

Level of Service (LOS) means an indicator of the extent or degree of service provided by, or proposed to be provided by a public facility or service based on and related to the operational characteristics of the public facility or service.

Limited access easement, see Easement, limited access.

Limited access street, see Street, limited access.

Littoral Zone means that region of the shoreline beginning at the Ordinary High Water (OHW) and extending waterward to a maximum depth of minus three (-3) feet OHW.

Loading space means the off-the-street area designated for loading and unloading of trucks, in the form which may include one (1) or more truck berths located either within a building or in an open area on the same lot.

Local Government means the City of Boynton Beach, Florida.

Local street, see Street, local.

Lot means the smallest division of land identified as a single unit of ownership for conveyance and legal development purposes, and delineated by a closed boundary that is either:

1. Depicted on a record plat;
2. Depicted on a survey, map or drawing for which an affidavit or waiver or affidavit of exemption has been recorded; or
3. Described on a recorded deed or agreement for deed.

The total area of abutting lands joined pursuant to a recorded unity of title shall be deemed a single lot for the purposes of this Handbook. As used herein, the term shall be synonymous with the terms “plot”, “parcel”, or “tract” when referring to lands within a closed boundary not further divided by one or more interior property lines.

Major driveway (*) means a main ingress or egress to a public street from the site of any development generating more than 1,000 vehicular trips per 24 hour day or more than 250 trips in any single hour including, but not limited to, a shopping center, multiple-family development, industrial park, hospital or any other use.

Major street, see Street, major.

Major thoroughfares (*) means a main traffic artery connecting two (2) or more municipalities.

Marginal access street, see Street, marginal access.

Master Plan (*) means a drawing which shows the intended division of and improvements on real property.

Master stormwater management plan (*) means documents outlining proposed primary and secondary drainage and stormwater treatment facilities.

Material, excess means excavated material not required for backfill or grading of the premises as determined by a final site plan.

Material (fill) (*) means sand, clay, rock, muck, gravel, loam or like materials existing or hauled to the site.

Material, extractive or excavated, means earth, sand, gravel, rock, shellrock, muck, or other mineral or organic substance, other than vegetation, which naturally occurs upon a lot.

Mean high water means the average height of tidal high water over a nineteen (19) year period.

Mean sea level means the average height of the sea of all stages of the tide based on the National Geodetic Vertical Datum (NGVD).

Mining (*) means the removal of materials from a site in quantities exceeding what is physically necessary to develop the site. Mining is prohibited in the City of Boynton Beach.

Minor street, see Street, minor.

Motor vehicle shall have the meaning ascribed by the statutes of the State of Florida providing for the regulation, registration, licensing and recordation of ownership of motor vehicles in the State of Florida.

Mulch means non-living organic material customarily used in landscape design to retard erosion and retain moisture.

Municipality means a general purpose local governmental entity created by the State Legislature and governed by Sec. 166.01, et. seq., Fla. Stat. For the purpose of the local municipality, the City of Boynton Beach is the governing authority.

New capital facilities means newly constructed, expanded or added capital facilities that provide additional capacity. New capital facilities shall not include that portion of reconstruction or remodeling of existing facilities that does not create additional capacity.

“O” Horizon means the layer of organic matter on the surface of a mineral soil. This soil consists of decaying plant residues.

Off-site improvements means improvements constructed outside of the boundaries of the project which are required as a part of a development approval.

Off-street loading space means the stall and berth along with the apron or maneuvering area incidental thereto.

Oil/water separator means a watertight receptacle or reservoir receiving stormwater runoff from a concentrated vehicle parking area or a vehicle washdown area or other source containing oily residue runoff.

One-foot drawdown contours means the locus of points around a well or wellfield where the free water elevation is lowered by one (1) foot due to a specified pumping rate of the well or wellfield.

Operating permit means the permit required of certain activities to operate within wellfield zones.

Ordinary High Water (OHW) means, for areas with an established control elevation, the control elevation will be the OHW. For areas without an established control elevation, the wet season water table prior to the excavation activity will be the OHW.

Ordinary Water Level (OWL) means the average level of water as determined by an engineer or by the applicant’s appointee. The established water surface elevation shall consider seasonal fluctuations in the groundwater table and other factors that may cause fluctuations of the water level.

Outfall (*) means a pipe which discharges treated stormwater into waterways

Owner means the owner of the freehold estates, as appears by deed of record, or agreement for deed. It shall not include short-term lessees, reversioners, remainderman, or mortgagees. It shall include lessees with a lease of more than twenty-five (25) years.

Parcel means a unit of land legally established by property lines.

Parking lot (*) means any outdoor or partially enclosed or enclosed space, plot, yard or any portion thereof, which is utilized for the parking or storage of vehicles, upon which two (2) or more parking stalls are constructed. Parking lots include access aisles, ramps, maneuvering and all vehicle use areas. (Parking facilities designed for detached single-family homes or duplex units with a maximum of four parking stalls are exempt from this definition.)

Parking lot, commercial means a paved area intended or used for the off-street parking or storage of operable motor vehicles on a temporary basis, other than accessory to a principal use.

Parking lot, shared or common means a parking lot or area that serves more than one (1) lot use or residential dwelling.

Parking, off-street means the minimum number of parking spaces per land use as required by Chapter 2 (Zoning) of the City's Land Development Regulations.

Parking space mean a surfaced or grassed area, enclosed or unenclosed, sufficient in size and approved to store one (1) motor vehicle.

Parking stall (*) means a surfaced area, enclosed or unenclosed, within a parking tract sufficient in size to store one automobile with a minimum width and a minimum length per current city standards.

Parking tract means a parking lot delineated on a plat or otherwise created by instrument of record for the purpose of providing common vehicular parking and legal access for owners of abutting lots.

Percolation pond means an artificial impoundment similar to a holding pond for which the design and operation provides for fluid losses through percolation or seepage.

Percolation test means a test conducted to determine the rate of percolation or seepage of water through soils in the area of the drainfield, the result of which test is expressed as time in minutes per one inch drop of water.

Performance security means funds irrevocably committed by written instrument that are sufficient to secure the complete performance of a contract or condition of a development order, Development Agreement, or covenant. Performance securities shall be denominated in United States dollars. The form of the security shall be approved by the City Attorney, and may include:

1. An irrevocable letter of credit;
2. A cash bond.

Person means any individual, corporation, governmental agency, business trust, estate, trust, partnership, association, property owners' association, two (2) or more persons having a joint or common interest, or any other legal entity.

Phased development means development which is designed, permitted or platted in distinct, sequential stages to be constructed over a specified period of time.

Planned Development means a planned development district or a previously approved planned development. A regulation containing the term "planned

development” means that the regulation applies to a planned development district and a previously approved planned development.

Plat means a map or delineated representation of the subdivision of lands, being a complete, exact representation of the subdivision and other information in compliance with all requirements of all applicable provisions of Chapter 177, Fla. Stat., and may include the terms ‘replat’, ‘‘amended plat’’, or ‘‘revised plat’’.

Plat boundary means a map or delineated representation for recordation of a single lot for development purposes prepared, approved, and recorded in accordance with the requirements and procedures for a plat pursuant to Chapter 177, Fla. Stat.

Plat, final means a finished plat including all signatures required for recordation except those signifying approval by the City.

Plat, preliminary means a copy of the plat in sufficient form to readily compare the plat with the subdivision plan and construction plans.

Plat of record means a plat which conforms to the requirements of the applicable state laws, and Chapter 5 (Platting) of the City’s Land Development Regulations, and recorded in the Public Records of Palm Beach County, Florida.

Pond means a permanent body of water less than one (1) acre in size and less than six (6’) feet in depth.

Positive drainage means the provision of a stormwater management system, which conveys stormwater runoff to a point of legal positive outfall.

Potable water facilities mean the planning of, engineering for, preparation of acquisition documents for, acquisition of land for, or construction of potable water facilities necessary to meet the LOS for potable water facilities.

Private street, see Street, private.

Project means a land use or group of land uses involving the development of a particular parcel of land at a particular density which was granted a valid City Development Order, or which substantially complies with applicable provisions of the City’s Land Development Regulations.

Property owners’ association means an organization recognized under the laws of the State, operated under recorded maintenance and ownership agreements through which each owner of a portion of a subdivision, be it a lot, home, property or any other interest, is automatically a voting member, and each such member is automatically subject to a charge for a prorated share of expenses, either direct or indirect, for maintaining common properties within the subdivision, such as roads, parks, recreational areas, common areas and other similar properties. Within the text of this Handbook, a property owners’

association is considered to be a single entity for property ownership. As used in this Handbook, the term “property owners association” shall also be deemed to include a homeowners’ association, condominium association or cooperative (apartment) association, as defined in Chapter 711, Fla. Stat., as amended, having a life tenure of not less than twenty (20) years; as well as a third party having an agreement with a condominium or cooperative association as permitted by Chapter 711, Fla. Stat., as amended.

Public agency means any government or governmental agency, board, commission, authority or public body of Palm Beach County, the State of Florida, or of the United States government, or any legally constituted governmental subdivision or special district.

Public easement, see Easement, public.

Public facilities means capital facilities, including but not limited to roads, parks and recreation, fire-rescue, library, law enforcement, public buildings, school sites and utility systems in support thereof.

Public Facilities Agreement means an agreement entered into by the City of Boynton Beach or a Service Provider and a developer or landowner for the purpose of ensuring a public facility is reserved for a proposed development.

Public Health Unit means the Palm Beach County Health Department.

Public right-of-way (*) means the land which is dedicated for pedestrian or automotive traffic or which is dedicated for access to utilities and is, or is intended to be, permanently open for these uses.

Public street, see Street, public.

Public utility means an entity owning, operating, managing or controlling a system or proposing construction of a system that is providing or proposing to provide water or sewer service, electricity, natural or manufactured gas, or any similar gaseous substance, telephone, telegraph or other communication service to the public for compensation.

Public works and/or utility projects means projects that may be conducted by government agencies or departments or are linear projects, such as paving and drainage, water and wastewater lines, pipelines, transmission lines, telephone lines, etc., that are constructed for no single property.

Quasi-public easement, see Easement, quasi-public.

Queuing area means a one-way aisle that provides a waiting area for a specified number of cars.

Reclamation means increasing the land use capability to be made suitable for development or by changing the land's character or environment through drainage, fill or revegetation.

Residence, see Dwelling unit.

Residential access street, see Street, residential access.

Retention means the collection and storage of a specific portion of stormwater runoff without subsequent direct release to surface waters of said portion or any part thereof.

Retention or detention pond means any pit, pond, or excavation excluding canals of conveyance which creates a body of water by virtue of its connection to ground-water, and which is intended to receive stormwater.

Right-of-way means a strip of land dedicated or deeded to the perpetual use of the public.

Road facilities mean the planning of, engineering for, preparation of acquisition documents for, acquisition of land for, or construction of roads on the major road network system necessary to meet the LOS for road facilities.

Roadway (*) means that portion of a highway improved, designed or ordinarily used for vehicular travel, exclusive of the berm or shoulder. In the event a highway includes two or more separate roadways, the term "roadway" as used herein refers to any such roadway separately, but not to all such roadways collectively.

Sand means sediments having a distribution of particle diameters between 0.074 and 4.76 millimeters, as defined in the Unified Soils Classification System. Sand grain analyses shall follow the methodology described in Folk, Robert L. 1980, *Petrology of Sedimentary Rocks* to determine grain size distribution.

Sanitary sewer facilities mean the planning of, engineering for, preparation of acquisition documents for, acquisition of land for, or construction of sanitary sewer facilities necessary to meet the LOS for sanitary sewer facilities. The term "wastewater facilities" is used interchangeably with the term "sanitary sewer facilities", and carries the same meaning.

Service Provider means any agency that is responsible for the provision of public facilities to developments in the service area of the Utilities Department of the City of Boynton Beach.

Sewer system, central means the regional sewerage system, owned and operated jointly by the cities of Boynton Beach and Delray Beach, which provides sewer service to several developments located within its service area.

Sight distance means the extent of unobstructed vision in a horizontal and vertical plane.

Stall or berth means the space within which vehicles are placed during actual loading or unloading operations.

State road (*) means any highway designated as a state-maintained road by the Florida Department of Transportation.

State standards means the most recent edition of all state standard indexes and specifications.

Storm drainage (*) means a system sufficient to prevent inundation resulting from a three-year storm which conveys storm waters to publicly dedicated and maintained drainage canals or natural waterways acceptable to the agency having jurisdiction.

Stormwater means the flow of water that results from and occurs immediately following a rainfall event.

Stormwater management plan means an engineering drawing and written report outlining the proposed secondary and tertiary stormwater management system needed for the proper development of a specific increment of the developing area of the City and its perimeter service area, including details of drainage-related conditions and characteristics of the existing development site and surrounding lands.

Stormwater management system means a comprehensive system designed and constructed or implemented to collect, convey, store, absorb, inhibit, treat, use or reuse stormwater in order to prevent or reduce inundation, flooding, over-drainage, environmental degradation, and water pollution, or otherwise affect the quantity and quality of stormwater runoff.

Stormwater runoff means that portion of stormwater which occurs either as overland flow or subsurface lateral flow through normally unsaturated soils, and which is neither intercepted by vegetation, evaporated, nor recharged to groundwater.

Stormwater system, primary means classified surface waters of the State which convey stormwater runoff toward the ocean or a major inland water body.

Stormwater system, secondary means that component of a stormwater management system which consists of facilities and features primarily designed to provide for treatment and control of stormwater runoff generated by specifically delineated lands, in order to meet regulatory requirements governing the quality and quantity of stormwater discharged to the primary stormwater system. May also be known as retention or detention ponds.

Stormwater treatment means removal of pollutants, debris, and other undesirable materials from stormwater runoff by means of natural, chemical, biological or physical processes, including, but not necessarily limited to, detention, retention, filtration, percolation, sedimentation, floatation, and skimming. This definition does not normally include active treatment processes requiring the consumption of electrical or mechanical energy.

Stormwater system, tertiary means that component of a stormwater management system which consists of facilities and features designed to provide for rapid removal of stormwater from structures, building sites, streets, and other areas of development or uses sensitive to damage or disruption by inundation. This may also be referenced to as the collection system and include piping, inlets and swales.

Street means a strip of land, owned privately or publicly, which affords legal access to abutting land and is designated for vehicular traffic. “Street” includes road, court, way, thoroughfare, parkway, avenue, boulevard, expressway, lane, throughway, place, circle and square, or however otherwise designated. Streets are further classified according to the function they perform.

Street, arterial means a major street of higher classification than a plan collector street, used primarily for traffic traveling a considerable distance within or through an area not served by an expressway, and used primarily as a main traffic artery.

Street, collector means a street which carries traffic from local streets to arterial streets. Collector streets have more continuity, carry higher traffic volumes and may provide less access to abutting properties than local streets.

Street, collector, non-plan means a collector street which is not included on the Thoroughfare Plan and which is the highest classification of a minor street.

Street, collector, plan means a collector street which is part of the Thoroughfare Plan, and which is the lowest classification of a major street.

Street, dead-end means a street with only one (1) outlet.

Street edge means a buffer used to define and continue a residential frontage line along the unbuilt portion of a lot.

Street, frontage (*) means the property line adjacent to a public or private street.

Street, limited access means a street to which access from abutting property is under the control and jurisdiction of the city pursuant to a limited access easement or other regulatory access restriction.

Street, local (*) means a street shown or described as such according to the current or most recent functional classification contained in the City of Boynton Beach Comprehensive Plan, as adopted and amended.

Street, local commercial means a street designed and maintained primarily to provide legal and vehicular access to abutting commercial or industrial lots. A local commercial street is of limited continuity, is not for through traffic, and is the middle order street of minor streets.

Street, local residential means a street designed and maintained primarily to provide legal and vehicular access to abutting residential lots. A local residential street is of limited continuity, is not for through traffic, and is the middle order street of minor streets, being of a higher classification than a residential access street.

Street, major means a street depicted on the adopted thoroughfare plan; a thoroughfare plan road. Major streets are further classified as collector street, arterial street, and expressway.

Street, marginal access means a special purpose local street which is parallel and adjacent to a plan collector street, expressway, arterial street or other limited access street, and which has its principal purpose of relieving such streets from local service of abutting property by providing access to abutting property, and separation from the through traffic. A marginal access street may also be called a “frontage street”.

Street, minor means any street not classified as a major street, and includes streets providing traffic circulation within the development.

Street, private means any street which:

1. Has not been dedicated for public use;
2. Is reserved to a property owner’s association pursuant to recorded restrictions and covenants or a plat of record; or
3. Is dedicated for public use but has not been accepted for maintenance by the City, another local governmental or quasi-governmental entity, the State, the County or a special district.

Street, public (*) means any street dedicated to the public and accepted for ownership and maintenance by the City Commission.

Street, residential access means the lowest order of minor street, which is intended to carry the least amount of traffic at the lowest speed.

Street, through means a street that serves more than one neighborhood, or that carries traffic between neighborhoods proper.

Subdivision means the division of land, whether improved or unimproved, whether previously platted or not, into two (2) or more contiguous parcels for the

purpose, whether immediate or future, of transfer of ownership. The term shall include any modification of legal boundaries for the purpose of redividing or combining any lot(s) depicted on a record plat, or on a certified survey or other map recorded pursuant to any affidavit or exemption or affidavit of waiver. When appropriate to the text, the term refers to the process of subdividing of the land proposed to be or which has been subdivided.

Substitution means that the Department will receive and consider the contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Department. If the following conditions are not satisfied, the Department will return the requests without action except to record noncompliance with these requirements:

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents or "Shop Drawings" (Appendix Exhibit "N").
3. The request is timely, fully documented, and properly submitted.
4. The specified product or method of construction cannot be provided within the Contract time. The Department will not consider the request if the product or method cannot be provided as a result of failure to pursue the work promptly or coordinate activities properly.
5. The request is directly related to an "or equal" clause or similar language in the Contract Documents or "Shop Drawings" (Appendix Exhibit "N").
6. The requested substitution offers the Department a substantial advantage, in cost, time, energy conservation or other considerations, after deducting additional responsibilities the Department must assume. The Department's additional responsibilities may include compensation for any redesign and evaluation services, increased cost of other construction by the Department, and similar considerations.
7. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the contractor certified that the substitution will overcome the incompatibility.
9. The specified product or method of construction cannot be coordinated with other materials and where the contractor certifies that the proposed substitution can be coordinated.
10. The specified product or method of construction cannot provide a warranty required by the Contract Documents or "Shop Drawings" (Appendix Exhibit "N") and where the contractor certified that the proposed substitution provides the required warranty.
11. Where a proposed substitution involves more than one sub-contractor, each sub-contractor shall cooperate with the other sub-

The contractor's submittal and the Department's acceptance of shop drawings, product data, or samples for construction activities not complying with the Contract Documents or "Shop Drawings" (Appendix Exhibit "N") do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

Surety (*) means an irrevocable surety guaranteeing that all required surveying and construction improvements will be completed in full accord with approved documents and all conditions attached thereto.

Surface water means water upon the surface of the earth whether contained within natural or artificial boundaries, or diffused.

Surveyor means a professional land surveyor and mapper registered in the State of Florida.

Suspension order means suspension of construction work directly over the potential archaeological find. During the initial site visit, a qualified archaeologist may extend the boundary of the suspension order based on the potential significance and geographic coverage of the find.

Swale means a stabilized and graded depression designed to convey stormwater runoff and retain water for only a brief period following a rainfall event.

Thoroughfare plan, thoroughfare right-of-way protection map or plan means that which is described in the traffic circulation Element of the Palm Beach County Comprehensive Plan, III; Existing Conditions; the Thoroughfare Right-of-Way Protection Map.

Through street, see Street, through.

Traffic (*) means pedestrians, ridden or herded animals, and vehicles, streetcars and other conveyances either singly or together while using any street or highway for purposes of travel.

Traffic control devices (*) means any mechanism used to regulate traffic, such as pavement striping, signs, etc, as specified in the US DOT/FHWA *Manual on Uniform Traffic Control Devices (MUTCD)*, excluding any mechanical or electrical device such as traffic lights.

Traffic control signal (*) means any device whether manually, electrically or mechanically operated by which traffic is alternately directed to stop and permitted to proceed.

Traffic impact analysis (*) (TIA) means a traffic statement prepared by a professional engineer competent in traffic engineering registered in the State of Florida. Such analysis should address at a minimum, daily and peak hour movements, turn lanes required, signalization, capacity of the street system and interior driveway lengths.

Trailer means any vehicle with or without mechanical power, other than a pole trailer, designed for carrying persons or property and for being drawn by a motor vehicle.

Trip means a one-way movement of vehicular travel from an origin (one trip end) to a destination (the other trip end).

Trip generation means the attraction or production of trips caused by a given type of land development.

Truck shall have the meaning ascribed by the statutes of the State of Florida, providing for the regulation, registration, licensing, and recordation of ownership of motor vehicles in the State of Florida.

Ultimate right-of-way means an area set aside for future road widening or used as means of ingress, egress or approach as determined by the Florida Department of Transportation, the Office of the County Engineer, the City Commissioners, or by this Code whichever provides the widest right-of-way.

Unit means a building or portion of a building, or a mobile home used primarily for human habitation purposes with separate bathing, cooking and/or dining facilities. In the case of a hotel or motel, or a congregate living facility, it shall mean the room and bathrooms.

Unity of control means a covenant stipulating that a lot, lots or project with different owners shall be developed according to a common site or master plan, providing unified control, and the combined lots shall meet land development requirements as if they were one (1) lot.

Unity of title means a document recorded in the office of the Clerk of the Circuit Court of Palm Beach County stipulating that a lot, lots or parcel of land shall be held under single ownership, shall not be eligible for further subdivision and shall not be transferred, conveyed, sold or divided in any unit other than in its entirety.

Upland Reclamation Area is the land area preserved or established around the perimeter of an excavated area created to insure useable end-use of the land.

Use means any purpose for which a building, other structure, or a tract of land may be designed, arranged, intended, maintained, or occupied; or any activity, occupation, business or operation carried on, or intended to be carried on, in a building, other structure, or on a tract of land.

Utility means a governmental or franchised provider of water, sewer, electric, gas, telephone, telegraph, cable television or similar service.

Utility easement, see Easement, utility.

Utility, minor means elements of utility distribution, collection, or transmission networks, other than electrical generation and transmission voltage facilities, required by their nature to be relatively dispersed through the service area. Typical uses include gas and water, electrical distribution substations, sewage lift stations, and telephone exchange buildings and substations.

Variance means an abatement or relief of the terms of the Land Development Regulations for a use, where such variance will not be contrary to the public interest and where, owing to conditions peculiar to the property and not the result of the actions of the applicant, a literal enforcement of the Code would result in unnecessary and undue hardship.

Waste means discarded material including but not limited to garbage, rubbish, yard trash, litter, non-combustible refuse and industrial wastes.

Wastewater treatment facility means a facility designed for treatment and disposal of more than five thousand (5,000) gallons per day of wastewater, including large regional plants and above ground package treatment facilities.

Water management tract means a parcel of land under single ownership, identified and created as a single unit on a plat or other instrument of record, established for the purpose of delineating a complete facility or unified area to be utilized for detention, retention, or groundwater recharge of stormwater runoff prior to discharge from a development site.

Water system, central means a water supply system owned and operated by the municipality, which provides water service to several developments located within its service area.

Water system, individual means a privately owned water supply system, which provides water service to a single development because of unavailability of a central water system.

Water table elevation means the upper surface of the groundwater or that level below which the soil or underlying rock material is saturated with water. Water table elevation is measured from the soil surface down or up to the free water level.

Water treatment facility means a facility designed for the treatment of ground or surface water for potable and sanitary purposes, with a design capacity of more than ten thousand (10,000) gallons per day.

Water well means a source of water used for drinking, culinary, sanitary and other domestic purposes. Wells are classified as follows: private well, semi-private well, non-community well, community water well and non-potable well. Each relates to the number of dwelling units to be served from each type of well. For the purpose of this Handbook, all community water wells are owned and operated by the Utilities Department.

Watercourse means any stream, canal, ditch, or other natural or artificial channel in which water normally flows within a defined bed, banks, or other discernible boundaries, either continuously or seasonally, whether or not such flow is uniform or uninterrupted.

Waters of the state mean waters, as defined in Sec. 403.031(12), Fla. Stat., subject to compliance with State Water Quality Standards adopted pursuant to Chapter 403, Fla. Stat., and set forth in Chapter 17-3, F.A.C.

Watershed means the land area which contributes to the total overland flow of water entering a receiving stream or water body.

Waterway means any water body such as a canal, channel, ditch, drainage way, lake, stream, watercourse, etc.

Well means an opening in the ground designed to conduct water from a ground water supply to the surface by pumping or natural flow when water from such opening is used or is to be used for a drinking water supply system or irrigation purposes.

Wellfield means an area of land which contains more than one (1) potable well that is designed for a pumping rate of at least one hundred thousand (100,000) gallons per day.

Wellfield Zones 1 and 2 means zones of influence delineated by iso-travel time contours around public water supply wellheads. Zone 1 is identified as the land area within a thirty (30) day travel time and Zone 2 is the land area within a two hundred ten (210) day travel time. Zone of influence maps, including zones 3 and 4 are developed pursuant to the Wellfield Protection Section (Section 9.3, Unified Land Development Code of Palm Beach County, last updated in October, 1996) and are on file and maintained by the Palm Beach County Department of Environmental Resource Management (DERM).

Wet detention/retention means detention or retention in a storage facility not designed, constructed, and operated so as to provide dry detention/retention.

Wetland means any persistent or intermittent water body or area characterized by the dominance of those submerged or transitional wetland species listed in the F.A.C., Rule 17-301 or located within or up to three (3) miles directly offshore of Palm Beach County. Dominance shall be defined in accordance with F.A.C. Rule

17-301 and shall be determined in the appropriate plant stratum (canopy, subcanopy, or ground cover) as outlined in F.A.C. Rule 17-301.

Wettest season means that period of time each year in which the groundwater table elevation can normally be expected to be at its highest elevation.

Zones of Influence means zones delineated by iso-travel time contours and the one (1) foot drawdown contour within cones of depression of wells which obtain water from the unconfined or surficial aquifer system. These zones are calculated, based on the rate of movement of groundwaters in the vicinity of wells at a specified pumping rate.

Zones of Influence Maps mean aerial photographs at scales determined by DERM showing the location on the ground of the outer limits of Zones of Influence for present and future public potable water supply wells and wellfields permitted for 100,000 gallons per day or more usage.

Zoning Code (*) means Chapters 2 and 2.5 of the City's Land Development Regulations as adopted by the City Commission.

C. ABBREVIATIONS AND ACRONYMS:

ABB	Abbreviation
ACCORD	Accordance
ADD	Addendum
ADJ	Adjacent
A/C	Air Condition
ALT	Alternate
AL, ALUM	Aluminum
ALCMP	Aluminum Corrugated Metal Pipe
AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society of Testing and Materials
AT & T	American Telephone and Telegraph Co.
AWWA	American Water Works Association
ACOE	Army Corps of Engineers
ANCH	Anchor
A, ∠	Angle
APPROX	Approximately
A/E	Architectural/Engineering
ARCH	Architectural
ACP	Asbestos Concrete Pipe
ASPH	Asphaltic Concrete
ASSY	Assembly

@	At
AVE	Avenue
AVG	Average
ABT	Auger Boring Terminated
BM	Benchmark
BCCMP	Bituminous Coated Corrugated Metal Pipe
BO	Blow off
BHP	Brake Horsepower
BV	Butterfly Valve
BOC	Back Of Curb
BL, B	Base Line
BRG	Bearing
B.R.	Bearing Reference
BELL	Bell Telephone Co.
BETW	Between
BIT	Bituminous
BLK	Block
BOT	Bottom
BLVD	Boulevard
BLDG	Building
BE	Buried Electric Conduit
BT	Buried Telephone Cable
CIP	Cast Iron Pipe
CB	Catch Basin
CL, ¢	Centerline
CO	Certificate of Occupancy
CV	Check Valve
CLDR	City's Land Development Regulations
CO	Cleanout, Change Order
CEB	Code Enforcement Board
CW	Control Water Elevation
CAP	Corrugated Aluminum Pipe
CASP	Corrugated Aluminized Steel Pipe
CMP	Corrugated Metal Pipe
CPEP	Corrugated Polyethylene Pipe
CSP	Corrugated Steel Pipe
CU FT, CF	Cubic Foot (Feet)
CFM	Cubic Feet per Minute
CFS	Cubic Feet per Second
CU YD, CY	Cubic Yard
CATV	Cable Television
CALC	Calculated
CALIF	California
CI	Cast Iron
CIP	Cast Iron Pipe

CTR	Center
CLF	Chain Link Fence
CIR	Circle
COL	Column
CCC	Concentric
CONC	Concrete
CBS	Concrete Block And Stucco
C.M.	Concrete Monument
CONN	Connection
CONST	Construction
CJ	Construction Joint
CONT	Continuous
CONTR	Contractor
COORD	Coordinate
CT	Court
CU IN	Cubic Inch
C&G	Curb & Gutter
CRV	Curve
Δ	Delta
dB	Decibel
DBPUD	City of Delray Beach, Public Utilities Department
DEPT	Utilities Department, City of Boynton Beach
DERM	PBC Department of Environmental Resource Management
DHW	Design High Water
DRI	Development of Regional Impact
DE	Drainage Easement
DIP	Ductile Iron Pipe
DET	Detail
DIAG	Diagonal
DIA	Diameter
DIM	Dimension
DIR	Direct
DIV	Division
DBL	Double
DN	Down
DS	Downspout
D/F	Drainfield
DWGS	Drawings
DR	Drive
ESMT, EASE	Easement
ECR I	PBC Environmental Control Rule I (On-site Sewage Disposal Systems)
ECR II	PBC Environmental Control Rule II (Water Supply Systems)
ERC	Equivalent Residential Connection
EA	Each

E	East
ECC	Eccentric
EOP, EP	Edge of Pavement
EOW	Edge of Water
ELEC	Electric
EHH	Electric Hand Hole
EL, ELEV	Elevation
ERCP	Elliptical Reinforced Concrete Pipe
END	Endwall, Headwall
ENGR	Engineer
ENT	Entrance
EQUIP	Equipment
EXIST, EX	Existing
EXP	Expansion
EJ	Expansion Joint
FPM	Feet per Minute (unit of velocity)
FPS	Feet per Second (unit of velocity)
FHBM	Flood Hazard Boundary Map
FIRM	Flood Insurance Rate Map
F.A.C.	Florida Administrative Code
FDBPR	Florida Department of Business & Professional Regulation
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FPL	Florida Power and Light Company
Fla. Stat., F.S.	Florida Statutes
FOC	Face of Curb
FT	Feet
FF	Finish Floor
FH	Fire Hydrant Assembly
FW	Fire Water
FBV	Florida Bearing Value
FLR	Floor
FAR	Floor Area Ratio
FL	Flow Line, Flange, Florida
FTG	Footing
FM	Force Main
FD	Found, Floor Drain
FDN	Foundation
FUT	Future
GAL	Gallon(s)
GPD	Gallons per Day
GPM	Gallons per Minute
GPS	Gallons per Second
GV	Gate Valve
GA	Gage
GALV	Galvanized

G	Gas
GEN	General
GRD	Grade
GND	Ground
GFA	Gross Floor Area
GWL	Ground Water Level
GUT	Gutter
HP	Horsepower (unit of power); 1 HP = 746 watts = 2545 BTU/HR
HWL, HGWL	High Ground Water Level
HDCP	Handicap
HD	Head
HDR	Header
HDWL	Headwall, Endwall
H	High
HW	High Water Elevation, High Water Level
HWY	Highway
HORIZ	Horizontal
HB	Hose Bibb
ICWW	Intracoastal Waterway
IAW	In Accordance With
INC	Incorporated
ID	Inside Diameter
IN	Inch
INV	Invert
I.E.	Invert Elevation
I.P.	Iron Pipe
I.R.	Iron Rod
JT	Joint
JCT BX, JB	Junction Box
KW	Kilowatts (units of power)
LOS	Level of Service
LF	Lineal Foot (Feet)
LN	Lane
LAT	Latitude
LT	Left
L, LEN	Length
LS	Lift Station, Lump Sum
LBR	Limerock Bearing Ratio
L/A	Limited Access
LG	Long
LONG	Longitude
MSL	Mean Sea Level

MGD	Million Gallons per Day
MAINT	Maintenance
MH	Manhole
MUTCD	Manual of Uniform Traffic Control Devices (for Streets and Highways)
MFR	Manufacturer
MATL	Material
MAX	Maximum
MHWL	Mean High Water Level
MLWL	Mean Low Water Level
MEAS	Measured
MECH	Mechanical
MJ	Mechanical Joint
MI	Mile
MIN	Minimum
M.T.S.	Minimum Technical Standards
MISC	Miscellaneous
MES	Mitered End Section
MOD	Modified
NEC	National Electrical Code
NFC	National Fire Code
NGVD	National Geodetic Vertical Datum – (1929)
NAVD	North American Vertical Datum – (1988)
NSF	National Sanitation Foundation
N&TT	Nail & Tin Tab
N&W	Nail & Washer
N	North
NE	Northeast
NW	Northwest
N/A	Not Applicable
NIC	Not in Contract
NTS	Not to Scale
NO, #	Number
OSHA	Occupational Safety and Health Administration
OHW	Ordinary High Water
OLW	Ordinary Low Water
O.R.B.	Official Record Book
OC	On Center
OCEW	On Center Each Way
OPNG	Opening
OPR	Operate
ORIG	Original
OD	Outside Diameter
OS&Y	Outside Screw and Yoke
OH	Overhead

PBC	Palm Beach County
PBCHD	Palm Beach County Health Department
PBCWUD	Palm Beach County Water Utilities Department
PUD	Planned Unit Development
PVC	Polyvinyl-Chloride Pipe
PSI	Pounds per Square Inch (unit of pressure)
PSF	Pounds per Square Foot (unit of pressure)
PBC BCC	Palm Beach County Board of County Commissioners
PBCED	Palm Beach County Engineering & Public Works
PK NAIL, PK	Parker - Kalon Nail
PG	Page
PS	Parking Space
PKWY	Parkway
PVMT	Pavement
PERF	Perforated
PCP	Permanent Control Point
PRM	Permanent Reference Monument
PERP, \perp	Perpendicular
P.B.	Plat Book
PNT	Point
POB	Point of Beginning
POC	Point of Connection, Point on Curve, Point of Commencement
PC	Point of Curvature
PI	Point of Intersection
PCC	Point of Compound Curve
PRC	Point of Reverse Curve
PT	Point of Tangency
POL	Point on Line
POT	Point on Tangent
PVI	Point of Vertical Intersection
PIV	Post Indicator Valve
LB, #	Pound
P	Power
PP	Power Pole
PL, P	Property Line
PO	Public Ownership
PUE	Public Utility Easement
RCP	Reinforced Concrete Pipe
RPM	Revolutions per Minute
ROW, R/W	Right-of-way
R, RAD	Radius
RGE	Range
RED	Reducer
REF	Reference
REINF	Reinforced
REQ'D	Required

RM	Residential Multi-Family
REV	Reversed, Revised, Revision
RD	Road
RDWY	Roadway
RT	Right
SP	Sample Point
SF	Single Family
SPRC	Site Plan Review Committee
SFWMD	South Florida Water Management District
SBCCI	Southern Building Code Congress International
SRAP	Spiral Rib Aluminum Pipe
SRASP	Spiral Rib Aluminized Steel Pipe
SRSP	Spiral Rib Steel Pipe
SBC	Standard Building Code
SFPC	Standard Fire Prevention Code
SIC	Standard Industrial Code
SMC	Standard Mechanical Code
SPC	Standard Plumbing Code
SAN	Sanitary
SS	Sanitary Sewer
SCHED,SCH	Schedule
SEC, SECT	Section
S	Sewer
SH	Sheet
SS&W	Ship Spike & Washer
S/W, SDWK	Sidewalk
SLP	Slope
SO	South
SE	Southeast
SW	Southwest
SBT	Bell South (Southern Bell Telephone)
SPEC	Specification
SPR	Spring
SQ	Square
SQ FT, SF	Square Feet
SQ IN, SI	Square Inch
SQ YD, SY	Square Yard
STAB	Stabilize
STD	Standard
SDR	Standard Dimension Ratio
STA	Station
STL	Steel
STOR	Storage
SD	Storm Drain, Storm Sewer
ST	Street
SURF	Surface
SUR	Survey

SYM	Symbol, Symmetrical
SYS	System
TSSW	Ten States Standards – Water
TSSS	Ten States Standards - Sewer
tntc	Too numerous to count
TDH	Total Dynamic Head
TAP-O	Turnpike Aquifer Protection Overlay District
TAN	Tangent
TELE	Telephone
TEMP	Temporary
TEN	Tension
TERM	Terminating, Termination
TERR	Terrace, Territory
TB	Test Boring
THK	Thick
THRU	Through
TOD	Time of Drilling
TOE	Toe of Slope
TOB	Top of Bank
TOW	Top of Wall
TWP	Township
TR	Trail
TYP	Typical
USEPA	United States Environmental Protection Agency
UE	Utility Easement
U/G	Underground
UNIV	University
UP	Up
UTIL	Utility
VCP	Vitrified Clay Pipe
v/c	Volume to capacity ratio
VERT	Vertical
VOL	Volume
WPZ	Wellfield Protection Zones
W	Water, West, Wide
WM	Water Main, Water Meter
WAY	Way
WWF	Welded Wire Fabric
W/	With
W/O	Without
X	X-Ray, Cross Section, Cut Section
X-OVER	Crossover
X-SECT	Cross Section

YD	Yard
YLD	Yield

III. CONSTRUCTION PLANS AND SUPPLEMENTAL ENGINEERING GUIDELINES

A. PLAN PREPARATION AND APPROVAL:

It shall be the responsibility of the design engineer to secure proper existing line information, plan layout, size facilities and prepare plans, all in accordance with these minimum standards. It remains the design engineer's right to exceed these standards if deemed necessary or desirable.

All construction plans shall be approved by the Department. No changes shall be made on approved plans without specific written Department concurrence. The Department shall enforce the approved construction plans to a level equal to that of our minimum standards, and to any additional level as required by the design engineer without concurrence.

No construction shall start prior to a pre-construction conference. While every effort will be made to ascertain that the plans are in conformance with these standards, the right is reserved to enforce the minimum standards.

B. UTILITY CONSTRUCTION PLAN SUBMISSION:

The design engineer should apply the following prior to making a submission; all construction plan submittals for the installation of required improvements shall consist of and contain, but not limited to:

1. A cover sheet showing the applicable project name and project number, sheet index, category of improvements, and vicinity sketch;
2. Prepare utility plans on 24" x 36" sheets using a scale no smaller than 1" = 50' for plans with potable water only or reclaimed water only or wastewater only; 1" = 40' for plans with two piping systems, 1" = 30' for plans with potable water, reclaimed water and wastewater unless specific approval for a smaller scale is obtained from the Department prior to initial plan submittal. Drawings submitted on other size sheets or at an unacceptable scale will be returned without review. The scale used shall be one that appears on a standard engineer's box scale. Like scales shall be used on plan & profile with correct grids, (i.e., 1"=50' horiz, 1"=5' vert.; 1"=40' horiz., 1"=4' vert.) Do not interchange scales nor grid count. [Submit two (2) sets].

3. Obtain Fire Marshall approval of potable water system plans prior to plan submission to the Department. The Fire Marshall approved set shall indicate the minimum fire flow requirement for the project.
4. Submit Fire Marshall approved set, paving and drainage plan, preliminary plat or utility easement plan at scale matching potable water, reclaimed water, and/or wastewater plans, landscaping plan, master plan for multi-phase project, cover sheet and all plan sheets with relevant and easily readable location sketch, completed wastewater survey for projects with potential pretreatment requirements, lift station calculations, canal and road permits, including preliminary FDEP forms [two (2) preliminary copies”].
5. Show clear phase lines and match lines as appropriate. Phasing shall be decided before review.
6. Use the Department’s details or detail sheets to minimize review time and comments. If details are found to have been altered without the knowledge of the Department or without specifically stating in the transmittal which details are altered, the plans will be returned without review.
7. Provide all applicable detail drawings, including special profile sheets as required to show special or unique situations.
8. Benchmark, based on NAVD (1988); show the elevations of conflicting pipes with indication of top and bottom pipe elevations to show the clearance between pipes.
9. Place wastewater design data, including manhole invert and rim elevations, on plan & profile sheets. Plan and profiles are required for gravity wastewater collection mains (show all crossings), transmission mains, and jack and bore crossings and may be required for canal crossings and off-site mains. Display of data in tabular form will not be accepted.
10. Piping shall be placed in the roadway right-of-way areas unless unavoidable. If easements are required, see sub-section E (Easements) below.
11. If pretreatment sampling is required, the location of the sample points are to be shown on plan sheets.
12. Notes regarding special conditions and specifications applicable to the construction, addressing:
 - a) required compliance with construction requirements of this Handbook and the Department standards.

- b) required compliance with State standards applicable to the work;
- c) minimum standards for materials;
- d) test requirements for compaction or stabilization of subgrade, base, and backfill;
- e) required installation of underground utilities and storm drainage located throughout the development in an orderly and consistent manner and/or within the adjacent streets prior to construction of subgrade for pavement;
- f) special construction or earthwork requirements for site work in areas of nonpervious or unstable soils, or to cope with unsuitable soil conditions.

13. After the Department's plan approval, all revisions shall be noted in revision block. (Otherwise, plans will be returned with no review).

C. COMPUTER GENERATED DRAWINGS:

- 1. Use only computer generated scales that can be read with a standard engineer's box scale.
- 2. Show profile grade between manholes.
- 3. Use appropriate symbols for natural ground, compacted earth and pavement.
- 4. Please include one (1) set of electronic data files with your final submittal prior to sign-off approval. See Article Six, Section XV, and Exhibit "A" in the Appendix for requirements.

D. STORMWATER UTILITY MANAGEMENT PLAN:

The design engineer preparing permit application shall include the final stormwater management plan, based upon and consistent with the preliminary stormwater management plan, in separate report form detailing the design of all secondary and tertiary stormwater management facilities, including, as a minimum, the following design data and information:

- 1. Pre-development and post-development drainage basin maps showing site topography, drainage basins, catchment areas, and stormwater inflow/outflow locations for the site;
- 2. Pre-development and post-development site characteristics affecting runoff such as ground cover, soil profile, wet season mean high water

3. Individual catchment area characteristics used for design, including area, times-of-concentration, runoff factors, and quantitative breakdown of pervious/impervious areas;
4. A statement of applicable design and/or performance assumptions and criteria for each part of the system providing drainage, treatment, or discharge control;
5. Evidence of existing access to legal positive outfall(s);
6. Complete hydrologic and hydraulic calculations for design of storm sewers, retention/detention area, and discharge structures;
7. Identification of standard methods and/or proprietary models used for hydrologic and hydraulic analysis, noting that methods or models other than those of the Florida Department of Transportation, South Florida Water Management District, SCS, the rational method, the SBUH method, the Puls method or common modifications of such methods, may require additional documentation;
8. A listing of specific City and South Florida Water Management District requirements used as the design basis for street drainage, site grading, finished floor elevations, floodplain storage compensation, retention/detention volumes, and discharge limits; and
9. Requirements for construction and maintenance of any temporary or phased stormwater management facilities necessary to ensure proper stormwater control and treatment during site development.

E. EASEMENTS:

1. Proposed Department facilities should not be constructed in areas that are to be landscaped. However, if the Department determines that there is no alternative, the Department may consent to the location of minimal plants with non-aggressive root systems within five (5) feet of a utility facility or potable water/wastewater/reclaimed water main. If plantings are allowed within five (5) feet of utility mains, customer shall execute a Hold Harmless Agreement, in the form provided for by the City's Clerk Office, which shall be recorded in the Public Records of Palm Beach County and with the City Clerk.
2. Easements should allow unhindered access to all Department facilities and mains.

3. Adjacent and parallel to roadway right-of-ways, a ten (10) foot wide easement may be sufficient.
4. A twelve (12) foot easement may suffice for a single line in areas where zoning or other legal requirements would ensure that structures are not placed within ten (10) feet of facilities.
5. A twenty (20) foot easement will be necessary for a line that runs down the side property line of a single family type area or through areas not typically accessible (buffer zones, green areas, lakeside easements, golf courses, etc).
6. A thirty (30) foot utility easement will be necessary when two Department owned pipes parallel each other.
7. Wider easements may be required for deeper runs per Department's discretion specially where stormwater drainage outfalls are proposed.
8. Deviations from these requirements may be considered on a case by case basis.
9. "Access or Maintenance Easements" dedicated for construction and maintenance of utilities serving abutting lots are required for all "zero lot line" subdivisions.
10. Wastewater pump station sites that have not been specifically dedicated through the platting process are required to be dedicated by parcel or tract. The size, location, and configuration of the pump station shall be approved by the Department. At least a 30x30 foot site for a fenced in station is required. Additional access and/or utility easements may be required for underground piping and/or road access purposes.
11. Easements will be required for all public water supply well sites as defined in Article 14 – ENVIRONMENTAL STANDARDS Chapter B – WELLFIELD PROTECTION, of the Palm Beach County Unified Land Development Code as amended from time to time. The size, location, and configuration of the well site shall be approved by the Department. At least a 60 x 40 foot easement for the well and well head piping is required. Additional access and/or utility easements for well construction, maintenance, and off-site raw water main piping and other auxiliary utilities may be required. The Department reserves the right to control access to all or a portion of the well site through fencing or other applicable means.
12. Drainage easements shall be provided where necessary at a width adequate to accommodate the drainage facilities. A minimum width of twelve (12) feet shall be provided for underground storm drainage installations. Where swales are used, the width shall be adequate to accommodate the

waters from off-site contributory areas. Other requirements are delineated in Article Five, STORMWATER SYSTEM, of this Handbook.

F. PLAN SUBMITTAL – REVIEW PROCEDURES:

1. The design criteria noted in the next four (4) Articles of this Handbook shall be used to review the utility design of the systems included in any project site development. However, when required by good engineering practice and/or economics, the design engineer shall request, in advance and in writing, deviations from these criteria. Deviations shall be approved, in writing, by the Utilities Director or his designated representative.
2. Provide the utility plan(s) in accordance with Section III.B.1. above.
 - a) The design engineer shall schedule a meeting to review the proposed submittal with the City’s utility engineer prior to the formal submittal.
 - b) An incomplete submittal shall NOT be reviewed and shall be noted as NOT APPROVED.
 - c) If the submittal is reviewed and an excess of twenty (20) comments are noted on the submitted plans prior to the completion of the review, the entire submittal may be returned to the design engineer as incomplete due to lack of quality assurance check and shall be noted as NOT APPROVED.
 - d) If upon resubmittal the reviewed plan(s) reveal an excess of ten (10) subsequent comments noted on the submittal plans prior to the completion of the review, the entire submittal may be returned to the design engineer as incomplete due to lack of quality assurance check and shall be noted as NOT APPROVED.
3. It is incumbent upon the design engineer that prior to any submission, the drawings (and corresponding applications) shall be thoroughly checked and coordinated. Quality control is the responsibility of the design engineer – not the Department’s utility engineer.

ARTICLE TWO – DRINKING WATER SYSTEM

IV. DESIGN CRITERIA

A. POTABLE WATER DESIGN:

There shall be no physical connection between an active potable water supply and an unapproved water supply, or any reclaimed water, wastewater or stormwater system which would allow unsafe water to enter or backflow into the active potable water system by direct pressure, vacuum, gravity or any other means. All potable water services shall be in compliance with all applicable cross connection control regulations.

Design standards for potable water mains (WM) are as follows:

1. Minimum Cover: Minimum cover to finished grade over WM shall be 36". All potable water transmission mains within major thoroughfare rights-of-way shall have full plan and profiles shown. Pipe depth to be designed to be as level as possible and to avoid high points.
2. Horizontal Separation (Wall to Wall):
 - a) Ten (10) feet preferred and six (6) feet minimum to wastewater gravity or force main, 3 feet minimum to reclaimed water lines and to drainage pipe, and 5 feet to drainage structures. Separation of WM to trench drains shall be minimum 10 feet from pipe to edge of drainage fabric.
 - b) Fifteen (15) feet to buildings, top of bank of lakes and canals, other structures (10 feet absolute minimum only when unavoidable and with DIP).
3. Vertical Separation:
 - a) WM shall cross over other pipes unless not feasible.
 - b) A minimum of 12" separation between all pipes shall be maintained. A minimum of 6" vertical separation is acceptable if it is not possible to maintain 12" when the WM crosses over a reclaimed water line, storm or wastewater gravity main; however, when there is no alternative to the WM passing under a wastewater main, and when the WM crosses over or under a reclaimed water main or force main, a minimum of 12" vertical clearance must be maintained.

4. Layout:

- a) The potable WM shall be looped unless otherwise not feasible. Multiple feed lines may be required at the discretion of the Department. Dead ends (end of line) shall be equipped with a blow-off for flushing purposes unless the Department determines that a nearby hydrant is sufficient.
- b) WM should be placed in right-of-ways whenever possible. Placement of WM on or adjacent to interior property lines or between structures is discouraged and will be approved only when unavoidable or when necessary for looping.
- c) Details of connections to existing facilities, (i.e. double valving), must be shown. A reverse tap due to pre-existing conditions is acceptable only if previously approved by the Department (detail drawing required).
- d) In order to facilitate potable water service for all properties within the service area, potable WM shall be extended along the full length of the road frontage of a property by the Developer/Owner requesting potable water service and may be required to be extended through the property if another development section is to be served in the future.
- e) Loop potable WM a distance of 40 feet minimum after valve to existing potable WM or leave provisions for looping or extension whenever possible. The mains in such instances shall end with a valve and plug restrained for a minimum of two (2) pipe lengths.
- f) Sample points as required by the Palm Beach County Health Department (PBCHD) must be shown on plans.

5. Material:

Pressure Class Rated or Special Thickness Class Rated Ductile Iron Pipe (DIP) (cement lined) shall be used for all potable WM. Where special atmospheric or soil conditions require consideration of the pipe material, the use of C-900 Class 150 DR-18 PVC will be evaluated. Department approval of the use of PVC will be required prior to designing any WM with this material. Unless specified approval is granted, no WM shall be encased in concrete.

All pipe used as a potable WM, shall be marked with one continuous strip of 6" wide magnetic blue coded tape imprinted with two (2) inch high

lettering reading “Caution – Potable Water Line Buried Below”, and located approximately eighteen (18) inches above the crown of the pipe. The wording shall occur every three (3) feet. The following is a list of acceptable Pressure Class/Special Thickness Class Ductile Iron Pipe for projects within the Department’s service area:

(Standard laying conditions, min. 36” cover)

<u>Pipe Size</u>	<u>Pressure Class</u>	<u>Special Thickness Class</u>
3”, 4”	350	51
6” to 12”	350	50
16” to 20”	250	50
24” & larger	200	50

Minimum Special Thickness Class 53 is required for exposed (flanged) pipe.

DIP shall also be required in the following circumstances:

- a) Jack and bores (mechanical joints with “MEGALUGS” or equal).
- b) Potable WM for fire sprinkler system connections up to point of service.
- c) Fire hydrant branches.
- d) The right is reserved to mandate DIP in any instances of off-site or on-site construction where future damage to the line is possible due to location or circumstances, or in private property away from dedicated right-of-ways.
- e) Flanged ductile iron pipe is required for exposed (not buried) installation.

6. Size:

The WM shall be sized by the developer’s engineer as required. The Department’s Master Planning may require a greater diameter. An “oversizing credit” may apply pursuant to the City’s Code, Sec. 26-16, and the Land Development Regulations, Chapter 1 – General Provisions, Article V – Impact Fees and Dedications, and Article VI – Land Development Fees (the CLDR). Use the “Friction Coefficient Factor” C=120 for flow calculations to determine applicable credits. The minimum size of WM shall normally be 6”. Four (4) inch mains may be proposed for non-fire hydrant lines serving discrete areas where additional development will not occur. The engineer may be required to demonstrate the adequacy of such sizing. In cases where the completion of gaps in the potable water systems to meet flow requirements of the development is necessary, the developer shall construct the required improvements.

Delivered flows should meet peak domestic requirements as mandated by Florida Department of Environmental Protection (FDEP) plus fire flow as

mandated by the Fire Marshall. Domestic flows shall be based on 250 gpd per single family dwelling unit which is the Department's equivalent of one Equivalent Residential Connection (ERC) hydraulically. The residual pressure under these conditions shall not be less than 20 psi.

Potable WM sizes shall conform to the latest Department potable water Master Plan.

7. Valves and Appurtenances:

- a) Valves – Valving of all systems shall be designed to facilitate the isolation of each section of pipeline between intersections of the grid system. Generally, the number of valves at an intersection shall be one less than the number of pipes forming the intersection.

All valves shall be resilient seat gate valves with right hand closed operation; valves 16" or greater shall be butterfly valves unless another type of valve is approved in writing by the Department.

Valves shall generally be installed at intervals of no greater than 1,000 LF on transmission mains, at intervals of no greater than 700 LF on main distribution loops and feeders, and on all primary branches connected to these lines. In high density areas, valves shall be installed as necessary to minimize the number of persons affected by a break.

In all instances, effectiveness of placement shall be primary criteria in determining valve location. Valves placed in curbs will not be accepted. All valves require lids be marked "water".

- b) Air Release Valves – Air release valves shall be installed at all canal crossings and at high points, as directed by the Department.
- c) A full range EMS marker is required at all fittings and valves.

8. Thrust Restraint:

- a) All pipe-to-pipe, branch connections, valves and all change of direction fittings shall be restrained with EBAA Iron MEGALUG products or approved equal. A second form of restraint, either thrust blocks or tie rods, may be required in certain cases as directed by the Project Manager and Engineer.
- b) All valves and change of direction fittings 16" diameter and larger shall have two (2) forms of restraint. The valve and fittings shall have mechanical joints with EBAA Iron MEGALUG products or approved equal, and either thrust blocks or tie rods. If tie-rods are

approved, the tie-rods shall be in a “mid-span” configuration utilizing EBAA Iron products or approved equal.

- c) Any line terminated as a construction phase that is a known future extension, shall have a valve placed at the end, and restrained with EBAA Iron MEGALUG products or approved equal to the last two (2) pipe joints with a MJ cap.
- d) Flex-Ring Restrained Joint Ductile Iron pipe supplied by American Cast Iron Pipe Company (ACIPCO) and TR Flex Restrained Joint Ductile Iron pipe supplied by U.S. Pipe & Foundry, LLC may be used as approved by the Project Manager and Engineer. Self restraining push-on gaskets are allowed for Jack & Bore applications only as approved by the Project Manager and Engineer.

9. Fire Hydrants and Fire Sprinkler Systems:

The Fire Marshall has final jurisdiction on all hydrant and fire sprinkler line requirements. The Fire Marshall approved plan is required with each first plan submission, and with any revision that relocates a hydrant or a fire line connection. An above ground double check detector assembly or reduced pressure principle detector assembly shall be installed on all dedicated fire lines as required by the Fire Marshall.

- a) Fire Hydrants – Fire hydrants shall be provided in all potable water distribution systems and shall have a 5-¼” main valve. Commercial or Multifamily Residential fire hydrants shall be spaced such that the radius of protection will not be more than 200 feet, or as approved by the Fire Marshall. Each hydrant shall be capable of delivering a minimum flow of 1000 gallons per minute with a residual pressure of not less than 20 psi, or a higher flow as required by the Fire Marshall. Multiple fire hydrants with looped mains and/or larger main sizes may be required to provide water for higher flow demand.

Fire hydrant branches (from main to hydrant) shall not be less than 6” ID and be as short as possible to minimize any potential for a potable water main stub with no flow. Long branch leads will require a second gate valve. Each branch shall be provided with a gate valve located as close as possible to the main.

Hydrants shall be located 10 feet maximum and 5 feet minimum from edge of pavement and no less than 4 feet from driveways with the pumper discharge nozzle facing the roadway. Hydrants shall be located so as to minimize their vulnerability to traffic.

Bollards and a 6” raised curb for traffic protection may be required where minimum distances cannot be met.

Fire hydrants shall be placed in an accessible, unobstructed location with 5 feet clearance in all directions.

Fire hydrants shall be painted two (2) coats of ‘fire engine’ or ‘safety’ red in color. Blue pavement reflectors at the fire hydrant location(s) shall be set by the Contractor after acceptance of the installed water utility system.

- b) Fire Sprinkler System Connections – Closed dedicated fire sprinkler connections shall require, as a minimum backflow prevention device, a double check detector assembly. Sprinkler systems with booster/jockey pumps, pressure/storage tanks and auxiliary water supply connections shall require reduced pressure backflow preventer assembly.

10. Water Service Lines and Taps:

Potable water service taps on the main shall be spaced at a minimum distance of 18” apart. All service lines shall be installed in accordance with the construction details of this Handbook. One (1) inch diameter “saddle taps” shall be performed for 5/8”x 3/4” meters, 1” meters on 4” and larger D.I.P. and 6” and larger PVC pipe. Two (2) inch diameter “saddle taps” shall be performed for 1½” and 2” meters on D.I.P. water main (any PVC main requires double strap saddle).

Services shall not exceed 100 feet to the meter. Services crossing under parking tracts shall have their meters placed prior to the crossing so that the Department is not responsible for these lines. Rolled Type “K” copper is required if either terminal end is located under pavement.

In developments where the property line is not clearly defined (condominiums and commercial), the meter shall be placed in a readily accessible location.

Private services shall not cross potable WM. The developer shall coordinate the installation of private service lines with location of meters to deliver potable water to the correct multi-family dwelling unit or bay and shall identify each to the Department.

Wet taps equal or larger than one half the pipe diameter require a cast iron mechanical joint tapping sleeve or a stainless steel full contact saddle with flange.

11. Water Meter Installation:

- a) General Requirement – Construction plans shall include a typical meter installation detail for each size meter to be installed. Service line and meter sizes must be shown on the plans. Dual metering of a single building service (i.e., two 1” meters instead of one 2” meter) shall not be permitted. The proper sizing of meters and service lines is the responsibility of the developer’s engineer. Meters will be available in the following sizes only: 5/8” x 3/4”, 1”, 1½”, 2”, 3”, 4” and larger sizes as necessary. Meter boxes for 2” and smaller meters are standard. Bypass will be required for meters 3” and larger (see details). Any meter installations 6” or larger will have to have permanent road access to the meter pit.

All meter installation charges must be paid to the Department prior to installation. All meters will be installed by the Department. All service piping, valves, boxes and required backflow prevention devices must be completed in accordance to these standards prior to meter installation. Generally, the Department will not install services for meters 3” and larger. Meter boxes shall not be installed in pedestrian walkways or driveway areas. Service lines under driveways shall be encased in three (3) inch PVC Schedule 80 pipe sleeve. Service taps under driveways shall be avoided whenever possible.

The number of meter connections shall match the number of connections reserved, meter location and layout shall be determined prior to plan approval.

- b) Locations requirement –
- 1) (a) Meter shall be set in grassy area generally at a common property line.
(b) Meter boxes for “zero lot line” properties shall be set in grass area as close as possible to a common property line. Installation detail shall be added to each plan sheet.
 - 2) Locations for meter boxes and control valves shall be selected to be accessible and provide the “minimum unobstructed space” shown on applicable details.
 - (a) Minimum 12” horizontal separation is required between front edge of electrical transformer pad and back edge of water meter box.

- (b) The Developer and/or his representative shall be responsible for coordination of locations of services.
 - (c) Meter/service will not be installed until:
 - i. “Minimum unobstructed space” is provided as shown on applicable details.
 - ii. The required backflow prevention device is installed.
 - (d) Minimum eight (8) feet horizontal separation is required between potable water service line and wastewater lateral.
- 3) Meters shall not be placed in areas that can be fenced, such as backyards, under any circumstances.
 - 4) Meters shall not be placed in any concrete surfaced area (sidewalks, curbs, etc.) unless specifically approved by the Department.
 - 5) When no alternative is available, meter will be allowed in paved area and:
 - (a) Top of box shall be flush with surface located outside of drainage flow lines (i.e., dry surface area).
 - (b) Traffic rated box (FDOT H-20 load range) and lid shall be placed out of the common traffic area. Bollards may be required under certain conditions.
 - 6) In cases where potable water, reclaimed water and wastewater lines have been constructed and a developer replatted the development or relocated structures, the Department shall require that services which cannot be reasonably adjusted, be removed and plugged at the main. If the number of services removed is excessive, the entire line may be required to be replaced. A reasonable adjustment is considered to be less than 3 feet laterally. Any adjustments/reconstruction shall be regarded as having to meet all new construction requirements.

12. Backflow Prevention:

Backflow prevention devices on the USC approved list shall be provided on all projects for prevention and control of cross-connections. This is mandated by the following chain of laws and regulations: Section 403.850-403.864, Florida Statutes; Chapter 62.555.360, Florida Administrative Code; Section 1204, Standard Plumbing Code, Palm Beach

County; and Section 11, Environmental Control Rule II, Palm Beach County.

The backflow preventers will remain the property of the owner/developer, who will also be responsible for proper operation, maintenance and testing thereof. Application and acceptable backflow preventer devices are covered in the Appendix D of this Handbook. All nonresidential services, services for buildings (as they apply to City Code of Ordinances) with more than three stories and services with 3" meters or larger shall have a reduced pressure zone backflow preventer. There shall be no service connection between the RPZ backflow preventer and meter assembly.

In cases where a Reduced Pressure Principle or Double Check Detector assembly type backflow preventer is required, the developer is to furnish a certification that the assembly has been properly installed and operates properly from a certified Backflow Prevention Technician within five (5) business days or ten (10) calendar days of meter installation or fireline service initiation.

B. POTABLE WATER MAIN CONSTRUCTION:

1. Installation: Installation of potable water pipe and associated fittings shall be in accordance with current AWWA and NSF specifications, and manufacturers' requirements for their particular products. All mains shall have 36" clear cover to finished grade with pipe being as level as possible. Any variance will require approval by the Department. Approved pipe joint restraint shall be required at each fitting involving a change of direction and as specified in plan details. If thrust blocks are approved, visqueen protection of plugs and bolts shall be provided. The contractor shall be responsible to ensure that all safety requirements are met with respect to construction.

Changes in pipe alignment may be accomplished using appropriate fittings or through pipe deflection. Pipe deflection at the joint is allowed with ductile iron pipe only and shall not exceed 75% of the manufacturer's recommended maximum joint deflection.

All pipe shall be laid in trenches having a dry and stable bottom. Backfill shall be free of boulders and debris. Pipe shall be fully supported along its entire length. Sharp or rocky material encountered in the base shall be replaced with proper bedding. Pipe shall be laid on line and grade as designed.

Fire hydrants shall be installed with the center of the pumper nozzle approximately 18" above finished grade. Hydrants shall not be placed in sidewalks or traffic areas. It will be the responsibility of the developer to move hydrants placed in an unacceptable location and provide protection

from traffic damage if necessary, upon the Department's request. Fire hydrants can be ordered red in color. Fire hydrants must be clean and have a glossy 'fire engine' or 'safety' red finish when accepted by the utility. If painting is required, all oil, grease, dirt, salts and other contaminants must be removed. Two coats of approved paint to be applied by brush per manufacturers specification for a DFT of at least 4 mils per coat.

All valves shall be placed according to plans unless relocation is approved by the Department. As-built drawings shall reflect the actual location of all mains, hydrants, services, and valves. All taps must be at least 18" from a fitting or bell. Potable WM shall not be laid in fuel contaminated areas.

All road crossings, pavement cuttings and restoration shall be in accordance with the requirements of the City of Boynton Beach or Palm Beach County (if project is located in their jurisdiction but within the Department's service area).

2. Connection to Existing System: All connections to existing potable WM shall be made under the direct supervision of the Department. Valves on existing potable WM shall be operated by the Department personnel or under direct supervision by the Department. Tapping sleeve and valve shall be pressure tested prior to tapping. If service must be cut off to existing customers, the Department must have fourteen (14) days notice to make necessary notifications. The contractor or developer may be required to assist in notifications. In this event, contractor shall be ready to proceed with as much material preassembled as possible at the site to minimize the length of service interruption. The Department will postpone a service cut-off if the contractor is not ready to proceed on schedule. Such connections may be made at night to minimize effects. No customer should be without service for more than six (6) hours. Local chlorination will be required for all pipe and fittings used to complete connections with potable water.
3. Cleaning and Flushing: Foreign material shall be kept out of pipe or cleaned from pipe prior to installation. Upon completion of installation, the mains shall be swabbed (soft-sided pigging) until properly cleaned and the water disposed of without creating a nuisance.
4. Testing: All potable WM shall be pressure tested and tested for bacteriological acceptability. Potable water shall be supplied to the main and pumped to the required pressure, 150 psi. The main tested shall either be separated from presently potable lines or isolated from potable water lines by a double valve arrangement.

The maximum length of line to be tested as one section will be 2,000 feet. The test shall be performed as determined in the current AWWA specification. The standard test duration is two (2) hours. The maximum quantity of water that must be supplied into the tested pipe to maintain pressure within 5 psi of the specified test pressure shall not exceed the applicable AWWA C-600 Standard.

Bacteriological testing shall not begin until after the pressure test has been passed by the Department.

5. Disinfection: All potable water mains shall be disinfected in accordance with AWWA specifications and Palm Beach County Public Health Department regulations. Samples will be taken from all sections of main and a clearance is required from the Health Department before the main can be put in service.
6. Handling, Abandonment and Disposal of Asbestos-Cement Pipe:
 - a) Federal regulations (40CFR Part 61, Subpart M) classify asbestos-cement pipe (AC pipe) as Category II non-friable asbestos-containing material. AC pipe must be handled in a manner which will maintain this classification. Therefore, all handling, cutting, and/or disposal of AC pipe must be performed by a Florida licensed Asbestos Contractor.

The Department will make every effort to identify and quantify the location of known AC pipe and material prior to onset of work.

If the Contractor, during the course of work, observes, uncovers, or otherwise becomes aware of the existence of any asbestos-cement pipe, pieces, or material at the site to which the Contractor or any subcontractor, supplier, or other person may be exposed, the Contractor shall immediately notify the City (Risk Management Department and Utilities Department) and confirm any verbal notice in writing. The Risk Management Department shall promptly consult with the project engineer concerning such condition and determine the necessity of the City retaining special consultants or qualified experts. The contractor shall not perform any work near or in connection with the suspect material until receipt of special written instructions from the Risk Management Department. The Contractor will ensure that all subcontractors follow these procedures. **The Contractor will be responsible for the proper handling and/or disposal of the asbestos-containing material.**

- b) Abandonment – AC pipe to be abandoned in place shall be filled with grout. Abandoned A/C pipe is to be shown on the as-built drawings. The grout mix (based on a cubic yard volume) shall be:

<u>Type</u>	<u>Pounds</u>	<u>Cubic Feet</u>
Cement	340	1.73
Sand	2840	17.91
Stone	0	0
Water	374	6.00
Admix/Type B13 oz		
Air	170 ± 5.0%	1.35

The slump shall be 6" + 1 inch, Admix 1 shall meet ASTM C-494 type B.D. Alternative mixes will be considered.

7. Preconstruction Conference: A prework conference is required before the start of any new construction. See attached check list (Exhibit C).

C. POTABLE WATER MAINS USING PVC:

The Department does not accept installation of Polyvinyl Chloride Pipe (PVC) into its water distribution system unless special atmospheric or soil conditions require consideration of the pipe material. Department approval of the use of PVC will be required prior to designing any segment of the City's water distribution system with this material. When the use of PVC is approved, it shall be C-900 Class 150 DR-18 PVC. The following criteria will apply:

1. Installation: In addition to the requirements of sub-section B.1 above, no deflection at the joint is allowed for PVC pipe. PVC pipe curvature shall be accomplished by bending the pipe. The bending shall form a true arc, i.e., the pipe is curved uniformly throughout its length and shall not exceed the following parameters:

<u>PVC Pipe Size (Inch)</u>	<u>Min. Allow. Radius (Ft)</u>	<u>Max. Deflection (inch) per 20' Length</u>
6	300	8"
8	400	6"
10	600	4"
12	600	4"

D. CONSTRUCTION USING HORIZONTAL DIRECTIONAL DRILLING:

1. General: Potable water design and construction standards shall apply unless otherwise noted. The Department reserves the right to disapprove a horizontal directional drilling installation if the conventional open trench or jack and bore installation is preferred by the Department, because:

- Excessive depth of pipe is of concern;
- A casing is required by the Department to protect the utility pipe;
- Future service and main connections to the utility pipe are possible.

2. Pipe sizes, pipe material: The horizontal directional drilled utility pipe shall be restraint joint PVC AWWA C-900 DR14, 200 psi, NSF 61 (4" – 12"). If the directional-drilled pipe is to be used as a casing for a small diameter service line (up to 2" diameter), DR18 pipe is acceptable. Pipe, coupling and all restraining components shall be completely non-metallic. Pipe and couplings shall be free from voids, cracks, inclusions, and other defects and shall be uniform in color throughout the installation.

3. Design Requirements: The Engineer shall inquire with the Department about approval of a horizontal direction drilling procedure for a pipe installation. With the Department's concurrence, the Engineer shall submit a signed and sealed pilot bore plan for review and approval. The plan shall be submitted on a 24" x 36" sheet to a maximum 1" = 20' horizontal, 1" = 2' vertical scale (1" = 10' horizontal, 1" = 5' vertical scale preferred). The plan must show:
 - Finished grade and surface improvements
 - Locations of drill set-up
 - Length of bore
 - Deflection and radiuses of the pilot bore
 - Locations of existing utilities and underground structures
 - Minimum horizontal and vertical clearances from underground structures, conduits, piping systems (the proposed clearances must exceed Department's standards plus the guidance system accuracy tolerance)
 - Pipe size and specifications
 - Proposed pilot bore pipe deflection limits (not to exceed 75% of the maximum deflection allowed by the pipe manufacturer)
 - Limits of directional bore installation
 - Limits of pressure testing
 - Connection to existing utilities
 - Rights-of-way limits, utility easements and temporary construction easements

4. Preconstruction Meeting: Upon approval of the pilot drill plan by the Department and obtaining all necessary permits for the directional drilling, the Engineer shall schedule a preconstruction meeting with the Department. The Engineer and the Contractor(s) performing the utility work shall attend the meeting.

5. Pilot Bore: The Engineer shall schedule the beginning of work with the Department a minimum of three (3) days in advance. The drill path shall be accurately surveyed and plotted to create an "as-built" drawing (same scale as the pilot drill plan). The Engineer shall evaluate the "as-built" data and confirm the compliance with the design parameters. Deviation beyond approved parameters (depth, deflection radius, separation to other

utilities or structures, etc.) shall be brought to the attention of the Department. The signed and sealed pilot bore "as-built" drawing shall be submitted to the Department for review and approval.

6. Pull Back of Carrier Pipe: Upon approval of the pilot bore location by the Department, the pullback operation of the carrier pipe shall begin. The Contractor shall select the proper reamer type with the final hole opening to be a maximum of one and one-half (1.5) times the outside diameter of the largest component system.

The open borehole shall be stabilized by means of bentonite drill slurry. The slurry shall be contained at the entry or the exit side of the bore in pits or holding tanks.

The pipe sections shall be joined together in accordance with the manufacturer's specifications. The ends of the pipe, gaskets and couplings shall be inspected for cleanliness. Chipped, scratched, scraped, cracked or excessive deformed pipe or couplings shall be rejected. A tracer wire shall be taped to the pipe at 24-inch intervals. The pipe shall be elevated to the approximate angle of entry and supported by roller arms or equivalent.

7. Testing: Installed pipe shall be flushed and pressure tested using potable water. Pressure testing shall be conducted at 150 psi for a minimum of two (2) hours duration. No leakage is acceptable. Installed services, tees and stub-outs shall be pressure tested together with the main. Pressure test is not required if the installed pipe is intended to be used as a casing. If the pipe successfully passed the pressure test, a connection to the existing pipe system may be performed. Bacteriological testing and final pressure testing are required.
8. As-Builts: Certified as-built drawings (signed and sealed paper copies, and computer CD) must be submitted to the Department for review and approval prior to any final certification.

V. STANDARD DETAILS

[SEE SEPARATE LISTING FOR THIS SECTION]

ARTICLE THREE – WASTEWATER SYSTEM

VI. DESIGN CRITERIA

A. WASTEWATER DESIGN:

Wastewater gravity collection systems, pumping stations and force mains shall be designed to deliver peak flows under the following conditions:

1. Flow: Wastewater systems shall be designed on the basis of an average per capita daily flow of not less than 100 gallons per day (gpd) and an average domestic flow of no less than 250 gpd per single family dwelling unit, which equals 1.0 ERC hydraulically. On that basis, lateral wastewater piping shall be designed with capacities when running full of not less than four times the average flow. Trunk lines shall have capacities under the same conditions of not less than 2.5 times the average flow. Special allowance shall be made in each case for wastewater from commercial and industrial sites.

Stormwater shall not be permitted to enter into the wastewater collection systems.

Industrial wastes from service station wash-racks, lubrication racks, car wash, repair shops or other commercial facility and shop floor drains shall not be connected into the wastewater collection system without pre-treatment specifically approved by the Department. The wastes will be disposed of separately by the owner. No toxic, hazardous or discharge deleterious to the wastewater system shall be allowed to be discharged without a Utilities Department approved pre-treatment program. This will also include any diluting of discharge other than that which meets pre-treatment standards.

Any commercial facility where foods are prepared, processed or served, shall have a grease trap of adequate capacity with a solids retention device installed through which the wastewater from the preparation area shall pass before entering the wastewater system. The sizing, design and construction of grease traps must conform to all applicable State, Building Code and Health Department requirements and regulations including, but not limited to, Florida Administrative Code Chapter 10D-6. The grease traps (model and capacity) shall be identified on water/wastewater design plans whenever applicable. No drains are allowed to be connected from dumpster enclosures without prior approval of the Department. The dumpster pad shall be located so as not to allow surface runoff into the wastewater system.

2. Size and Layout: The minimum allowable size for any wastewater gravity main other than house service connection shall be 8” in diameter. See detail sheets for service laterals. Upsizing of wastewater lines to reduce slopes will not be permitted unless justified by calculated flow. In order to facilitate wastewater service for all properties within the service area, wastewater gravity mains and force mains shall generally be extended along the full length of the roadway frontage of a property by the developer/owner requesting wastewater service, and may be required to be extended through the property if another is to be served in the future. The cost associated with upsizing or additional depth may be subject to a credit as defined in CLDR.

3. Slopes: All gravity wastewater lines shall be designed with hydraulic slopes sufficient to give mean velocities, when flowing full or half full, of not less than 2.5 feet per second nor more than five (5) feet per second, based on an acceptable equation. All slope gradients shall not be carried beyond two (2) decimal places, and shall be divisible by four (4) so that the resultant elevation calculation is to the hundredths of a foot (i.e., x.xx).

The following minimum grades will be used for design:

<u>Size Gravity Main</u>	<u>Minimum Slope</u>
8”	0.44%
10”	0.36%
12”	0.28%
16”	0.20%

A 0.1 foot drop inside the manholes is recommended to be used to reduce the effective minimum slope to 0.42%, which, when utilizing PVC pipe for the material, would allow the effective design slope to be 0.40%.

4. Increasing Size: When wastewater collection lines are increased in size, or when a smaller line joins a larger one, the invert of the larger pipe should be lowered sufficiently to maintain the same energy gradient.

5. Alignment: Wastewater collection lines of all sizes shall be designed with uniform slope and alignment between manholes. The last total run between the final manhole and the lift station shall be DIP as the pipe material, and the minimum length shall be 20 feet (one pipe length).

6. Pipe Material: Polyvinyl Chloride (PVC) and vinyl based epoxy cement lined using Florida Linerguard 100, Protecto 401 or Permite 9043 – Type 2 (millage to be according to manufacturer specification) Ductile Iron Pipe (DIP) shall be acceptable pipe material for gravity wastewater lines. Unless specific approval is granted, no gravity wastewater line shall be encased in concrete. PVC gravity lines deeper than 15 feet to invert shall

be Class C-900 DIP DR-18. The lining for DIP shall be applied in accordance with the manufacturer's recommendations. DIP shall be specified in the following circumstances:

- a) Anytime a wastewater line passes under any other pipe with less than 12" clearance. (No joint within 10 feet of crossing potable/reclaimed water lines)
- b) When a wastewater line passes over any potable/reclaimed water main regardless of separation and over other pipe with less than 12" clearance (No joint within 10 feet of crossing potable/reclaimed water lines).
- c) When there is less than four (4) feet from finish surface to the invert of the pipe. Four and one half (4 ½) feet to invert shall be the standard design depth. Less depth will not be accepted unless it is unavoidable and has prior Department approval.
- d) Any time the wastewater line is separated horizontally (wall to wall) from a potable water main by less than six (6) feet or reclaimed water main by less than three (3) feet.
- e) When the wastewater line is placed out of a right-of-way, between buildings, along property lines, or in extensive areas potentially subject to landscaping, or is not under pavement. (PVC pipe will be considered on a case by case basis)
- f) The last run of pipe into a wet well.
- g) Inside jack & bore casings (with mechanical joint).
- h) From the manhole to undisturbed soil with Class B bedding (a minimum of ten (10) feet length) of DIP each cored invert (i.e. not precasted by manhole manufacturer). See Standard Manhole Details.

7. Wastewater Lines in Wellfields: New or replacement installation of gravity wastewater lines in protected zones of a public drinking water wellfield shall be constructed to force main standards. See Part C of this section for specific construction materials and testing requirements.

8. Manholes:

- a) Location – Manholes shall be installed at the end of each wastewater system, at every change in grade, size or alignment, at all gravity wastewater main intersections, and at distances not greater than 400 feet apart unless prior approval is obtained from the Department for a distance greater than 400 feet. Gravity wastewater mains shall have no

less than a 90° angle to direction of flow between runs. Manholes shall be placed in accessible locations, preferably in pavement, always flush to the surface. The design depth of the manhole from rim elevation to invert elevation shall be no less than 4.5 feet and no more than 16 feet, unless specifically approved by the Department prior to initial plan submittal. All wastewater mains (including stubouts) shall end with a manhole. In “phased” projects pavement must be in place over stubout runs a minimum 5 feet past the end manhole.

- b) Drop Manholes – An exterior drop pipe shall be provided for a wastewater run designed to enter a manhole at an invert elevation of 2.0 feet or more above the outgoing manhole channel invert. In cases where the elevation difference between the inverts is less than 2.0 feet, a drop pipe is not required, but a channel shall be constructed to guide the flow into the outgoing channel. There is no limit on the length of a drop pipe. No drop invert shall be in the cone section or within six (6) inches of a seam or joint between sections of the manhole. Manholes with a change in direction of flow of over 45 degrees and manholes with more than two (2) inverts shall have no greater than a six (6) inches inside drop.
- c) Flow Channel – The manhole floor shall have a flow channel made to conform in shape and carrying capacity to that of the wastewater pipes.
- d) Service Connections – A collector service connection may not be directed into a manhole unless approved on the construction plans. This is permissible only if it is treated as a wastewater main, i.e. provide elevation, precast hole and flow channel, and no reasonable alternative is available. No service connection shall be made within 5 feet of any manhole. The allowable length of service connections will be kept to a minimum. All service connections must be leak-free using same methods and materials as for main lines. Cleanouts shall be shown on plans at the property/right-of-way line or other required locations to limit the Department’s maintenance and ownership responsibility.

Unless otherwise specified, one cleanout at the property line is required for each wastewater service main connection.

For a single wastewater service, the cleanout has to be constructed per the Department’s “Typical Cleanout Installation” detail prior to water meter installation.

For double wastewater services, the cleanout has to be constructed per the Department’s “Typical Cleanout Installation” detail prior to water meter installation for the second lot.

Service connections shall be typically six (6) inch wyes.

B. FORCE MAINS:

Force mains (FM) shall generally not be less than 4" ID and with a flow velocity of no less than 2.5 FPS nor greater than 5.5 FPS. Force mains less than 4" in diameter will be approved on a case by case basis, with proper justification. Design standards for FMs will be generally the same as for potable water mains. FMs shall never enter a manhole from a direction contrary to the direction of flow out of the manhole. All private FMs entering a road right-of-way shall be built to the Department's standards past that point (usually at property line) and a valve shall be placed there to delineate the change in responsibilities and to control the flow. For energy saving purposes the following sizes can serve as a guideline:

<u>Size FM</u>	<u>Flow Range</u>
3"*	60 GPM to 100 GPM
4"	100 GPM to 200 GPM
6"	200 GPM to 400 GPM
8"	350 GPM to 700 GPM

*with justification approved by the Department

Design standards for force mains are as follows:

1. Minimum Cover: Minimum cover to finished grade over FM shall be 36". Pipe depth to be designed as level as possible.
2. Horizontal Separation:
 - a) Ten (10) feet to potable water mains (less than 10 feet requires DIP, if permitted), 5 feet to drainage structures and pipe, 3 feet to reclaimed water mains.
 - b) Fifteen (15) feet to buildings, top of bank of lakes and canals, other structures (10 feet absolute minimum only when unavoidable and with DIP).
3. Vertical Separation: 12" separation between all pipes shall be maintained, with FM crossing under potable water mains and reclaimed water mains whenever possible.
4. Layout: FM should be placed in right-of-ways whenever possible. Placement of FM on or adjacent to interior property lines or between structures is discouraged and will be approved only when unavoidable. The Department may require the developer to extend the force main across the property for future connections. The cost associated with any upsizing may be subject to a credit as defined in the CLDR.

5. Valves and Appurtenances (FM): Valving of all systems shall be designed to facilitate the isolation of each section of pipeline. All valves shall be resilient seat gate valves with right hand closed operation.

Valves shall generally be installed at intervals of no greater than 1,000 LF on transmission mains.

In all instances, effectiveness of placement shall be primary criteria in determining valve location. Valves placed in curbs will not be accepted.

All pipe-to-pipe, branch connections, valves and all change of direction fittings shall be restrained with EBAA Iron MEGALUG products or approved equal. A second form of restraint, either thrust blocks or tie rods, may be required in certain cases as directed by the Project Manager and Engineer.

All valves and change of direction fittings 16" diameter and larger shall have two (2) forms of restraint. The valve and fittings shall have mechanical joints with EBAA Iron MEGALUG products or approved equal, and either thrust blocks or tie rods. If tie-rods are approved, the tie-rods shall be in a "mid-span" configuration utilizing EBAA Iron products or approved equal.

Any line terminated as a construction phase that is a known future extension, shall have a valve placed at the end, and restrained with EBAA Iron MEGALUG products or approved equal to the last two (2) pipe joints with MJ cap.

Flex-Ring Restrained Joint Ductile Iron pipe supplied by American Cast Iron Pipe Company (ACIPCO) and TR Flex Restrained Joint Ductile Iron pipe supplied by U.S. Pipe & Foundry, LLC may be used as approved by the Project Manager and Engineer. Self restraining push-on gaskets are allowed for Jack & Bore applications only as approved by the Project Manager and Engineer.

Clearance of 18" or one pipe diameter, whichever is greater, shall be maintained between all fittings (bells, valves, flanges, etc.). All branch valves shall be restrained with galvanized dipped ¾" restrainer rods with friction clamps or approved equal. Any line terminated as a construction phase that is a known future extension shall have a valve placed at the end and restrained with galvanized dipped ¾" restrainer rods with friction clamps or approved equal to the last two (2) pipe joints.

All force main valve boxes will have a lid denoting that it is a wastewater force main valve

All wastewater force main valves with valve operator nut 36" or more below final grade will be equipped with an approved mechanically

connected valve extension. All valve operator nuts will be center in the valve box.

Air release valves are to be located at the high points of the force main/points where air may be trapped.

6. Materials: Force mains shall be DIP or PVC C-900 and shall be marked with one continuous strip of six (6) inch wide, brown coded magnetic tape imprinted with two (2) inch high lettering reading: "CAUTION – FORCE MAIN BURIED BELOW", and located approximately eighteen (18) inches above the crown of pipe. The wording shall occur every three (3) feet. When, in the judgment of the Department there is a potential for damage to the force main, the force main shall be vinyl based epoxy lined DIP. The lining shall be applied in accordance with the manufacturer's recommendations. Unless specific approval is granted, no force main shall be encased in concrete. Flanged ductile iron pipe is required for exposed (not buried) installation.

The following is a list of acceptable Pressure Class/Special Thickness Class Ductile Iron Pipe for projects within the Department's service area:

(Standard laying conditions, min. 36" cover)

<u>Pipe Size</u>	<u>Pressure Class</u>	<u>Special Thickness Class</u>
3", 4"	350	51
6" to 12"	350	50
14" to 20"	250	50
24" and above	200	50

Minimum Special Thickness Class 53 is required for exposed (flanged) pipe.

C. WASTEWATER LINE CONSTRUCTION:

1. Installation: Gravity wastewater lines shall be laid accurately to both line and grade. The Department will generally not accept any line laid with a slope varying by more than 10% of its design slope especially for lines laid at minimum gradients. For specific instance the minimum acceptable slope of an 8" line shall be 0.40% if the design called for 0.44%. The Department reserves the right to independently verify questionable survey results. Visible leakage deflections, horizontal misalignment, significant bowing, non-constant slopes between manholes and sagging joints shall each be grounds for rejection of lines. Certified verification by televising of line will be required by the Department.

The minimum design depth of a PVC gravity wastewater line shall be 4.5 feet to invert. DIP shall be placed for all lengths with less than 4.0 feet to invert in cases where this cannot be met and prior approval is obtained.

Trenches and excavations shall be kept dry while work is in progress. The contractor shall be responsible to ensure that all safety requirements are met. Unsuitable excavated material such as boulders, logs and other deleterious materials shall be removed from the site. The pipe barrel shall be uniformly supported along its entire length on undisturbed soil or bedding material. Proper bedding shall be supplied if the existing material includes rock, organic material or other sharp or unsuitable material.

2. Manholes: Manholes shall be set according to construction plans and shall be precast in accordance with approved shop drawings and specification detail drawings accompanying this text. The manhole invert shall be carefully shaped to conform to the pipe flow channel. Flow channels within the manholes involving changes of direction or slide slopes shall smoothly direct the flow in accordance with detail drawings. All concrete irregularities shall be plastered with cement mortar in such a manner as to give a neat and water-tight job. Manholes shall be core-drilled to provide pipe opening when precast hole is not available.

“Ram-nek” or equivalent shall be used at all riser joints. Structures with any leakage will not be accepted. All manholes shall be painted inside and outside with approved coatings. Two (2) coats are required for both the inside and outside of the appurtenance. Manhole interior protection shall consist of the following approved processes: Thoroc, Mainstay, Sewpercoat, Strong Seal or Refratta HAC 100 coating applied in the field. Manhole exterior protection shall consist of the use of Carbiline (Koopers) Bitumastic 300M (or approved equal). The first coat in the color gray or red, and the second coat being the color black. Other exterior finish will be considered. Minimum thickness is 12-15 mils (D.F.T.) per coat, or to manufacturer recommendation, whichever is greater thickness.

3. Inspection and Testing: Lamping of the completed gravity wastewater system will be performed after complete backfilling, the laying of the roadway base, and prior to application to the P.B.C.H.D. for clearance certification. The lamping will determine that the lines have been laid to accurate line and grade. At time of lamping, the line shall be clean and dry. A final inspection will be held after the roadway is completed to verify that the system has not been damaged. All lines and appurtenances not meeting specifications or reasonable standards shall be repaired or replaced.
4. Construction in Wellfields: All new or replacement installations of gravity wastewater mains in Zone One (1) or Zone Two (2) of a public drinking water wellfield shall be constructed to force main standards. The following are the required minimum design and construction standards for

wastewater system pipe, fittings, coatings and pressure testing criteria within Zones 1 or 2 of a wellfield.

- a) Ductile Iron Pipes and fittings for gravity wastewater main and force main application:
 - 1) Ductile iron pipe shall conform to the requirements of ANSI/AWWA C151/A21.51-86 unless otherwise noted on the plans. Glands for mechanical joints shall be of ductile iron or cast iron. Ductile iron pipe shall be epoxy lined.
 - 2) Fittings shall conform to the requirements of ANSI/AWWA C110/A21.10-87, or C153/A21.53-88. Fittings 12" and smaller shall have a 250 psi minimum working pressure.

Flanged ductile iron pipe shall be "special thickness class 53". Flanged ductile iron pipe and fittings shall have threaded flanges, unless otherwise noted on the drawings, and shall conform to ANSI/AWWA C115/A21.15-83. All flanges shall be Class 1560, ANSI B16.5. All above grade flanges shall be flat faced unless they are mating up to existing, or otherwise specified, raised flanges. All gaskets shall be full faced 1/8" red rubber.
 - 3) Joints shall conform to the requirements of ANSI/AWWA C111/A21.11-85.
- b) PVC Pipe (gasketed joint) and fittings for gravity wastewater application. Pipe 6" or larger in diameter shall conform to the requirements as set forth in AWWA C900-81 with dimension ratio DR 18. Provisions must be made for contraction and expansion at each joint, or with rubber ring and an integral bell as part of each joint, or by a rubber ring sealed coupling. Clean, reworked material generated from the manufacturer's own pipe production may be used. Fittings shall be cast or ductile iron. Pipe shall have cast iron pipe equivalent outside dimensions.
- c) Coatings: All ductile iron pipe and fittings shall have a vinyl based epoxy and a bituminous coating on the exterior, per AWWA specification C-210. The coating and lining shall be applied in accordance with the manufacturer's recommendations.
- d) Pressure Tests: The test shall be of two- (2) hour duration. During the test, the pipe being tested shall be maintained at pressure of not less than 150 psi. All pipes shall be pressure tested in accordance with the current AWWA C-600 Standard with a no leakage tolerance. No more than 2000 feet of force main shall be tested at one time.

e) Manholes: Manholes shall be precast and coated with an inert impervious material. Manhole inlets and outlets shall be tightly sealed around the sewer pipe and coated to eliminate leakage.

f) Pipes and manholes with any leakage will not be accepted.

D. WASTEWATER FORCE MAIN CONSTRUCTION:

1. Installation: Installation of force main pipe and associated fittings shall be in accordance with current AWWA specifications, and manufacturer's requirements for their particular products. All mains shall have a depth of 36" clear minimum cover to finished grade. Approved pipe joint restraint shall be required at each fitting involving a change of direction and as specified in plan details. If thrust blocks are approved, visqueen protection of lugs and bolts shall be provided.

All pipe shall be laid in trenches having a dry and stable bottom. Backfill shall be free of boulders and debris. Pipe shall be fully supported along its entire length. Sharp or rocky material encountered in the base shall be replaced with proper bedding. Pipe shall be laid on line and grade as designed.

Changes in pipe alignment may be accomplished using appropriate fittings or through pipe deflection. Pipe deflection at the joint is allowed with ductile iron pipe only and shall not exceed 75% of the manufacturer's recommended maximum joint deflection.

All valves shall be placed according to plans unless relocation is approved by the Department. As-built drawings shall reflect the actual location of all mains and valves. All taps must be at least 18" from a fitting or bell. Force mains shall not be laid in fuel contaminated areas.

All road crossings and pavement cuttings shall be in accordance with the requirements of the City of Boynton Beach or Palm Beach County (if the project is located in their jurisdiction within the Department's service area)

2. Connection to Existing System: All connections to existing mains shall be made under the inspection of the Department. Valves on existing mains shall be operated by Department personnel or under direct supervision by the Department. Tapping sleeve and valve shall be pressure tested prior to tapping. A reverse tap due to pre-existing conditions is acceptable only if previously approved by the Department (construction detail required).

If service must be cut off to existing customers, the Department must have a minimum of 48 hours notice to make necessary notifications. The contractor or developer may be required to assist in notifications. In this event, contractor shall be ready to proceed with as much material pre-

assembled as possible at the site to minimize the length of service interruption. The Department will postpone a service cut-off if the contractor is not ready to proceed on schedule. Such connection may be made at night to minimize effects. No customer should be without service for more than six (6) hours. Any further disruption of service shall be at the discretion of the Department.

3. Cleaning: Foreign material shall be kept out of pipe or cleaned from pipe prior to installation.
4. Testing: All force mains shall be pressure tested in accordance with the current AWWA C-600 Standard. Water shall be supplied to the main and pumped to the required pressure, 150 psi. The maximum length of line to be tested as one section will be 2,000 feet. The standard test duration is two (2) hours. The maximum quantity of water that must be supplied into the tested pipe to maintain pressure within 5 psi of the specified test pressure shall not exceed 50% of the applicable AWWA C-600 Standard.
5. Handling, Abandonment and Disposal of Asbestos – Cement Pipe:
 - a) Federal regulations (40CFR Part 61, Subpart M) classify asbestos-cement pipe (AC pipe) as Category II non-friable asbestos-containing material. AC pipe must be handled in a manner which will maintain this classification. Therefore, all handling, cutting, and/or disposal of AC pipe must be performed by a Florida licensed asbestos contractor.

The Department will make every effort to identify and quantify the location of known AC pipe and material prior to onset of work.

If the Contractor, during the course of work, observes, uncovers, or otherwise becomes aware of the existence of any asbestos-cement pipe, pieces, or material at the site to which the Contractor or any subcontractor, supplier, or other person may be exposed, the Contractor shall immediately notify the City (Risk Management Department and Utilities Department) and confirm any verbal notice in writing. The Risk Management Department shall promptly consult with the project engineer concerning such condition and determine the necessity of the City retaining special consultant or qualified experts. The Contractor shall not perform any work near or in connection with the suspect material until receipt of special written instructions from the Risk Management Department. The Contractor will ensure that all subcontractors follow these procedures. **The Contractor will be responsible for the proper handling and/or disposal of the asbestos-containing material.**

- b) Abandonment: AC pipe to be abandoned in place shall be filled with grout. Abandoned A/C pipe is to be shown on the as-built drawings. The grout mix (bases on a cubic yard volume) shall be:

<u>Type</u>	<u>Pounds</u>	<u>Cubic Feet</u>
Cement	340	1.73
Sand	2840	17.91
Stone	0	0
Water	374	
Admix/Type B	13 oz.	6.00
Air	170 ± 5.0%	1.35

The slump shall be 6" + 1 inch; Admix shall meet ASTM C-494 type B.D. Alternative mixes will be considered.

6. Preconstruction Conference: A pre-work conference is required before the start of any new construction. See attached check list (Exhibit C).

E. WASTEWATER PUMP STATION REQUIREMENTS:

1. Type:

The standard wastewater lift station shall be a below ground, submersible pump type. All stations shall be designed for a minimum of 240 volt, 3-phase, 60-cycle electric service. Each pump will have a minimum horsepower rating of 5-horsepower, and will have a speed rating of between 1700 and 1800 RPM. No deviation from these standards will be permitted without the prior approval of the Department.

2. Site Enclosure:

- a) Provide a minimum 30'x30' site deeded to the City.
- b) All lift stations shall be enclosed by fencing (chain link, 6' high, black vinyl coating required) with a 20 foot wide vehicular double gate centered on the wet well. A three-foot wide pedestrian gate shall be adjacent to vehicular gate, the exact location to be determined by the Department. Decorative fencing or landscaping may be used in addition to the chain link fence. This is at the developer's /successor's discretion and maintenance responsibility and must be approved by the Department prior to installation. Wire mesh fencing shall be constructed of 9 gauge wire with a maximum 2" mesh of chain linked steel hot dip galvanized after weaving. Top and bottom salvage are to be knuckled. Line posts shall be nominal 2" size A.S.A. Schedule 40 galvanized steel pipe size. Gates shall be provided with stops and locks to secure in the open position.
- c) Alternate enclosure materials may be substituted for chain link with the approval of the Director of Utilities. Alternate enclosure

shall then be the responsibility of Association, or other governing body; NOT that of the Department.

- d) Twenty (20) foot wide (minimum) driveway and entire enclosure must be concrete (minimum 6") except portion of driveway to wet well cover which shall be minimum 8" with wire mesh reinforcement. Expansion joints in compound and driveway shall be installed as required. Concrete driveway shall be continuous from an accessible roadway to the edge of the station and so located as to make easy access and enable an appropriate vehicle to maneuver to the center of the lift station (center being defined as midway between the guide rails). Driveway shall be so configured that if excessively long, a turn-around space for a vehicle and generator, of a combined length of at least 32 feet, will allow comfort in maneuvering.
- e) The exterior top of the wet well shall be designed at or above the one hundred (100) year flood elevations and not be more than one (1) foot above the road grade adjacent to the station and in no case shall be at a lower elevation than the adjacent road. The driveway shall be no less than 30 feet in length with a maximum grade of 3%. The layout of the station should be such as to provide easy access without interference between control panel and truck access. The fenced area shall be laid with visqueen and covered with 6" thick concrete pad (broom finish required). The concrete pad shall extend 6" (minimum) beyond fenced area (see detail drawings).
- f) The fencing requirements shall be as follows:

Corner and gateposts shall be nominal 3" A.S.A. Schedule 40 galvanized steel pipe size. Line posts shall be nominal 2 1/2" A.S.A. Schedule 40 galvanized steel pipe size. All corner, line and gateposts shall be sleeved with PVC pipe through the concrete pad.

Post spacing shall be equidistant with maximum 8'-0" spacing. Fencing shall be 6'-0" high, fitted with top rail, mid-height horizontal brace and bottom tension wire. The top rail couplings are to be positioned over posts. Bottom tension wire to be minimum #9 wire.

Fabric shall be continuous from corner post to corner post or corner post to gate post and shall be supported on stretcher bars at each corner and gatepost.

Fabric shall be galvanized dipped 9 gauge, prior to vinyl coating.

Fabric ties shall be located at maximum 12" spacing.

Furnish and install PVC vertical tubular slats with horizontal lock strip, the color to be black, on all fabric panels.

Gates shall be fabricated of nominal 2" size A.S.A. Schedule 40 galvanized steel pipe, gate frames shall be full height of fencing, have horizontal bracing and gate fabric shall be sized to fit within the frame. Fabric shall be installed with stretcher bars.

Vehicular gates shall be double, providing for minimum 20'-0" clear opening between gateposts and shall be fitted with a lockable latch. Pedestrian gate shall be a single 3'-0" clear opening with a similar lockable latch.

Concrete line post footings shall be a minimum of 36" deep by 12" diameter. Corner and gateposts footings shall be minimum 40" deep by 12" diameter.

3. Applicable Codes:

All design, material and work shall be in strict accordance with all the applicable governmental, regulatory, and testing organizations including, but not limited to, the following:

ANSI	American National Standards Institute, Inc.
ASTM	American Society of Testing and Materials
AWWA	American Water Works Association
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
NEC	National Electrical Code
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PBCHD	Palm Beach County Health Department
SBC	Standard Building Code
SFPC	Standard Fire Prevention Code
SMC	Standard Mechanical Code
SPC	Standard Plumbing Code
TSSW	Ten States Standards – Water
TSSS	Ten States Standards – Sewer
USEPA	United States Environmental Protection Agency

No work shall commence without a pre-construction meeting with the Department or without the proper permits required by the following agencies, including, but not limited to:

- a) Palm Beach County Health Department
- b) Florida Department of Environmental Protection
- c) PBC Department of Environmental Resource Management

- d) Florida Department of Transportation
 - e) Palm Beach County Engineering Department
 - f) South Florida Water Management District
- And any other City, County, State or Federal occupational license or permit which may be required.

It shall be the responsibility of either the contractor, developer or engineer-of-record to apply for the necessary permits.

4. Wet Wells:

No lift station will be constructed for less than 200 residential units unless other design is not feasible.

Wet wells shall be a minimum of 6 feet in diameter, except at stations where at build-out the average daily inflow is expected to exceed 200 GPM. At these stations wet wells will have a minimum diameter of 8 feet or as required. Depth shall be a maximum of 25 feet from bottom of cover slab unless prior approval by the Department has been issued. Finish grade elevation for all wet well cover slabs shall be designed so as to exceed the 100 year storm flood level for the location. Wet wells (built-in-place) shall be Type II Acid Resistant Portland Cement conforming to ASTM C-150. Precast wet wells shall conform to ASTM C-76, Latest Revision, Class II, Wall B, Type II Portland Cement. All steel reinforcement shall conform to ASTM A-185, Latest Revision with a 0.20 steel area. All concrete shall develop a minimum of 4000 PSI @ 28 days. Wet wells shall be designed to give proper pump operation at build-out without excessive cycling (no more than twice per pump per hour) and that, at all times pumps will remain completely submerged.

The following calculations will be used as a typical standard for wastewater pump station elevations and pump starts. The Department will review the ultimate flow possible for the area and may require additional storage within the wet well. If additional storage cannot be met using the below formula, a larger diameter wet well will be required to meet the necessary storage.

“Lag pump on” elevation shall be set at the level equivalent to 5 minutes of average daily inflow above the “lead pump on” level, and a minimum of 10 minutes of inflow below the gravity line invert. Pump cycle time shall be calculated using the equation (T=15 minutes).

$$T = \frac{V}{R_1} + \frac{V}{R_2 - R_1}$$

Where T= Elapsed time between pump starts.

V= Volume between pump on and pump off levels

R₁= Rate of inflow (ADF)

R₂= Rate of Pumping

Alarm on elevation shall be set at 6 inches below the invert of the lowest inflow line.

All work shall comply with all requirements of the Department's Construction Specifications.

Note: At no time will surcharge be allowed to back up in collection system.

If necessary, the engineer may consider alternate methods to control and correct adverse pump cycle times and pumping levels. These may include, but are not limited to larger wet well diameters, triplex stations using a "jockey pump", electronic pump "soft start contactors", etc. Wet well requirements shall include (but not limited to) the following:

- a) Floor slabs shall have a minimum slope of one to one, to pump intake, to prevent settling of solids. Two (2) coats of "Florida Liners – LinerGard 100" or pre-approved equal shall be applied to both interior and exterior surfaces of wet well walls in strict accordance with manufacturer's instructions. Two coats shall be applied at 10-12 mils wet film thickness; 1st coat shall be gold, 2nd coat shall be white.
- b) Wet well access cover shall be a rubber gasketed aluminum diamond plate constructed of a minimum of ¼" gauge and a minimum grade of 6061-T6, ASTM B209 Type AA 5052 alloy aluminum. Dimensions shall be a minimum of 48" x 30" for horsepower up to and including fifteen (15), and 72" x 48" for pumps of over fifteen (15) horsepower. Covers shall be installed so as to open away from pump valves and control panel. Inspection is required prior to placing access cover to ensure proper positioning.
- c) Contractor shall provide a minimum of 3 - 2" PVC conduit from stainless steel control panel to wet well (1 for each pump cable and 1 for level control system). For motors with horsepower over 20 Hp conduit size shall be a minimum of 3".

All conduit shall have approved electrical fittings and be run in or below slab. Sealing compound for electrical cables and controls to wet well shall be non-hardening and no seal-off connectors shall be installed.

Contractor shall also provide a stainless steel pressure control tube with air pump, flow meter, pressure switches and associated tubing to monitor the wet well liquid levels for pump activation. Internal

control panel tubing shall be ¼” polyethylene tubing; wet well pressure control tube to be ¾” SST Schedule 80 (316 Grade).

- d) All equipment and hardware within wet well, except pump, pipe and level control system, shall be of a minimum grade 304 stainless steel. This includes, but is not limited to guide rails, pump lifting chains, chain holders, anchors, rail brackets, bolts, washers and all other related equipment including all used on cover and locking mechanism. Wells deeper than 20 feet will require intermediate rail brackets.

5. Pumps:

Two or more wastewater pumps are required. When only 2 units are provided, each shall be capable of handling the anticipated maximum flow. The capacity of each pump (discharge flow rate) shall not exceed the ultimate peak wastewater inflow rate by more than 25%. The hydraulic pump efficiency and the “wire to water” efficiency at operating point under ultimate flow conditions shall be a minimum of 40%. The pump and impeller shall pass 3” spherical solids. Only pumps pre-approved by the Department shall be accepted.

Pumps shall be easily installed and removed by a sliding guide bracket system. Seal of the pump at the discharge flange shall be accomplished by a single downward linear motion of the pump with the entire weight of the pump guided by two 2” diameter stainless steel guide rails or one 2” stainless steel t-bar guide rail. Then, pressing against the discharge connection, no part of the pump shall bear directly on the sump floor and no rotary motion of the pump shall be required for sealing. Sealing at the discharge shall insure and guarantee a positive leakproof system under all operating conditions, and for ease of removal of the pump. Nuts, bolts, or other forms of fastenings may not be used for pump connection; there shall not be a need for personnel to enter the wet well to remove the pumps.

All external pump and motor parts shall be resistant to mild corrosive liquids and chemical attack and shall be protected by a factory-applied coating. The design is such that the lifting cover, stator housing, and volute casing are constructed of ASTM A48, Class 30, gray cast iron. The lifting handle shall be stainless steel and be large enough to hook the pump with a standard hook from heights of 20 feet. The interfaces between the major castings shall be machined for metal to metal contact, and shall be additionally protected with circular cross section O-rings. All nuts, bolts, washers, and other fastening devices shall be constructed of stainless steel. Grommet and O-rings are to be oil resistant.

Volutes and impellers shall have no parts that have to be periodically adjusted to correct tolerances, due to normal wear. No “open” impeller

design will be accepted. A dual wear ring system shall be used to provide efficient sealing between the volute and the suction inlet side of the impeller. Each pump shall be equipped with a stainless steel wear ring or nitrile rubber coated stainless steel insert that is driven fitted into the volute inlet.

The mechanical shaft seal shall be a balanced tandem-type “Enclosed Block” design which locates both upper and lower sets of seal faces in one compact AISI Type 316 stainless steel casing. The O-rings used in the enclosed block seal shall be all circular cross section (Viton or Buna-N) material for sealing protection. The seal faces shall be made of high quality silicon-carbide or tungsten-carbide and held in place by two independent sets of eight AISI Type 316 stainless steel coil springs immersed in an oil bath. As each set of eight (8) coil springs is equally spaced around the shaft, a balanced spring force is exerted upon the seal faces, which is required if the mechanical seal is to be considered “balanced”. They shall be completely isolated from the pumped media on the impeller side.

The seals shall require neither maintenance nor adjustment and shall be easily replaceable. Conventional lip seals or double mechanical seals with a single or double spring between the rotating faces, requiring constant differential pressure to effect sealing and subject to opening and penetration by pumping forces, shall not be considered equal to the tandem seal specified. Seals shall not be held in place by the impeller.

The oversized pump shaft is to be one piece. No couplings or shaft extensions shall be allowed. The shaft material shall be AISI Type 420 stainless steel. No carbon steel shafts or shaft sleeves shall be allowed. The bearings shall be all spherical ball rolling type angular contact with 100,000 hour L10 life at the pumping design point. Bearings shall be permanently lubricated. The lower bearing is to be a double row thrust bearings and shall be further protected by a short shaft overhang which limits deflections of the shaft. The overhang (distance from thrust bearing to the hub of the impeller) shall be no more than 2.5 times the shaft diameter.

Pump motors shall be housed in a water tight casing constructed of ASTM A48, Class 30, gray cast iron, and shall have moisture resistant Class F insulated copper windings.

Motors shall have cooling characteristics suitable to permit continuous operation in totally, partially, or non-submerged conditions. Motors shall be able to withstand 15 starts per hour, voltage fluctuations of $\pm 10\%$ of nameplate rating and be of NEMA design B rated at 155 degrees Celsius maximum. Pump motors shall have a minimum 1.15 service factor. All pumps/motors shall have a stainless steel data plate.

Pumps to be installed will be HOMA, Sulzer/ABS, KSB, Barnes/Crane, or pre-approved equal, and must meet the following requirements:

- All motors must be copper wound
- All pumps must be capable of passing 3" spherical solids
- All pump hardware shall be a minimum of 304 Stainless Steel
- All pump motor shafts shall be a minimum of 304 Stainless Steel
- All pumps shall have cast-in or bolt on upright lifting bails
- All pump seals must be tungsten carbide, or silicon carbide seal faces
- All pump impellers must be single or double vane, double shroud
- All pumps must have replaceable wear rings
- Motors shall have isolated terminal boards
- Motors shall have a minimum of shaft overhang to minimize impeller deflection
- All pumps shall be supplied with minimum 304 stainless steel lifting chains. Chains shall be a minimum of ¼" up to 10HP, ⅜" 10 HP to 30HP, and ½" over 30HP.
- Pumps shall be supplied with stainless steel "Armor" wrapped power cables (or approved equivalent).

Vendors must have a fully operational Parts/Service facility with adequately trained service/field technicians and have facilities on site to conduct standard pump and motor tests.

The electric cable entry to the motor shall be watertight and have strain relief. The power and control cables shall enter the motor housing through an isolated chamber that is completely isolated from the stator chamber. The Hypalon power and control cable jackets shall be sealed via a compressible Buna-N grommet flanked by washers forming the first isolation point of the assembly. The cables shall be terminated on brass terminal lugs of the terminal board thereby sealing the cable entry chamber completely from the stator housing to the extent that any and all moisture that happens to find its way into the cable entry chamber is trapped there. The terminal board is designed to short out in the event that moisture has found its way into the cable entry chamber, thus signaling that the motor must have service without the costly complete overhaul that occurs with pumps that do not have isolated terminal boards. Cables shall be sized to permit voltage conversion without replacing the cable.

Contractor shall install pumps but neither contractor nor electrician shall test run pumps at the risk of voiding warranty.

An oil-filled pressure gauge with a 0-60 PSI scale shall be installed on the pump side of each pump gate valve and before the isolation gate valve. The gauges shall be installed using a 1" Series 42 Red valve gauge isolator and flushing valve.

Pumps shall be sized to meet both present and future conditions. Pumps shall be sized at twice-current peak demand or half build-out peak demand whichever is greater. Build-out conditions shall be based upon current zoning and land use densities, of the greatest possible gravity feed service area.

Pump and motor assembly shall have a minimum five (5) year warranty covering 100% of all parts and labor for the first year and 50% of all parts and labor for the remaining four years. The pump manufacturer shall provide the warranty for the complete pump and motor assembly. The warranty period shall commence at the time of pumping station takeover by the Department. The Department will not accept operation and maintenance responsibility for a “dry” station, that is, a station in which there is no flow.

6. Controls:

A pump control system is required. The primary control system shall be an air pressure differential control system that is mounted in the control panel unit. This system shall consist of an air pump, flow meter, air pressure switches, all connected to ¼” polyethylene tubing which shall connect to the ¾” stainless steel tubing (316 Grade) mounted vertically in the wet well via ¼” braided stainless steel teflon coated tubing.

“Swagelok” or approved equal is acceptable. Pump activation controls shall be set to the elevations as established for pump(s) off, lead pump on, and lag pump on. A float(s) will be located where they will not be affected by the flows into the wet well, or by the pump suction for the high water alarm level. If it is determined that high flow rates into the wet well may adversely affect performance of the float, float may be disallowed. In such a case, only high level float will be required with a pressure transducer for the remaining outputs. Provision shall be made in the control system to automatically alternate the pumps in use.

Provide a 1-inch round air filter stainless steel screen opening in the bottom of the cabinet with dense sponge filter material to provide air to the air pump.

7. Electrical Service Requirements:

- a) All stations shall have minimum three (3) phase power. No conversion of single phase, by any means, is acceptable.
- b) All electrical services shall be a minimum of 100 amp or 50% over required capacity, whichever is greater. All service feeders shall be copper stranded THHN with a bare copper ground wire, run continuous a minimum of 36” below final grade in Schedule 80 electrical PVC conduit from FPL transformer or manhole into meter. A low range sewer APC marker shall be placed above

conduit at intervals no greater than 10 feet to aid in location. In addition, an identifying plastic strip shall be placed 12" above conduit during backfilling to further aid in preventing physical damage during excavation operations.

- c) Stations with pumps up to and including 20 horsepower shall be 240/480 volts. Stations over 20 horsepower pumps shall be 480 volts.
- d) Position of control panels adjacent to wet well shall be approved by the Supervisor of Utility Pumping Stations prior to installation.
- e) Control Panel shall be a Stainless Steel NEMA 4 enclosure painted white, with a minimum size of 36"W x 48"H x 12"D. A double pole double throw Ademco key switch (key combination BA-1316) mounted on the exterior of the control panel and wired in series with a magnetic proximity or plunger type switch inside the cabinet door shall be wired to two monitor points in the telemetry unit.

Cabinet shall be installed with the top of panel a maximum of 7 feet above grade and bottom a minimum of 3 feet above grade of wet well slab. Mounting posts shall be minimum 4" galvanized conduit or 4" aluminum square tubing, set 4 feet in 2500 PSI concrete. That portion of pipe supports or tubing to be embedded in concrete, shall be pre-coated with an 8 mil covering of an approved bitumastic paint. Cross supports shall be a minimum of ½" aluminum or fiberglass versabar with comparable fittings. Panel shall be constructed with interior removable panel coated with a white baked enamel finish.

- f) All interior cabinet wiring shall be fully exposed, color coded and numbered (no back-wired panels will be accepted).
- g) All control and power circuit (breakers & contactors) components will be "Square D". Contactors shall be supplied with 24 or 120 volt coils.
- h) All interface relays installed will be "Square D", Type KP, AC or DC as required with pilot light.
- i) Inputs to phase monitors shall be protected by a maximum 1.0 amp fuse. Control circuit shall not be one of the inputs to the phase monitor and shall be fused (protected) separately.
- j) Power supply and all control circuit power supplies will be fused off the secondary side of control circuit breaker.

- k) Emergency power receptacles shall be Russel Stohl JRSA 1044 FR for 100 amp, 230-volt services and JRSA 2044 FR for 200 amp, 480-volt services.
- l) Wire sizing and breakers on emergency transfer shall be the equivalent of Main side.
- m) Level Control System shall consist of an air pressure differential control system for the off and on cycle of the pump motors which will control in ascending sequence of Low Level, Off Pumps, Lead Pump On, and Lag Pump On. The High Water (Alarm Level) shall consist of one (1) N.C. Anchor Scientific Roto Float wired for this purpose. All electrical voltage in wet well (excluding pump motors and cables) shall be a maximum of 24 volts.
- n) A factory assembled single throw fused knife disconnect switch shall be installed in a Nema 4 Ultraviolet inhibited fiberglass or Stainless Steel Water-Proof enclosure. This disconnect shall be installed between FPL meter can and pump control enclosure. A Joslin lightning arrestor/surge protector (Model #14XX-85) shall be installed on the load side of this disconnect before control panel for protection of components. Ground rods shall be installed to a minimum of 5 ohms, shall be Cad welded and installed below grade with a protective cover and inspection plate.
- o) Extra terminal strip for additional future sensors shall be installed.
- p) All breakers, and other components shall be permanently and clearly labeled on panel as to specific function.
- q) Panel shall be provided with non-resettable, elapsed time meters (1 per pump).
- r) Provide one (1) 24" long, two (2) tube fluorescent light fixture (40W) mounted in the top of the cabinet with the switch mounted internally in the lower right hand corner on the cabinet.
- s) Ground Fault Interrupt convenience circuit 20 amp shall be provided in panel with receptacle mounted inside cover panel and fed from a separate breaker.
- t) Contractor shall purchase and cause to have installed a Remote Terminal Unit, 125 mph rated antenna mast structure, antenna, and all other appurtenances. This will be inspected for conformance with specifications on site. The RTU shall be manufactured by DCR Engineering.

The RTU shall be equipped as follows:

1 ea. Radio Interface Module
1 ea. Pump Control Unit (PCU)
1 ea. Bus Extender Module
1 ea. 50 Watt Power Supply
1 ea. 6 Amp Hour Battery

1 ea. Anchor Scientific N.C. Roto Float (non-mercury) 3
wire, wired N.C.

The above equipment will be installed in a stainless steel cabinet painted white to be provided by DCR Engineering.

The 11.5 db gain antenna, coaxial cable, and antenna mast rated at 125 MPH wind survival rating shall be installed in a manner similar to the standard drawing. Note: RTU shall not be installed on antenna mast.

- u) One copy of electrical panel schematic along with complete pump and motor data shall be heat sealed in plastic and firmly attached inside motor control cabinet. A second copy of same data will accompany pump manuals and pump curves to the Department.
- v) Contractor shall provide three (3) each spares of every fuse (i.e., disconnect fuse set, control fuse, in-line circuits including the spare fuses for Joslyn surge protectors), two (2) complete starters with overloads, and one (1) elapsed time meter, air pump and pressure switch.

8. Valves and Piping:

A gate valve is required on the discharge line of each pump with a pressure gauge on the discharge side of the gate valves, installed with a double strap saddle. In addition, a pressure gauge shall be installed between the check valve and the discharge pump for line. [Note: A total of three (3) pressure gauges are required.] A check valve is required between the pump and gate valve. Only resilient seated gate valves shall be used in force mains. Gate valves shall be right hand close operation, check valves shall have an external weight arm; no springs will be permitted.

Specific requirements for the valves and piping are as follows:

- a) Check valves shall be Kennedy, no exceptions. Check valves shall be constructed with replaceable brass seats and minimum 304 stainless steel keyed shafts with lever and weight, as per AWWA C508, no lever and springs. All check valves shall provide shafts with clappers and levers secured using keyways.

Gate valves shall be as per the Department's specifications. Gate valves shall be fitted with resilient seats as per AWWA C509.

All pipes and fittings shall be using Florida Linerguard 100, Protecto 401 or Permite 9043 – Type 2 (millage to be according to manufacturer specification).

- b) Station piping shall be installed 36" above ground to the center line of pipes to allow a minimum of 16" clearance between bodies of check valves on 4" pipe, 20" clearance on 6" pipe, and 23" clearance on 8" pipe (to allow sufficient clearance to remove and repair valve shafts). A minimum 12" spool piece is required between all fittings and valves.
- c) Station emergency bypass line shall be so constructed and installed to enable the station to be drained with the use of an auxiliary pump. Bypass line shall be installed with a "Cam-Loc" and cover, check valve, and gate valve – in that order.
- d) Appropriate size gate valve shall be installed in force main to allow complete isolation of station from system for any required repair work. An appropriately sized pig launcher shall be installed on pump side of force main immediately before isolation valve.
- e) All station valves shall be mounted a minimum of 24" (above ground) to center line of pipe. Station piping that (due to field conditions) cannot be located above grade, shall be considered on an individual basis and must be approved by the Department.
- f) Minimum 1" metered water service will be provided with a 1" gate valve, a FEBCO Reduced Pressure Zone Backflow Preventer Model 825Y and a ¾" hose bib. Water service shall be piped in Type K soft copper continuous from meter to backflow prevention device.
- g) Minimum of 1' spool piece required between all fittings & valves.

9. Pump Station Acceptance Procedure:

A representative of the Department's Wastewater Division and the Utility Pump Stations Division shall be present at final inspection/start-up of the station. At that time, the following will be provided to the Department (two (2) copies of each) as a basis of acceptance:

- a) Complete submittal data package including all product documentation.

- b) All product warranty documentation indicating length of warranty (with starting and expiration dates on all components and equipment).
- c) Complete set of station white-print drawings showing all revisions or corrections, signed and sealed by the Engineer-of-Record.
- d) The telemetry unit is functioning properly.

At this time, the Contractor shall turn over to the Department all spare parts and documentation as required in Sections VI.E.5. (16th paragraph), and VI.E.7.u. above.

All work shall have been performed in a professional and workmanlike manner, and acceptable to the Department.

Upon final inspection of the station by the Department personnel and upon satisfactory correction of any deficiencies detected at said inspection, the appropriate person shall prepare a "Notice of Acceptance" (refer to form in the Appendix) indicating the names of the development, the developer, the design engineer and the contractor. After assigning the lift station number, the notice shall be signed and dated by the Deputy Director of the Wastewater Division and the supervisor of the Utility Pump Station Division, and the developer/authorized agent.

The Deputy Director of the Wastewater Division will ascertain whether or not the "Bill of Sale" is required, and if so, has been submitted and accepted. If it has, the date of acceptance on the Notice will be the same date as the developer/authorized agent signature date thereon. If the "Bill of Sale" has not been accepted, the Notice shall be withheld until the "Bill of Sale" has been accepted. Within seven (7) days of the acceptance date or the date of receipt of a copy of an FPL invoice from the developer (whichever is later), the Department shall notify FPL to transfer the power utility account to the Department. Notification of these actions to all interested parties shall be the responsibility of the Department.

F. WASTEWATER PUMP STATION GENERATOR REQUIREMENTS:

Provide a complete, trailer mounted mobile and operable emergency standby electric generating system. System to include all devices and equipment specified herein or required for operation. Equipment shall be new, factory tested, and delivered ready for installation. This system will be used as emergency standby power at the site to which this system will be assigned. However, if other sewage lift stations throughout the City require emergency standby power when the assigned site is operating normally, this system will be rotated to any and all sites in which utilization required its services.

Generally: One (1) **Cummins/Onan 80.0 ODGA**, diesel driven engine generator set, rated 80 KW, 100 KVA at 0.8 PF, 277/480 volts, three phase, four

wire, 60 Hz, 1800 RPM, radiator cooled, complete with all standard equipment and having the following accessories:

1. Controller:

- Twelve (12) light engineer monitors per NFPA 110, Level 1, with panel lamps and auto start.
- AC meter package with phase selector switch.

2. Engine:

- Electronic/Isochronous governor.
- Engine jacket water heater, 1000 watt at 120 volts.
- Flexible fuel lines, installed.
- Critical grade exhaust silencer, factory mounted.

3. Alternator:

- Standard 12 lead alternator.
- Two (2) main line circuit breakers, rated 100 amps and 250 VAC.
- PMG excitation.
- Voltage selector switch, ¼ turn to select between 277/480 volts and 120/240 volts, three phase, isolated outputs. Power switch (600 VAC rated) must be such that only one (1) breaker and cord combination is energized at any one time.

4. Accessories and Services:

- Two (2) sets of operators, parts and installation manuals.
- One (1) year basic warranty.
- Test acceptance conducted by factory trained technicians including towing to site and matching phase sequence and load test at predetermined site.
- Full tank of fuel.
- Two (2) hour on-site 100% rated load resistive load bank test.
- Locking weather protective enclosure, sound attenuated Level II, for sound levels no greater than 69 DBA at 23 feet and three (3) sets of keys.
- 10 amp battery charger, float equalizer type with alarms per NFPA 110.
- Pad type vibration isolators between genset and tank.
- Oil drain extension.
- NEMA 3R emergency breakglass station, exterior mounted.
- Load center with breakers for engine jacket heater and battery charger, with 30-foot retractable cord with plug.
- Russel-Stohl JRSA 1044FR receptacle exterior mounted and connected to output of 100 amp, 120/240 volt breaker.

- Three (3) fifty-foot long, Type "G", copper 1/0-4 SJO cords with connectors to match unit mounted receptacles and one (1) JPS2044FR and one (1) JPS1044FR plug.
- Two (2) 20 amp duplex 120 volt GRI receptacles with weatherproof covers and 2 amp single pole breakers energized from 120/240 volt power supply. These receptacles shall have no power when 480 volt source is selected.
- Two (2) eight-hour owner training sessions.
- 130-gallon diesel fuel tank with low level alarm, all vents and fittings, mechanical level gauge and locking fill cap with two (2) sets of keys.
- 7,000 pound GVW tandem axle trailer with adjustable luenette eye coupler, 5,000 pound tongue jack and sand shoe, DOT wiring and lighting packages, electric brakes, cable storage box, and rear stabilizer jacks.

VII. STANDARD DETAILS

[SEE SEPARATE LISTING FOR THIS SECTION.]

ARTICLE FOUR - RECLAIMED WATER SYSTEM

VIII. DESIGN CRITERIA

A. RECLAIMED WATER SYSTEM DESIGN:

Design standards for reclaimed water piping shall be as shown herein. There shall be no physical connection between a reclaimed water distribution system and any other utility system including potable water supply, wastewater or storm sewage system, which would allow unsafe water to enter or backflow into the reclaimed water system by direct pressure, vacuum, gravity or any other means.

Potable water services for properties with proposed or existing reclaimed water supply shall have a dual check valve assembly or a reduced pressure zone backflow preventer installed at the discharge side of potable water meter.

Design standards for Reclaimed Water Systems are as follows:

1. **Identification For Reclaimed Water System Components:**
The reclaimed water system shall be appropriately tagged or labeled to warn the public and employees that the water is not intended for drinking. All piping, pipelines, valves, and outlets shall be color coded, or otherwise marked, to differentiate reclaimed water system components from potable or other water. All PVC pipe and fittings are to be infused during manufacture with a permanent purple color. If color infused Schedule 40 PVC is not available, PVC service lines and fittings (3/4", 1", 1-1/2" & 2") shall be coated with approved paint prior to installation. PVC pipe must be scarified prior to painting. Ductile iron piping, casing and fittings shall be painted prior to installation with two (2) minimum 4" wide stripes of purple paint along the full length at approximately 2 and 10 o'clock considering pipe diameter. Flushing hydrants, above ground pipe, valve boxes and covers must be coated with two coats of approved purple paint.

Meter boxes with infused permanent purple color are required. The acceptable paint is Pantone 522 C or approved equal. Additionally, reclaimed water mains shall be marked with one continuous strip of 6" wide detectable tape imprinted with two (2) inch high lettering reading "Caution - Reclaimed Water Buried Below", and located approximately 18" above the crown of pipe. The wording shall occur once every three (3) feet. Service line valves, meter box lids, valve boxes and vault covers shall be

permanently identified (cast in letters) as “Reclaimed Water” system components. Meter box covers shall be permanently identified as “Reclaimed Water - Do Not Drink”.

2. Minimum Cover:
Minimum cover to finished grade over reclaimed water mains shall be 36”. All transmission mains within major thoroughfare rights-of-way shall have full plan and profiles shown. Pipe depth shall be designed to be as level as possible and to avoid high points.
3. Horizontal Separation:
Maximum obtainable separation of reclaimed water lines and other utility lines shall be practiced. A minimum horizontal separation of three feet (outside to outside) shall be maintained between reclaimed water lines and either potable water mains or wastewater or storm water lines.
4. Vertical Separation:
 - a) Reclaimed water pipes shall cross under potable water mains and over other piping unless otherwise approved. All conflicts shall be identified on plans with elevations.
 - b) A minimum of 12" separation between all pipes shall be maintained. A minimum of 6" vertical separation may be acceptable, however, if it is not possible to maintain 12" and the conflict is designed in accordance with the "Pipe Separation Standard" details.
5. Layout:
 - a) The reclaimed water system distribution mains shall be looped unless otherwise not feasible. Multiple feed lines may be required at discretion of the Department. Temporary and permanent dead ends shall be equipped with a flushing hydrant per Department’s standard detail.
 - b) In order to facilitate reclaimed water service for all properties within the service area, reclaimed water mains shall be extended along the full length of the road frontage of a property by the Developer/Owner requesting reclaimed water service, and may be required to be extended through the property if another is to be served in the future.
 - c) Reclaimed water distribution mains should be placed in right-of-ways whenever possible. Placement on or adjacent to interior property lines or between structures is

discouraged and will be approved only when unavoidable or when necessary for looping.

- d) Utility easements are required for lines outside of dedicated right-of-way.

6. Reclaimed Water Main Materials:

Ductile iron pipe (cement lined) or C-900 Class 150 D.R. 18 PVC pipe shall be allowed for reclaimed water pipes 12” diameter or smaller. Unless specific approval is granted, no reclaimed water main shall be encased in concrete.

The following is a list of acceptable Pressure Class Special Thick Class Ductile Iron Pipe for projects within the Department's service area:

Standard laying conditions, minimum 36” cover

<u>Pipe Size</u> <u>Thickness Class</u>	<u>Pressure Class</u>	<u>Special</u>
3”, 4”	350	51
6” to 12”	350	50
14” to 20”	250	50
24” and above	200	50

Minimum special thickness Class 53 is required for exposed (flanged) pipe.

DIP shall be required in the following circumstances:

- a) Mains smaller than 6” and larger than 12” in diameter.
- b) Within 3 feet (wall to wall horizontal separation) of wastewater pipes or potable water mains.
- c) Within 10 feet of structures, top of bank of canal or lakes.
- d) Crossings over potable water, and over or under pipes with less than 12” vertical separation with no joint within 10 feet of each other.
- e) Jack and bores (mechanical joints with MEGALUGS or equal).
- f) The right is reserved to mandate DIP in any instances of off-site or on-site construction where future damage to the line is possible due to location or circumstances, or outside of dedicated right-of-ways.
- g) Flanged ductile iron pipe is required for exposed (not buried) installation.

7. Reclaimed Water Pipe Sizing:

The piping shall be sized by the developer's engineer as required. Sizing within single family home subdivisions shall be based on usage of 20 GPM per single family home with not less than 25% of the platted homes in the subdivision using reclaimed water for irrigation at any one time or 1/2" of reclaimed water per acre per hour for all porous areas. Pipe sizing design shall ensure minimum 50 PSI residual pressure at peak instantaneous demand. Piping size for non-residential projects (golf courses, parks, etc.) shall be based on the demand of the connecting irrigation system. Reclaimed water piping shall be sized based on a Hazen/Williams coefficient of C=120 and shall allow not more than 8 FPS velocity. Minimum service line size is 1-1/2". Minimum size for reclaimed water distribution mains is 4". The engineer may be required to demonstrate the adequacy of pipe sizing. In cases where the completion of gaps in the reclaimed water systems is necessary to meet flow requirements of the development, the developer shall construct the required improvements.

The pipe sizing shall conform to the latest Department's Master Plan, for a reuse system.

8. Valves and Appurtenances:

- a) Valves - Valving of all systems shall be designed to facilitate the isolation of each section of pipeline between intersections of the grid system. Generally, the number of valves at an intersection shall be one less than the number of pipes forming the intersection. All valves shall be resilient seat gate valves with right hand closed operation; valves 12" or greater shall be butterfly valves unless another type of valve is approved in writing by the Department. Valves shall generally be installed at intervals of no greater than 2,500 LF on transmission mains, at intervals of no greater than 1,000 LF on main distribution loops and feeders, and on all primary branches connected to these lines, or as approved by the Department. In all instances, effectiveness of placement shall be primary criteria in determining valve location. Valves placed in curbs will not be accepted. Valve box cover for reclaimed water system valves shall be square with the words "Reclaimed Water" cast in raised letter on the cover.
- b) Air Release Valves - Air release valves shall be installed at all canal crossings and at high points.

9. Thrust Restraint:

- a) All pipe-to-pipe, branch connections, valves and all change of direction fittings shall be restrained with EBAA Iron MEGALUG products or approved equal. A second form of restraint, either thrust blocks or tie rods, may be required in certain cases as directed by the Project Manager and Engineer.
- b) All valves and change of direction fittings 16" diameter and larger shall have two (2) forms of restraint. The valve and fittings shall have mechanical joints with EBAA Iron MEGALUG products or approved equal, and either thrust blocks or tie rods. If tie-rods are approved, the tie-rods shall be in a "mid-span" configuration utilizing EBAA Iron products or approved equal.
- c) Any line terminated as a construction phase that is a known future extension, shall have a valve placed at the end, and restrained with EBAA Iron MEGALUG products or approved equal to the last two (2) pipe joints.
- d) Flex-Ring Restrained Joint Ductile Iron pipe supplied by American Cast Iron Pipe Company (ACIPCO) and TR Flex Restrained Joint Ductile Iron pipe supplied by U.S. Pipe & Foundry, LLC may be used as approved by the Project Manager and Engineer. Self restraining push-on gaskets are allowed for Jack & Bore applications only as approved by the Project Manager and Engineer.

10. Reclaimed Water Service Lines and Taps:

Reclaimed water service taps on the main shall be spaced at a minimum distance of 18" apart. All service lines shall be installed in accordance with the construction details of this Handbook and shall have corporation stops. Services shall be as short as possible and not exceed 100 feet to meter box. Services under driveways shall be encased in minimum 4" black iron or PVC Schedule 80 pipe. Service taps under driveways shall be avoided whenever possible. Services crossing under parking tracts shall have their meter boxes placed prior to the crossing.

In developments where the property line is not clearly defined (condominiums and commercial), the meter box shall be placed within a utility easement in a readily accessible location.

Private reclaimed water services shall not cross over any public utility mains.

11. Service Installation:

- a) General requirement - Construction plans shall include a typical meter or meter box installation detail for each service size to be installed. Service line and meter sizes, if applicable, must be shown on the plans. The proper sizing of meters, if applicable, and service lines is the responsibility of the developer's engineer. Services will be available in the following sizes only: 5/8", 1", 1-1/2", 2", 3", 4" and larger sizes as necessary. Service sizing shall be based on expected peak demand and correspond to the standard for maximum continuous operating capacity for a meter: 5/8" & 3/4" - 20 GPM, 1" - 50 GPM, 1-1/2" - 120 GPM, 2" - 160 GPM, 3" - 350 GPM, 4" - 1000 GPM, 6" & 2000 GPM.

All applicable service installation and connection charges must be paid to the Department prior to service initiation. All meters shall be installed by the Department personnel (see details). All service piping, valves, boxes must be completed in accordance to these standards prior to service initiation. One-inch diameter "direct taps" shall be performed for 5/8" & 3/4", and 1" meters on 4" and larger DIP, and 6" and larger PVC pipe. Two-inch diameter "direct taps" shall be performed for 1-1/2" and 2" meters on D.I.P. water main (PVC main requires double strap saddle). Multiple "direct taps" on a length of pipe, shall not be on a common line parallel to the longitudinal axis of the pipe. AWWA taper thread is required for all "direct taps". Threaded area of corporations shall be spiral wrapped with two (2) wraps of Teflon tape. The corporation stop shall not be bottomed out (1-3 threads showing). A torque of 35 ft.-lbs. or less is recommended. Generally, the Department will not install services for meters 3" and larger. Meter boxes shall not be installed in pedestrian walkways or driveway areas. All meters and meter box locations must be shown on the drawings prior to approval. Any meter installations 6" or larger will have to have permanent road access to the meter pit.

- b) Location requirement.
- 1) Meter boxes shall be set in grassy area whenever possible.
 - 2) Meter boxes and control valve locations shall be designed to be accessible and provide the "minimum unobstructed space" shown on applicable details (i.e., clear of buildings, trees,

- shrubbery, light poles, walled enclosures, hydrants, cable boxes, garbage compactors, etc.).
- 3) Minimum 12" horizontal separation is required between electrical transformer pad and meter box or control valve.
 - 4) The developer and/or his representative shall be responsible for coordination of service location.
 - 5) Meter/service will not be installed until:
 - Form boards for driveways and/or sidewalk are in place or
 - Driveway/sidewalk is in place or
 - "Finished grade" stake is set adjacent to the proposed meter box location
 - 6) "Minimum unobstructed space" is provided as shown on applicable details.
- c) For services 1-1/2" and larger, the minimum 3 feet unobstructed space shall begin at the end of the meter box.
 - d) Double service meter boxes shall be used for dual services installed on a common property line, whenever possible.
 - e) Meter boxes shall not be placed in areas that can be fenced, such as backyards, under any circumstances.
 - f) Meter boxes shall not be placed in any concrete surface area (sidewalks, curbs, etc.) unless specifically approved by the Department.
 - g) In areas where no alternative is available, meter will be allowed in paved area and:
 - 1) Top of box shall be flush with surface located outside of surface drainage flowlines (i.e., dry area).
 - 2) Traffic rated box and lid shall be placed out of a common traffic area. Bollards may be required under certain conditions.
 - h) In cases where reclaimed water, potable water and wastewater lines have been constructed and a developer replatted the development or relocated structures, the Department will require that reclaimed water services which cannot be reasonably adjusted, be removed and plugged at the main. If the number of services removed is excessive, the entire line may be required to be replaced. A reasonable adjustment is considered to be less than 3 feet laterally. Any adjustments/reconstruction shall be regarded

as having to meet all new construction standards and requirements.

B. RECLAIMED WATER SYSTEM CONSTRUCTION:

1. Installation:

Installation of reclaimed water pipe and associated fittings shall be in accordance with current AWWA specifications for potable water, and manufacturer’s requirements for their particular products. All mains shall have a minimum of 36” clear cover to finished grade with pipe being as level as possible. Approved pipe joint restraint shall be required at each fitting involving a change of direction and as specified in plan details. If thrust blocks are approved, visqueen protection of plugs and bolts shall be provided. The contractors shall be responsible to ensure that all safety requirements are met with respect to construction.

All pipe shall be laid in trenches having a dry and stable bottom. Backfill shall be free of boulders and debris. Pipe shall be fully supported along its entire length. Sharp or rocky material encountered in the base shall be replaced with proper bedding. Pipe shall be laid on line and grade as designed. Changes in pipe alignment may be accomplished using appropriate fittings or through pipe deflection. Pipe deflection at the joint is allowed with ductile iron pipe only and shall not exceed 75% of the manufacturer’s recommended maximum joint deflection. No deflection at the joint is allowed for PVC pipe. PVC pipe curvature shall be accomplished by bending the pipe. The bending of PVC pipe shall form a true arc, i.e., the pipe is curved uniformly throughout its length and shall not exceed the following parameters:

Deflection		Max.
<u>PVC Pipe Size (inch)</u>	<u>Min. Allow. Radius (Ft.)</u>	<u>(inch) per 20'</u>
<u>Length</u>		
6	300	8”
8	400	6”
10	600	4”
12	600	4”

Flushing hydrants shall be installed plumb with the nozzle minimum 18” above finished grade. Hydrants shall not be placed in sidewalks or driveways. It will be the responsibility of the developer to move hydrants placed in sidewalks or driveways and to provide protection from traffic damage, if necessary, upon

Department request. Flushing hydrants must be ordered purple in color. Hydrants must be clean and have a glossy purple finish when accepted by the utility. If painting is required, all oil, grease, dirt, salt and other contaminants must be removed. Two (2) coats of approved paint to be applied by brush per manufacturer's specification for a DFT of at least 4 mils/coat.

All valves shall be placed according to plans, unless relocation is approved by the Department. As-built drawings shall reflect the actual location of all mains, services and valves. All taps must be at least 18" from a fitting or bell. Reclaimed water mains shall not be laid in fuel contaminated areas.

All road crossings and pavement cuttings shall be in accordance with the requirements of the City of Boynton Beach or Palm Beach County (if the project is located in their jurisdiction, but within the Department's service area).

2. Connection to Existing System:

All connections to existing mains shall be made under the direct supervision of the Department. Valves on existing mains shall be operated by Department personnel or under direct supervision of the Department. Tapping sleeve and valve shall be pressure tested prior to tapping. The contractor shall be ready to proceed with as much material preassembled as possible at the site to minimize the length of service interruption. The Department will postpone a tie-in if the contractor is not ready to proceed on schedule. Wet taps equal to or larger than one half the pipe diameter, require a cast iron mechanical joint tapping sleeve. No size on size taps are permitted on PVC. A reverse tap due to pre-existing conditions is acceptable only if previously approved (detail drawing is required).

3. Cleaning and Flushing:

Foreign material shall be kept out of the pipe or cleaned from pipe prior to installation. Upon completion of installation, the reclaimed water mains shall be flushed with potable water and the water disposed of without creating a nuisance. The use of reclaimed water for flushing will not be permitted.

4. Testing:

All mains shall be pressure tested with potable water to the required pressure, 150 PSI. Reclaimed water shall not be used for pressure testing. The maximum length of line to be tested as one section will be 2,000 feet. The test shall be performed as determined in the current AWWA specification. The standard test duration is two (2) hours.

5. Handling, Abandonment and Disposal of Asbestos-Cement Pipe:
- a) Federal regulations (40CFR Part 61, Subpart M) classify asbestos-cement pipe (AC pipe) as Category II non-friable asbestos-containing material. AC pipe must be handled in a manner, which will maintain this classification. Therefore, all cutting and disposal of AC pipe must be performed by a Florida licensed Asbestos Contractor.

The Department will make every effort to identify and quantify the location of known AC pipe and material prior to onset of work.

If the contractor, during the course of work, observes, uncovers, or otherwise becomes aware of the existence of any asbestos-cement pipe, pieces, or material at the site to which the contractor or any subcontractor, supplier, or other person may be exposed, the contractor shall immediately notify the City (Risk Management Department and Utilities Department) and confirm any verbal notice in writing. The Risk Management Department shall promptly consult with the project engineer concerning such condition and determine the necessity of the City, retaining special consultants or qualified experts. The contractor shall not perform any work near or in connection with the suspect material until receipt of special written instructions from the Risk Management Department. The contractor will ensure that all subcontractors follow these procedures.

- b) Abandonment - AC pipe, to be abandoned in place, shall be filled with grout. Abandoned AC pipe is to be shown on the as-built drawings. The grout mix (based on a cubic yard volume) shall be:

<u>Type</u>	<u>Pounds</u>	<u>Cubic Feet</u>
Cement	340	1.73
Sand	2840	17.91
Stone	0	0
Water	374	6.00
Admix/Type B	13 oz.	
Air	170 + 5.0%	1.35

The slump shall be 6" + 1", Admix 1 shall meet ASTM C-494 Type B.D. Alternative mixes will be considered.

6. Preconstruction Conference:
A prework conference is required before the start of any new construction. See attached check list (Exhibit C).

IX. STANDARD DETAILS

[SEE SEPARATE LISTING FOR THIS SECTION]

ARTICLE FIVE - STORMWATER SYSTEM

X. DESIGN CRITERIA

A. STORMWATER MANAGEMENT:

1. Minimum required improvements: The following shall be the minimum required improvements for all developments to provide the level of service required to support the goals and objectives of the National Pollutant Discharge Elimination System (NPDES) and the criteria of the South Florida Water Management District (SFWMD).
 - a) A complete, fully functional tertiary stormwater drainage system, including necessary lot grading, ditches, canals, swales, storm sewers, drain inlets, manholes, headwalls, endwalls, culverts, and other appurtenances, shall be required for the positive drainage of stormwater runoff in conformance with the approved drainage plans.
 - b) A complete and fully functional secondary stormwater system shall be required in conformance with the approved stormwater management plan.
 - c) A means to convey all stormwater discharge from the development site to at least one (1) point of legal positive outfall shall be provided as an integral part of the required stormwater management system, including construction of all necessary conveyance facilities and establishment of appropriate easements for operation and maintenance of said off-site facilities.
 - d) Adequate physical and legal means shall be provided to ensure the continued conveyance of all pre-development flow of surface waters into or through the development site from adjacent lands. Unless otherwise specified by ordinance, regulation, or condition of development approval, such conveyance may be accomplished by incorporating the inflow into the on-site stormwater management system or diverting the inflow to its pre-development location of outflow from the development site, including construction of all necessary conveyance facilities and establishment of appropriate easements to accommodate said inflow.
 - e) All facilities necessary to meet requirements for stormwater treatment, off-site discharge control, and conveyance of existing inflows applicable to that portion of the site under construction

must be in place and operational at the time of commencement of construction of required improvements, and shall be maintained by the developer until such time that all required improvements are complete and approved..

2. General criteria: Secondary and tertiary stormwater facilities for each subdivision, and for each lot, street, and other development site within the subdivision, shall be designed and constructed so as to:
 - a) Prevent flooding and inundation to a degree consistent with levels of protection, adopted by the City, for buildings, streets, lots, parking areas, recreational areas, and open space;
 - b) Maintain stormwater runoff rates at levels compatible with safe conveyance and/or storage capacities of drainage facilities and established legal limits applicable to receiving waters at the point of discharge;
 - c) Mitigate degradation of water quality and contravention of applicable state water quality standards in surface and groundwater receiving stormwater runoff;
 - d) Provide facilities for conveyance to legal positive outfall of all allowable discharges of stormwater runoff from each development site without causing or contributing to inundation of adjacent lands;
 - e) Provide for continued conveyance of pre-development stormwater runoff and surface waters that flow into or through the development site from adjacent lands;
 - f) Provide for long-term, low maintenance, low cost operation by normal operating and maintenance methods;
 - g) Provide for necessary maintenance of the pre-development range of groundwater levels to prevent adverse impacts on land uses and water resources of the development site and adjacent lands; and
 - h) Promote percolation, recharge, and reuse of stormwater.
3. Hydrologic design data: Unless otherwise specified by a particular design or performance standard, or approved by the Division based on justification submitted by the developer's engineer for an individual case, hydraulic and hydrologic data used in design of stormwater management facilities shall be based on:

- a) Rainfall intensity-duration-frequency curves for FDOT-Zone 10;
 - b) Rainfall hyetographs of 24-hour total rainfall as published in South Florida Water Management District - Management and Storage of Surface Waters Permit Information Manual - Volume IV;
 - c) Rainfall quantity (or intensity) vs. time distribution in accordance with those published by SFWMD, FDOT, or the SCS - Type II (South Florida Modified) distribution;
 - d) Post-development runoff characteristics, such as slopes, available soil storage, runoff coefficients, ground cover, channelization, and overland flow routing, applicable to the development site and contributory off-site areas after complete development has occurred;
 - e) Maximum operating tailwater elevations at the outlet of each conveyance or discharge facility, determined as the maximum hourly average receiving water surface elevation resulting from a 24-hour duration rainfall with a return period equal to that of the design storm applicable to the facility, or as otherwise established by the agency having operational jurisdiction over the receiving water elevation.
4. Design flood elevation determination: Unless otherwise specified by a particular design or performance standard, the 100-year flood elevation applicable to a development site shall be determined as the highest of:
- a) The base flood elevation specified for the area of development located within zones designated A, AH, or A1-30 as delineated on the appropriate Federal Flood Insurance Rate Map (FIRM);
 - b) The wind or current driven wave elevation specified for the area of development located within zones designated V1-V30 as delineated on the appropriate FIRM;
 - c) The inundation elevation obtained by adding the depth of shallow flooding to the area-weighted mean pre-development elevation of the area of development located within zones designated A0 as delineated on the appropriate FIRM;
 - d) The 100-year inundation elevation established by SFWMD within specific sub-areas of the C-15 Canal and C-16 Canal watersheds pursuant to Chapter 40E-41, F.A.C.; or

- e) Where not otherwise established by Chapter 40E-41, F.A.C., or by a City drainage plan adopted pursuant to the Comprehensive Plan, the maximum inundation elevation resulting from the total on-site storage of runoff produced by the 100-year, 3-day rainfall event assuming fully developed site conditions and no discharge of surface water from the development site.

5. Tertiary stormwater system design and performance: The tertiary system shall consist of all drainage features such as storm sewerage, swales, gutter, culverts, ditches, erosion protection, and site grading necessary for the immediate drainage and rapid removal of stormwater from building sites, streets, and areas of other land uses subject to damage or disruption by inundation in accordance with acceptable levels of service as established by the City's drainage plan.

- a) Lot and building site drainage: In order to provide for such levels of service, tertiary drainage for lots and buildings shall meet the following minimum requirements:
 - 1) The minimum finished floor elevation of the principal building(s) to be constructed on a lot or portion thereof shall be at or above the 100-year flood elevation applicable to the building site.
 - 2) Site grading immediately adjacent to the perimeter of each building shall be sloped so as to drain away from the structure. However, under no condition will a site (or lot) be allowed to be graded to drain to any adjacent privately held property.
 - 3) Each single family residential lot shall be graded to drain along or within its property lines to the street or parking area providing immediate access, unless adequate common drainage facilities in expressed drainage easements with an established maintenance entity are provided to accommodate alternative drainage grading.
 - 4) Each residual lot with gross area of one-quarter acre or less shall have a finished grade not lower than the maximum water surface elevation produced by the 3-year, 24-hour rainfall event in any detention or retention facility receiving stormwater runoff from the lot.
 - 5) Each residential lot with a gross area greater than one-quarter acre shall have a finished grade as specified in Sec. X.A.5.a.iv. within twenty (20) feet of any principal

building site. The remainder of the lot shall be graded at sufficient elevation to ensure that inundation does not persist for more than eight (8) hours following cessation of the 3-year, 24-hour rainfall event, unless such area is designated for stormwater management purposes and included in an expressed easement for drainage, floodplain, or the like.

- b) Minor street drainage: Except as provided in Sec. X.A.5.c., minor streets shall have tertiary drainage meeting or exceeding the following minimum requirements:
- 1) The minimum edge of pavement elevation of any street section shall be no lower than two (2) feet above the control elevation of any detention or retention facility receiving runoff from the section.
 - 2) Roadside swales shall conform to applicable City standards and shall be designed and constructed such that:
 - (a) The flowline gradient is at least 0.32%, but not greater than 2.4%, unless approved erosion protection is provided;
 - (b) The flowline gradient is equal to or slightly exceeds the longitudinal gradient of adjacent pavement;
 - (c) The water surface elevation of swale flow resulting from peak runoff based on the 3-year rainfall event shall not exceed the adjacent edge of pavement at any point along the swale run. However, at least one storm sewer inlet or other acceptable discharge facility shall be provided for every six hundred (600) linear feet of swale, and no single swale run shall exceed four hundred (400) feet to an inlet; and
 - (d) The soil adjacent to each inlet is protected from local scour by installation of a four (4) foot wide perimeter apron of sod or concrete.
 - 3) Curb and gutter drainage shall conform to applicable City standards and shall be designed and constructed such that:
 - (a) The flowline gradient is at least 0.24%;

- (b) The water surface elevation of flow resulting from peak runoff based on the 3-year rainfall event shall not exceed the adjacent centerline elevation of pavement at any point. However, at least one storm sewer inlet or other acceptable discharge facility shall be provided for every six hundred (600) linear feet of pavement, and no single gutter run shall exceed four hundred (400) feet to an inlet; and
 - (c) Surface flow of runoff across street intersections is prevented by provision of corner inlets and cross drains or by grading of gutters to flow away from the intersection.
- c) Non-Plan collector street drainage: Non-Plan collector streets shall have tertiary drainage meeting all appropriate requirements for minor streets except that:
 - 1) Conveyance capacity of road drainage facilities shall be based on peak runoff resulting from the 5-year rainfall event; and
 - 2) The water surface elevation of gutter flow resulting from peak runoff based on the 5-year rainfall event shall not exceed the adjacent centerline elevation of the outermost travel lane at any point.
- d) Parking tract and parking area drainage: Each residential parking area serving three or more dwelling units and all non-residential parking areas shall have a finished grade elevation not lower than the maximum water surface elevation produced by the 3-year, 24-hour rainfall event in any retention, detention, or conveyance facility receiving stormwater runoff from the lot. However, where detention or retention is provided by subsurface exfiltration systems the finished grade shall be no lower than the maximum storage elevation produced by the 5-year, 24-hour event.
- e) Storm sewerage: Storm sewerage shall be designed and constructed so as to meet or exceed the following requirements:
 - 1) Where not otherwise specified, all storm sewer system capacity design shall, at a minimum, provide for conveyance of peak inflow from the applicable catchment, based on the 3-year rainfall event, such that the hydraulic gradient elevation does not exceed the grate or cover

- 2) Inlet times assumed for determining required street drainage system capacity shall not exceed ten (10) minutes, unless adequate justification for use of longer times is submitted.
- 3) Storm sewer pipe shall have a nominal diameter of not less than fifteen (15) inches, or equivalent oval pipe size.
- 4) Storm sewerage shall be designed to attain flow velocities of not less than two and one half (2.5) feet per second in all pipe runs serving two (2) or more inlets, nor greater than ten (10) feet per second in any pipe run.
- 5) A suitable access structure such as a manhole, junction box, or inlet must be installed at each junction or change in pipe size, slope, or direction.
- 6) The maximum pipe run between access structures shall be:

300 ft. for 15" and 18" pipe
400 ft. for 24" to 36" pipe
500 ft. for 42" and larger pipe.
- 7) All pipe used in the storm sewer system shall be either reinforced concrete, metal or HDPE pipe covered by and conforming to current ASTM, AASHTO, or ANSI standard specifications for materials and fabrication of barrel and joints, and shall meet current FDOT standard specifications and policies applicable to the intended use.
- 8) Concrete pipe shall have gasket joints.
- 9) When metal pipe is used beneath pavement within a street, it shall be designed to provide a joint-free installation or, where joint-free installations are not feasible, shall be jointed with a twelve-inch wide band having a mastic or neoprene gasket providing a watertight joint. Other jointing techniques meeting or exceeding these requirements may be used upon submittal to and approval by the Division.
- 10) All pipe used in storm sewer systems within a tract development may include corrugated polyethylene pipe

(double wall), covered by and conforming to current ASTM, AASHTO or ANSI standard specifications for materials and fabrication of barrel and joints, and shall meet current FDOT standard specifications and policies applicable to the intended use.

- 11) Drainage pipe shall be fitted with headwalls, endwalls, inlets and other appropriate terminating and intermediate structures. Structure design shall meet or exceed City standards.

6. Secondary stormwater system design and performance: The secondary system, including all facilities and appurtenant structures for detention, retention, discharge, and conveyance to legal positive outfall, shall be designed and constructed to provide the degree of treatment and control of all stormwater runoff discharged from a development site necessary to meet the requirements of the agency having jurisdiction over receiving waters at each point of legal positive outfall.

a) In addition to requirements expressly stated herein:

- 1) Secondary facilities for each residential, commercial, and industrial development exempt from South Florida Water Management District permitting pursuant to Chapters 40E-4, 40E-40, or 40E-41, F.A.C., shall meet all requirements of issuance of the applicable permit; and
- 2) Secondary facilities for each residential, commercial, and industrial development exempt from South Florida Water Management District permitting pursuant to Chapter 40E-4, F.A.C., except for a individual residential lot containing not more than two (2) dwelling units, shall be designed and constructed on site, or otherwise be provided through authorized connection to off-site secondary facilities, so as to limit the discharge rate at the point of legal positive outfall to not more than the peak runoff rate produced by the site under pre-development conditions for both the 3-year, 1-hour and the 25-year, 72-hour rainfall events, and either:
 - (a) Detain the greater of the first one (1) inch of runoff or the total runoff from the 3-year, 1-hour rainfall event; or
 - (b) Retain the initial portion of runoff in an amount equal to one-half of that required to be detained.

- b) No discharge of stormwater runoff resulting from rainfall up to and including the 25-year, 72-hour event shall take place from a development site except by means of one or more approved discharge structures, other than those existing inflows from off-site for which separate, approved means of conveyance through the site have been provided.
- c) Facilities for conveyance of discharge to each point of legal positive outfall shall be designed and constructed with adequate capacity to accommodate the combined flow from the applicable discharge structure(s) and all inflows from other contributory areas resulting from the 25-year, 72-hour rainfall event without overflow to adjacent lands.
- d) Except where bulkheading is approved in accordance with the City's Land Development Regulations, Chapter 6, Required Improvements, each wet detention/retention facility designed for storage of stormwater runoff in an open impoundment shall have:
 - 1) Side slopes no steeper than 4(H): 1(V) extending to a depth of at least two (2) feet below the design control elevation;
 - 2) Side slopes no steeper than 2(H): 1(V) from two (2) feet below control elevation to the bottom of the facility; and
 - 3) A continuous berm, at least twenty (20) feet wide with a cross-slope no steeper than 8(H): 1(V), graded adjacent to the shoreline. Where said berm abuts any residential lot, it shall be graded at an elevation not lower than the maximum design water surface elevation resulting from the 3-year, 24-hour rainfall event. Along portions of the impoundment where the design water surface is less than forty (40) feet wide at control elevation, a berm shall be required on only one side, provided that adequate legal and physical access is established from a minor street to each separate segment of the remaining berm.
- e) Dry detention/retention facilities designed for storage in open impoundments shall have side slopes no steeper than 4(H): 1(V).
- f) All normally exposed side slopes and maintenance berms of open impoundments shall be fully grassed or otherwise protected from erosion.
- g) Each piped inlet to an open impoundment shall have a concrete or sand-cement rip-rap endwall designed and constructed with a

suitable foundation for installation on the slope or bed of the impoundment as applicable. However, the endwall may be eliminated on inlets to wet detention impoundments where the pipe is installed with the crown at least two (2) feet below the control elevation and with the pipe invert protruding as least two (2) feet beyond the side slope.

- h) Stormwater runoff from pavement, roofs, and unpaved areas of compacted soil surfaces with no significant vegetative cover shall be directed over grassed, pervious soil surfaces as diffused flow prior to entering wet detention/retention facilities or dry detention facilities in order to promote infiltration, particulate deposition, nutrient removal, and interception of debris or other undesirable material which may overload, pass through, cause nuisance conditions in, or increase maintenance needs of said facilities.
- i) In order to protect against over-drainage of surrounding lands, no control elevation shall be lower than the pre-development average annual mean water table elevation of the detention facility site.

7. Drainage and maintenance access rights:

- a) Each secondary system facility for detention or retention of stormwater runoff in an open impoundment shall be placed entirely within a water management tract dedicated or deeded to an acceptable entity responsible for operation and maintenance of the stormwater management system.
- b) Except as otherwise provided pursuant to this article, there is hereby required around each water management tract established for purposes of wet detention or retention in an open impoundment a lake maintenance easement a minimum of twenty (20) feet in width and graded at a slope no steeper than 8 (H): 1 (V), coinciding with the required maintenance berm. The width of the easement shall be measured from the point at which the grade is not steeper than 8 (H): 1 (V). Lake maintenance from an abutting local street may be permitted by the Division in accordance with good engineering practices. Access to a lake maintenance easement from at least one (1) local street shall be established as part of said easement or, when necessary, by separate expressed easement or other instrument of record. A lake maintenance easement shall be required on only one (1) side of the water body or water management tract where the water surface at control elevation does not exceed forty (40) feet in width; provided, however, that elimination of said easement does not isolate any remaining lake maintenance easement from proper access. If the

water surface at the control elevation is greater than forty (40) feet wide, a lake maintenance easement shall be required on both sides. No lake maintenance easement shall be required behind bulkheads; provided, however, an easement not less than ten (10) feet in width shall be provided behind bulkheads where necessary to provide access to outfalls and, further, that elimination of said portion of lake maintenance easement does not result in isolating any remaining lake maintenance easement from required access. In a residential subdivision, lake maintenance easements, including required access, shall be established over common areas only, and shall not encroach residential lots.

- c) **Drainage easements:** Drainage easements shall be provided where necessary at a width adequate to accommodate the drainage facilities. A minimum width of twelve (12) feet shall be provided for underground storm drainage installations. Where swales are used, the width shall be adequate to accommodate the entire design section between tops of slope. Where canals or ditches are permitted, the width shall be adequate to accommodate drainage facilities plus twenty (20) feet on one side for maintenance purposes. Drainage easements shall be provided to accommodate existing drainage of surface waters from offsite contributory areas. When a subdivision is traversed by existing canals, watercourses, streams, drainage ways or channels, there shall be provided a drainage easement or right-of-way conforming substantially with the lines of such watercourse and of such further width or construction or both as may be needed for access, maintenance, and floodplain purposes.

- 8. Certificate of compliance for lots: When the finished lot grading required by the City's Land Development Regulations and Section X.A.5.d) above, is to be completed in conjunction with building construction, prior to issuance of the Certificate of Occupancy the developer shall submit to the Building Official, a Certificate of Compliance from a Florida registered professional surveyor, engineer, or landscape architect. Such statement shall be in a form approved by the City's Building Division and shall state that lot grading was done in accordance with either the approved grading plan for the subdivision or, in the absence of each plan, in accordance with the applicable requirements of City's Land Development Regulations and Section X.A.5.d) above.

B. DREDGE, FILL AND CONSTRUCTION IN WATERS OF THE STATE:

- 1. Applicability: Subdivision of lands containing or abutting existing or proposed waters of the State, including canals, lakes, streams, and

wetlands, shall comply with and conform to the requirements of this subsection.

2. Easements or rights-of-way: Where land within a proposed subdivision abuts existing or proposed waters of the State, there shall be provided a floodway or floodplain easement or a drainage right-of-way conforming substantially with the lines of such water course or water body and of such further width or construction or both as will be adequate for the purpose. Additional easement or right-of-way width may be required where it is necessary for maintenance, safety and convenience. Each required easement and right-of-way shall be deeded or dedicated to an appropriate public agency. Maintenance responsibility and use limitations applicable to said easements and rights-of-way, or any facilities placed therein, shall be in accordance with all applicable permit conditions and shall be stated or referenced by note on the appropriate plat(s).
3. Permits: Where proposed dredging or filling affects waters of the State or sovereign land, said activities shall be approved by the governing agency having jurisdiction in such matters. Prior to the construction of any seawall, bulkhead, dock or pier, a construction permit shall be obtained from the City's Building Division or Engineering Division, in addition to all required permits or expressed exemption from permitting for construction in waters of the State.

C. ALTERNATE DESIGN, CONSTRUCTION STANDARDS, AND TYPES OF MATERIALS:

1. Applicability: Alternate designs, construction standards, and types of materials which, in the opinion of the Division, are equal or superior to those specified may be approved in accordance with this subsection.
2. Contents of application: The application shall be submitted in a form established by the Division prescribed in the Appendix of this Handbook, and made available to the public. Said application shall be accompanied by written data, calculations and analysis, and drawings which are necessary to show, by accepted engineering principles, that the proposed alternates are equal or superior to those specified, or are necessary due to environmental considerations. Within forty-five (45) days of receipt of such application, the Division shall either approve or deny the application and shall advise the developer's engineer and the developer in writing of the decision.

D. STORMWATER SYSTEM CONSTRUCTION:

1. Gravity stormwater line construction:

- a) Installation: Gravity stormwater lines shall be laid accurately to both line and grade. The Division will generally not accept any line laid with a slope varying by more than 15% of its design slope, especially for lines laid at minimum gradients where scouring velocity cannot be achieved. The Division reserves the right to independently verify questionable as-built survey results. Visible leakage (unless designed for a percolation system), deflections, horizontal misalignment, vertical joint sagging shall be grounds for rejection of the storm lines.

The minimum design depth of a stormwater line shall be 4.0 feet to invert. The minimum cover over the stormwater line shall be 2.2 feet. Prior approval shall be obtained if either of these minimums cannot be met.

Trenches and excavations shall be kept dry while work is in progress. The contractor shall be responsible to ensure that all safety requirements are met. Unsuitable material such as boulders and logs shall be removed from the site. The pipe barrel shall be uniformly supported along its entire length on undisturbed soil or bedding material. Proper bedding shall be supplied if the existing material includes rock, organic material or other sharp or unsuitable material.

- b) Inlets: Inlets (and catch basins) shall be set according to construction plans and shall be precast in accordance with approved shop drawings and specification detail drawings accompanying this text. The bottom inverts shall be carefully shaped to conform to the pipe flow channel where possible (providing that the inlet is not the sump type) on all in-line structures. Where roadway inlets are design into the stormwater management system, the construction of the structures (including grates and frames) shall be in accordance with the FDOT Standard Index drawings for the designated structure on the plans, and be constructed in accordance with said FDOT Specifications, 2000, Section 425 and ASTM C478.

When percolation inlets are called for on the plans, they shall be the required FDOT Specifications type inlet modified to allow for either horizontal or vertical perforated CMP as shown on the inlet detail, backfilled with granular material (ballast rock) to the designated depth.

- c) Manholes: Manholes shall be set according to the construction plans and shall be precast reinforced concrete storm sewer manholes as indicated on the plans, complying with ASTM C478,

and in accordance with approved shop drawings and specification detail drawings accompanying this text. The manhole invert shall be carefully shaped to conform to the pipe flow channel. Flow channels with the manholes involving changes of direction or side slopes shall smoothly direct the flow in accordance with detail drawings.

Precast concrete top, of concentric cone, eccentric cone, or flat slab reinforced top type, and indicated on the plans shall be in accordance with the FDOT Standard Index details. Precast concrete base, with base riser section and separate base slab, or base riser section with integral floor as shown on the plan details and having shop drawing approval shall be the only structure component permitted.

All concrete irregularities shall be plastered with cement mortar in such a manner as to give a neat and water-tight product. Manholes shall be core-drilled to provide a pipe opening when a precast hole is not available. Ram-neck or equivalent shall be used at all riser joints. Structures with any leakage will not be accepted.

Ductile-iron 26" diameter cover, heavy-duty, indented top design with lettering casted into the top reading "STORM SEWER" shall be required, unless an alternate design is approved by the Department Director. Such alternate design could be the City's logo on manhole cover in addition to the top reading.

d) Materials:

- 1) Reinforced Concrete Pipe (RCP): The pipe shall conform with the requirements of Table III of ASTM C-76-82b, and with the FDOT Specifications, 2000, Section 941. Bell and spigot with round rubber gasket shall be required. Fittings for RCP shall be of the same strength as the adjoining pipe, tongue-and-groove gasketed joints shall comply with ASTM C-443.

If slotted concrete pipe is used, the slots shall be a maximum of $\frac{3}{8}$ " wide, spaced 12" o.c. staggered on opposite sides of the pipe. The length of the slots is dependent on the pipe diameter; refer to Exfiltration Trench Detail for this dimension.

- 2) Corrugated Metal Pipe (CMP): The pipe shall conform to the requirements of AASHTO M-196 with bituminous coating, and with the FDOT Specifications, 2000, Section

943. If aluminum pipe is used (ALCMP), the pipe shall conform with the requirements of AASHTO M-196 and to the FDOT Specifications, 2000, Section 945.

Installation of Corrugated Metal Pipe: All joints on storm sewer pipe shall be made up with either ½” neoprene or ¼” strip sealant gasketed material. All bands shall have the same corrugated design as the pipe. Width of the bands shall be as follows: 12” up to 48” diameter pipe, 24” over 48” diameter pipe.

- 3) Ductile Iron Pipe (DIP): This pipe shall conform to the requirements of ANSI/AWWA C151/A21.51-86 unless otherwise noted on the plans. Glands for mechanical joints shall be of ductile iron or cast iron. Fittings shall conform to the requirements of ANSI/AWWA C110/A21.10-87. Flange fittings are not permitted on underground installations. Joints shall conform to the requirements of ANSI/AWWA C111/A21.11-85.
- 4) Polyvinyl Chloride Pipe (PVC): Pipe 12” or larger in diameter shall conform to the requirements as set forth in AWWA C900-81 with dimension ratio SDR 18 and ASTM D-3034-85b. The pipe shall be made of PVC plastic having a cell classification of 12454-B or 12454-C or 13364-B with a minimum tensile modulus of 3450 M Pa (500,000 PSI) as defined in ASTM D-1784. Provisions must be made for contraction and expansion at each joint, or with rubber ring and an integral bell as part of each joint, or by a rubber ring sealed coupling. Clean, reworked material generated from the manufacturers own pipe production may be used. Fittings shall be cast or ductile iron. Pipe shall have cast iron pipe equivalent outside dimensions.
- 5) Corrugated Polyethylene Pipe (CPEP): Provide high density corrugated polyethylene or heavy duty polyethylene (HDPE) smooth interior pipe with annular exterior corrugations. Provide pipe fittings and accessories of same material and weight/class as pipes, with adjoining method as indicated. All roof drain connections shall be made with a pre-manufactured welded tee fitting.

All materials shall comply with AASHTO MP-6, ASTM D-2412, and/or AASHTO M-294, Type S, or M-252. All pipe and fittings shall be “N-12, HC 42 or 48” HDPE” as

manufactured by Advance Drainage Systems, Inc., “HI-Q” as manufactured by Handor, Inc., or as approved by the City Engineer.

- e) Exfiltration Trench: The exfiltration trench (or drainfield) may use either slotted concrete pipe, perforated metal pipe or perforated PVC or CPEP pipe as the distribution conduit within the trench. Pipe shall terminate 12 inches from the end of the trench rock or connect to an additional inlet as required (see plan detail for configuration). Cover pipe ends with #10 galvanized or aluminum screen. The openings in the end screens shall be no larger than ½” square. Trench rock shall be ¾” washed ballast rock. The trench shall be lined on all sides with a plastic filter blanket (geotextile fabrics) and shall comply with FDOT Specifications, 2000, Sections 514 and 985.
- f) Outfalls: Construct cast-in-place or precast concrete as indicated on the plans, with reinforced headwall, apron, and tapered sides. Provide rip-rap as indicated to prevent washout of outfall discharge.
- g) Inspection: Initial piping interior inspection shall be made after lines between catch basins and manhole, or manhole locations, have been installed and approximately two (2) feet of backfill is in place, and again at completion of the installation. Lamping of the completed stormwater system will be performed after complete backfilling, the paving of the roadway base, and accurate record drawings are received. The lamping will determine that the lines have been laid to accurate line and grade. At the time of lamping, the line shall be clean and dry. A final inspection will be held after the roadway is completed to verify that the system has not been damaged. All lines and appurtenances not meeting specifications or reasonable standards shall be repaired or replaced. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, the contractor shall correct such defects and a re-inspection shall be performed.

2. Trenching and retention areas:

Perform all excavation of every description and of whatever substances encountered, to depths indicated on the plans or as specified. During excavation, pile material suitable for backfilling in an orderly manner a sufficient distance from banks of trench to avoid overloading and to prevent slides or cave-ins.

OSHA Trench Safety Compliance: The use of trench box or other

approved means to comply with the Florida Trench Safety Act (Chapter 90-96, Laws of Florida), and OSHA Trench Safety Standards, shall be used where excavation exceed five (5) feet in depth.

Remove all waste and excavated materials not required or suitable for backfill. Do such grading as may be necessary to prevent surface water from flowing into trenches or other excavations, and remove any water accumulating therein by pumping or by other approved methods. Do such sheeting and shoring as may be necessary for protection of work and for safety of personnel. Acquire all local permits necessary for dewatering operations and disposal of water.

- a) Trench excavation: Provide trenches of minimum necessary width for proper laying of pipe. Accurately grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its entire length, except for portions of pipe sections where it is necessary for bell holes and for proper sealing of pipe joints.

Dig bell holes and depressions for joints after trench bottom has been graded and only of such length, depth, and width as required for properly making particular type of joint, so that pipe rests on prepared bottom for as nearly to its full length as practical.

Except where rock is encountered, take care not to excavate below depths indicated. Where rock excavation is required, excavate to a minimum overhead of 8" below trench depths indicated on drawings or specified. Backfill over-depths in rock excavation with loose, granular, moist earth which shall be thoroughly tamped.

Where wet or unstable soil that is incapable of properly supporting the pipe, as determined by the Division is encountered in the trench, remove such soil to depth required by the Division and backfill trench to proper grade with appropriate material, as specified.

Do not make widths of trenches for drainage pipe greater than necessary to permit satisfactory jointing and thorough tamping of bedding material around pipe. Prepare bedding surface to provide firm foundation of uniform density throughout entire length of culvert or storm sewer. Carefully shape and round bottom of trench to a shape of lowest $\frac{1}{4}$ of the outside circular portion of pipe for its entire length. When over-excavation occurs, place a minimum of 4" of sand, stone or gravel below the pipe, then 6" lifts of backfill material, hand placed, to approximately two-thirds

of the pipe diameter and compact.

- b) Protection or removal of utility lines: Prior to construction, the contractor shall locate and adequately uncover existing utilities, (within the path of the proposed work), to determine possible conflicts. Information provided on the plans may be used as an approximate guide to assist the contractor, however, the contractor shall rely on actual field investigation to assure that all of the existing utilities are accurately located prior to commencement of his work. Existing structures reflect the best available information, but it shall be the contractor's responsibility to acquaint himself with all information and to avoid conflict with existing conditions. Protect all existing utility lines that are to be retained, or utility lines constructed during excavation operations, from damage during excavation and back-filling; if damaged, repair shall be at contractor's expense.
- c) Detention/retention facility: Each wet detention/retention (impoundment) facility designed for storage of stormwater runoff in an open impoundment shall have side slopes no steeper than 4(H):1(V) extending to a depth of at least two (2) feet below the design control elevation; the side slopes no steeper than 2(H):1(V) from the two (2) feet below the control elevation to the bottom of the facility. There shall be a continuous maintenance berm at least twenty (20) feet wide with a cross-slope no steeper than 8(H):1(V), graded adjacent to the top of the bank of the facility.

The area between design control elevation and the top of bank, and from the top of bank to a minimum of twenty (20) feet landward of the detention/retention facility shall be sodded, or seeded and mulched, anchored with a jute matting, to insure stabilization of the facility slopes until maturity of the ground cover protection intended for this purpose, or otherwise protected from erosion.

Dry detention/retention facilities designed for storage in open impoundments shall have side slopes not steeper than 4(H):1(V), and shall be fully grassed or otherwise protected from erosion.

Each pipe inlet to an open impoundment shall have a concrete or sand-cement rip-rap endwall designed and constructed with suitable foundation for installation on the slope or bed of the impoundment as applicable. However, the endwall requirement may be eliminated on inlets to wet detention/retention impoundments where the pipe is installed with the crown at least two (2) feet below the control elevation and with the pipe invert protruding at least two (2) feet beyond the side slope.

3. Control elevation structures:

a) Modified FDOT Type "E" Inlet with weir:

- 1) A Type "E" inlet with a concrete weir wall constructed along the longitudinal axis shall be constructed. The weir wall may either be precast separately from the inlet structure and inserted into the structure, or as an integral part of the structure. A detailed shop drawing will be required reflecting how the weir wall is to be constructed. A sump opening shall be precast into the intake side of the control structure. This opening is to be an 8" x 8" square, centered on the baffle side of the weir.

The grate shall be chained to the structure in accordance with FDOT Standard Index No. 201.

- 2) The weir wall shall incorporate the bleed down orifice (usually consisting of a 6" high by 6" wide inverted triangular notch, the bottom point being set at the normal control elevation). On the inlet side of the wall, a half-round corrugated aluminum pipe (CAP) baffle shall be installed, extending 6" above the top of the triangular notch to 6" below the bottom of the triangular notch. The top of the weir wall shall be set at the design elevation, the top shall be between 6" and 12" below the bottom of the inlet grate.

b) Modified FDOT Type "C" Inlet with skimmer & orifice:

- 1) A Type "C" inlet with a 6" inverted triangular orifice at the design control elevation shall be precast. The grate and frame shall be the Irving Q steel grate or approved equivalent as set forth in the FDOT Standard Drawing Index for this structure.
- 2) A 3/16" aluminum plate skimmer shall be fabricated in a rectangular shape that will stand off of the inlet structure by 6", extend above the top of the inlet structure by 6" and extend below the bottom of the precast inverted triangular orifice of the inlet structure by 6". It shall be fastened to the inlet structure by the installation of a bracket (consisting of two aluminum angles 5" x 5" x 3/8") which are welded to the skimmer, bolted together and anchor bolted into the inlet structure at 12" o.c. There shall be two (2) brackets on each side of the inlet structure. All bolts and anchors shall be 1/2" diameter stainless steel.

A shop drawing shall be submitted and approved prior to the fabrication of the skimmer.

- 3) Outfall pipe shall be as called for on the design plans. The exit of the outfall pipe into the receiving waters shall terminate via a headwall, endwall, or submerged pipe extension beyond the water body earthen bank.

c) FDOT Type “C” or “E” Inlet discharge structure:

This structure is a free-standing structure within a water body.

- 1) On-site storage elevation shall be for the greater of the first one-inch (1”) of runoff or total runoff produced by 3-year, 1-hour rainfall event from the total area drained by the outfall connection.
- 2) Peak on-site storage elevation for runoff produced by the 3-year, 24-hour rainfall event from the total area drained by the outfall connection shall be considered; it shall not exceed the hydraulic gradient line elevation for the design peak flow at the point of connection to the receiving water body system.
- 3) The top of the control structure will be set for the peak on-site storage elevation produced by the 25-year, 3-day rainfall event, not to exceed the lower of site perimeter berm elevation or the outside pavement edge elevation of a thoroughfare street.

d) Erosion and sedimentation requirements:

- 1) The contractor shall make every effort during construction to control wind and water erosion of the soil on site.
- 2) The contractor shall control excessive runoff from the project by excavating the proposed swale areas during the preliminary cleaning and grubbing operation of the project.
- 3) Should the site become excessively dry, and wind and soil erosion becomes prevalent and/or a nuisance, the contractor shall water and/or seed and mulch the area, and/or provide erosion control fencing as necessary.
- 4) Type I bale barriers shall be placed around all existing ditch bottom inlets in accordance with FDOT Standard Index No. 102.

4. Pre-construction conference: A pre-work conference is required before the start of any new construction. Refer to previous reference for pre-work checklist.

E. STORMWATER DISCHARGE PERMIT:

1. Purpose and Intent: Pursuant to the Federal Water Quality Act of 1987, and its regulatory requirements to meet the National Pollutant Discharge Elimination System (NPDES) criteria, the City has established regulations to promote the health, safety and general welfare in order to comply with the federal and state law and promulgated regulations regarding water quality within the City's jurisdiction. These regulations are located in Chapter 26 (Water, Sewers and City Utilities), Article VI (Stormwater System), Section 26-300, et seq., of the Boynton Beach Code of Ordinances.

Stormwater systems of conveyances used for collecting, storing and transporting stormwater runoff into facilities owned by the City of Boynton Beach (but not including any facilities intended to be used in accordance with applicable law for collecting and transporting sanitary or other wastewater), which are in violation of any federal, state, county, city or other law, rule or regulation are prohibited without a discharge permit issued by the City. This includes any industrial activity stormwater runoff from sites generating runoff which require a permit in accordance with the applicable law(s).

Any person or firm who holds an NPDES permit shall provide a copy of such permit to the City Engineer no later than sixty (60) calendar days after the issuance of this permit.

2. Illicit discharges, spills and dumpings: Any stormwater discharges into facilities owned by the City that are not entirely composed of stormwater is prohibited. This means that discharges containing any sewage, industrial waste or other waste materials, or containing any materials in violation of federal, state, county, municipal, or other laws, rules, regulations, orders or permits, is prohibited.

If any person becomes aware of any prohibited discharges into a stormwater system, that person shall notify Code Compliance of such discharge, and if such person is directly or indirectly responsible for such discharge, that person shall also take immediate action to ensure the containment and cleanup of such discharge is implemented and that the action taken reported to Code Compliance.

3. Inspections and monitoring: Whenever it is necessary to make an inspection to enforce any of the City's regulations or permit conditions

issued, or whenever an authorized official has reasonable cause to believe there exists a condition constituting a violation of any of the permit provisions issued for a particular site, the authorized official (with proper identification) may enter any property, building or facility at any reasonable time to inspect the same or to perform any duty related to enforcement of the permit provisions.

If any random sampling and sampling in areas with evidence of stormwater contamination, non-stormwater discharges or similar factors are suspected, any authorized official may establish on any property such devices as are necessary to conduct sampling or metering of discharges to the stormwater systems owned by the City.

4. Permit Application: Submit four (4) copies of the Permit and Application form (refer to the City's Utilities Engineering Design Handbook and Construction Standards, Appendix Exhibit "R"), along with four (4) copies of the following:
 - a) A neatly drawn site plan showing:
 - 1) Property boundaries and dimensions;
 - 2) The name and location of any adjoining streets or roads;
 - 3) Location and dimensions of any improvements including buildings, docks, paved or limerock areas, pipes, ditches, etc. (distinguish between existing and proposed improvements;
 - 4) For projects involving dredging or filling in wetlands or work in uplands: arrows indicating the direction of drainage from the proposed improvements;
 - 5) All impervious areas and pervious areas (indicate their size [in square feet]);
 - 6) Dimensions for all proposed works;
 - b) A topographic map showing the site boundaries and a minimum of 300 feet adjacent thereto;
 - c) A street map showing the location of the proposed project site, with written directions and addresses (if applicable);
 - d) Information that shows that the applicant qualifies for the storm-water discharge permit and that the application addresses all the parameters and thresholds required in the design criteria and general requirements of the permit;
 - e) Documentation of ownership evidencing that applicant (either owner or authorized agent) owns the property that is subject to the

permit (i.e., warranty deed, etc). If authorized agent is the applicant, submit a notarized statement from the property owner signifying that the authorized agent is submitting on the property owner's behalf;

f) Submit the site master stormwater management plan, including the supporting drainage calculations.

5. When Permit Required: A Stormwater Discharge Permit will not be required from the Department if:

- a) The subject property is a 'stand alone' (no discharge), and
- b) The subject property is less than 10 acres in size, and
- c) The subject property contains less than 2 acres of impervious area; and
- d) No wetland area is present; and
- e) No dredge and fill permit is required; and
- f) The subject property will be used for a single family residence or a duplex residence.

State standards will have to be met which call for the retention of the first flush (i.e., retention of the first ½" of rainfall runoff) or the detention of the first 1" of rainfall runoff. Generally, the water quality parameters of FDEP Chapter 17-25 need to be adhered to for the head of the pipe system (inlet) and the tail of the pipe system (outlet) used in any stormwater management system.

A Stormwater Discharge Permit may be required for those properties exceeding non-permit thresholds noted in the preceding paragraph, properties discharging into those water bodies (canals) being maintained by the City or City's rights-of-way, and properties being developed of an industrial nature which would manufacture and handle materials or liquids that would be deemed to generate illicit discharges, pursuant to Section X.E.2 above.

6. Other Agencies: The proposed activities may also require approval by other federal and state agencies. This Department informs other agencies about notices and permit applications received, but the responsibility for requesting approval from other agencies rest with the owner.

XI. STANDARD DETAILS

[SEE SEPARATE LISTING FOR THIS SECTION.]

ARTICLE SIX - ADMINISTRATION OF CONSTRUCTION AND RECORD DRAWINGS

XII. MATERIALS AND SPECIFICATIONS:

The construction standards shall be those prescribed in this Handbook. The following general specifications shall apply:

- A. All materials, fittings and appurtenances intended for use in pressure pipe systems shall be designed and constructed for a minimum working pressure of 150 psi unless the specific application dictates a higher working pressure requirement.
- B. Standard pressure pipe fittings of size 3" ID and larger shall be CIP or DIP fitted with mechanical joints. Fittings for force mains shall be epoxy lined. For sizes less than 3" ID, fittings shall be suitable to the pipe material and application. Only bolts furnished by the manufacturer for mechanical joints are acceptable.
- C. Pipe gaskets shall be as supplied by the pipe manufacturers.
- D. The attached "shop" specifications with the prework check list indicate specific material requirements. In general, material requirements will be guided by the latest revisions of the specifications of AWWA, ANSI, ASTM and NSF.
- E. Mains may be tapped with a tapping line up to or equal in size as the existing main line. Equal size line taps shall require a stainless steel full contact band assembly or a mechanical joint split tee. Under certain conditions, equal size lines will require that a tee be cut in. However, the method to be used shall be approved by the Department prior to plan approval of the project.
- F. Wet wells and manholes shall have precast, monolithic bases. Alternative methods for constructing wet well bases will be considered only if the size and depth of the well is excessive. All manholes shall have precast cones. Two-inch wide "Ram-nek" sheets or equivalent shall be continually placed at joints.
- G. Unnecessary transitions between DIP and PVC that are not specified or required by the plans or details are not permitted.
- H. Heavy duty flexible couplings ("Fernco" or approved equal) are acceptable for transition joints (stainless steel clamps only) with existing facilities only.
- I. PVC SDR-35 sewer pipe/ductile iron pipe adapters shall be used for DIP and PVC transition as required.

- J. All construction material and equipment shall be new, first quality. Repair clamps are not acceptable. Damaged or faulty pipe and materials must be properly replaced.
- K. Submersible Pumps - Pumps must meet or exceed the requirements contained in these standards.
- L. No joint deflection is allowed with PVC pipe.

XIII. INSPECTIONS, REPORTS AND REJECTION OF WORK:

The Department shall be notified in advance of the commencement of construction subsequent to the "Pre-Work" conference held at the Department's administration offices, and at such points during the progress of construction for which joint review by representatives of the Department and the project's consulting engineer are required.

- A. Construction shall be performed under the surveillance of, and shall at all times be subject to, review by the Department and/or its designated representatives; however, this in no way shall relieve the contractor of the responsibility for ensuring close field coordination and final compliance with the approved plans, specifications and the requirements of the Contract Documents.
- B. The Department inspectors may inspect all construction and material and may also inspect preparation, fabrication or manufacture of components, materials and supplies. The inspector is not authorized to revoke, alter or waive any requirements of the approved plans or these specifications, but is authorized and expected to call to the attention of the developer's engineer or contractor any failure of work or materials to conform to the plans or specifications. The inspector shall have the authority to reject work or materials and shall report immediately the issue to the Department Director or his designated representative. The inspector shall in no case act as foreman or perform other duties for the project engineer and/or contractor nor interfere with the management of the work, and advice which the inspector may give shall in no way be construed as binding to the Department or releasing the developer, his engineer or contractor from performing according to the intent of the plans, specifications and the Department's minimum construction standards.

Inspections will be scheduled for regular working hours only, except for nights when service interruptions are involved. Work will not be scheduled for weekends or holidays. The Department should be provided with at least two (2) full working days notice for scheduled inspections and a minimum of fourteen (14) working days advance notice to the Department in order to notify customers for construction with service interruptions. Inspectors will make routine passes on call to inspect such items as thrust blocks, material on site and clearances between conflicting lines. Scheduled inspections are also required for jack and

bore(s) and slippage through same, setting of wet wells, lift station start-ups with manufacturer's representative present and any time an existing City owned facility is to be connected to, i.e., manhole tie-in, water taps and tie-ins.

- C. The contractor shall require progress reports of the construction of the consulting engineer. The project's consulting engineer may also be required to submit construction progress reports directly to and at points of progress prescribed by the Department. The consulting engineer shall coordinate joint reviews of the construction with the Department at points specified by the Department.

The Department shall have the right to enter upon the project for the purpose of reviewing the construction of required improvements during the progress of such construction. The Department or its designated representatives shall have the authority to reject the work upon failure of the contractor or his engineering representative or the project's consulting engineer to coordinate the construction of the required improvements as prescribed by the subsection.

- D. It shall be the developer's engineer's responsibility to schedule inspections and their qualified representative shall be present when required by the Department. A scheduled inspection will be canceled if said representative is not present. The developer's engineer shall pre-test pressure tests and lampings to minimize failures. The developer's engineer shall prepare accurate record drawings and same shall be submitted to the Department prior to request of final inspection for service to any phase of a project.

- E. AUTHORITY OF NON-RESIDENT DEPARTMENT INSPECTOR:

The Department Director and/or authorized representative shall be permitted to enter upon any property without prior notification for the purposes of inspection, observation, measurement, sampling, testing, review and/or photocopying of records, or investigation as may be necessary for enforcement of the permit or ordinance. Entry shall be made during daylight or operating hours unless abnormal or emergency circumstances require otherwise.

XIV. MEASUREMENTS AND TESTS:

During construction, the contractor's engineer and/or the consulting engineer shall make or cause to be made such measurements, field tests, and laboratory tests necessary to certify that the work and materials conform with the approved development plans and the provisions of this article. The Department may require, at its discretion, specific types and locations of tests and measurements which it deems necessary to demonstrate conformance with approved plans and specifications.

XV. CERTIFICATION OF COMPLETION AND RECORD INFORMATION

A. ENGINEER'S CERTIFICATE OF COMPLETION:

The required improvements shall not be considered complete until a certification of completion, certifying to construction in conformance with the approved plans, and the final project records have been submitted to, reviewed, and approved by the Department. The certificate shall be signed and sealed by the contractor's engineer and/or the consulting engineer and shall be in a form established by the Department. Said certificate shall make specific reference to, and be accompanied by copies of measurements, tests and reports made on the work and materials during the progress of construction, along with a Record Drawing of each of the construction plans, showing the original design in comparison to the actual finished work with all material deviations noted thereon.

1. The Record Drawing(s) shall include complete "as-built" paving and drainage information relative to pavement location, concrete curb and gutter and sidewalks, elevations of surface drainage flows to insure proper routings of stormwater runoff, location of inlets and manholes, outfalls, endwalls and control structures, as well as the inverts, grates and rim elevations, and other features that were constructed in this project.
2. The Record Drawing(s) shall include complete "as-built" information of the utilities systems, (water and sewerage systems) including service laterals, valves, backflow preventers, force mains, information relative to location of manholes, valve pits (enclosures), wet wells, lift stations, as well as the inverts and rim elevations, and any other features that were constructed in this project.
3. The Record Drawing(s) shall be on file for all projects prior to the request of conditional/final inspections, Health Department Certification sign-off, and meter releases. The drawings shall include elevations, lengths, stations, and locations, as appropriate, for all facilities, including services and shall show sample points for pre-treatment sampling. Computer generated as-built drawings can be submitted. However, data in tabular form will not be accepted. Initially, two (2) signed and sealed paper prints are to be submitted for review. Following review by the Department, any comments are to be addressed. On final submission, the following items shall be provided:
 - a) Two signed and sealed sets of prints (24"x36").
 - b) Master utility plan on disk or rectified Master (site) Development plan on disk .
 - c) Final subdivision Plat on disk.
 - d) Record drawings on disk. All proposed data must be crossed out and the computer generated as-built data must be easy to be identified as such, using different font (larger size, thickness, pitch,

A sample of record data must be added to the legend and shown on each plan/profile sheet.

Note: The electronic files submitted must be Autocad 2010 or newer version (i.e. DWG file (preferred) or DXF file) on CD Rom. All fonts and linetypes shall be from the standard Autocad library or be Autocad compatible. Reference files and blocks are to be bound to drawings prior to submittal. Layers and drawings created by turning on and off layers are to be documented and submitted in MS WORD 97 (or better) or ASCII format. Files that do not fit on disks must be compressed and the compression executable file must be included on submitted disk. As a minimum requirement, electronic files must include all features that were shown on approved water/wastewater/reclaimed/stormwater plans. In addition to the CAD files, PDF files must be submitted.

4. When Health Department certifications are submitted, one print highlighting the part of the system requested is to be submitted. Any as-built drawing found to be inaccurate or incorrect will be rejected and cause for delay of inspection and testing.

B. THE RECORD DRAWINGS (AS-BUILT) CHECK LIST IS PRESENTED AS FOLLOWS:

1. Complete title block with current file name (including f/k/a, a/k/a, plat name, etc.)
2. A location sketch with dimensions to section corners, right-of-way lines, etc.
3. Correct street/road names are required with numbers for each lot, bay, etc. as shown on the record plat.
4. Potable water/reclaimed water/wastewater lines: Material, size, all fittings, tees, valves, etc. located by station or equivalent, elevation plans and wastewater gravity main profiles with slopes.
5. Off-site potable water/reclaimed water/wastewater/storm lines with fittings (elbows, tees, valves, appurtenances, etc.) stationed.
6. Complete lift station details, including private lift stations that discharge into the Department's force mains.
7. Label drawings "Record Drawing" with date.
8. Prints to be 24" x 36

9. As-builts for pressure mains shall include “top of pipe” elevations every one hundred (100) feet.

C. ACCOMPANYING THE RECORD DRAWING(S) shall be copies of all operating and utility clearance permits necessary to activate or put in use all support systems in the project. These permits have been noted previously, and are summarily (but not limited to) as follows:

1. FDOT Completion and Operation Permit(s) [if applicable]
2. SFWMD Surface Water Operational Permit
3. SFWMD Water Use (well operation) Permit [irrigation - if applicable]
4. Health Department Completion Certificate and Clearance to put Water System into Service
5. FDEP Completion Certificate and Clearance to put Water System into Service

XVI. STANDARD GENERAL DETAILS

[SEE SEPARATE LISTING FOR THIS SECTION]

INDEX OF APPENDICES

A	Project Documentation	3 sheets
B	Hold Harmless Agreement	7 sheets
C	Pre-construction Meeting Prerequisite Checklist	2 sheets
D	Shop Specifications	12 sheets
E	Generic Specifications – Paving, Drainage, Conduit and Restoration	4 sheets
F	Notice of Acceptance – Wastewater Pump (Lift) Station	2 sheets
G	Water System Shutdown Request Form	1 sheet

EXHIBIT “A”

PROJECT DOCUMENTATION

A. SERVICE AVAILABILITY

1. Property Questionnaire.
2. Survey of Property.
3. Site Plan.
4. Fee simple title holder authorization letter.

B. PRIOR TO PLAN REVIEW

1. Documents are not required to be signed and sealed at this time.
2. Preliminary plat with dedication sheet (2 sets).
3. Landscape plans (2 sets); utility easements must be shown.
4. Fire Marshall mark-up (1 set) with desired fire flow rate must be shown.
5. Construction Drawings:
 - a. Paving and Drainage Plans (2 sets).
 - b. Water and Wastewater Plans (2 sets).
 - c. Reclaimed Water Plans (2 sets) [if applicable].
6. FDEP Permit Applications – Water and Wastewater (2 each).

C. FINAL PLAN SUBMITTAL (All documents shall be fully executed, signed and sealed).

1. Water and Wastewater Permit Applications – (2 each).
2. Paving and Drainage Plans – (2 sets).
3. Water and Wastewater Plans – (3 sets).
4. Preliminary record plat with dedication sheet – (1 set).

D. PRIOR TO PRECONSTRUCTION MEETING (See Exhibit “C” for detailed description of requirements).

1. Roadway permit(s) [if applicable].
2. Contractor’s licenses.
3. Water and Wastewater system Permits.

E. FINAL DOCUMENTATION

1. Certification of mains/collection system in right-of-ways and/or easements.
2. Release of Liens – Engineer-of-Record, Underground Contractor, Fire Sprinkler Contractor, Specialty Contractor, General Contractor.
3. Request for Release – Water System with bacteriological results (PBCHD).
4. Certification of Completion – Wastewater System (PBCHD).
5. Record drawings prints, signed and sealed by PSM (see Exhibit “F”).
6. A CD with CAD and PDF files of record drawings.
7. Notarized Bill of Sale.
8. On-site easements including title insurance policy (if not plat dedicated).
9. Other documentation as may be pertinent to the particular project such as:
 - a. Sign off on roadway permits.
 - b. Indemnity agreements.
 - c. Lift station documentation
 - d. Sign off of aerial or submersible crossing of water bodies.

F. PRIOR TO CONSTRUCTION METER BEING SET

1. Release for service by PBC Health Department.
2. Receipt of final documentation items number 1, 3, 4, 5, & 8 listed in Section E above.
3. Inspection of water and sewer system(s).
4. Submittal of construction meter application.

G. PRIOR TO PERMANENT METER BEING SET OR SEWER SERVICE PROVIDED

1. Completion of all items listed above in Sections E and F, or appropriate surety in place of items number 7, 8 & 9 listed in Section E.
2. Inspection of water and sewer systems to verify punch list items were properly corrected.
3. Inspection of sewer lateral tie-in and backflow preventer installation.
4. Submittal of meter application and payment of required fees.

H. PROJECT CLOSEOUT

1. Inspection of sewer cleanouts before water meter(s) set.
2. Final inspection of water and sewer system after the last lift of asphalt is installed.
3. Once all of the above have been completed, then surety release can proceed.

EXHIBIT "B"

THE CITY OF BOYNTON BEACH
UTILITIES DEPARTMENT
124 East Woolbright Road
Boynton Beach, Florida 33435

HOLD HARMLESS AGREEMENT

I/WE, _____ am/are the property owner(s) of the real property located at, _____ Boynton Beach, Palm Beach County, Florida, having the following legal description:

Property Control Number: _____

As the Property Owner(s), _____ agree(s) to protect, defend, indemnify and hold the City of Boynton Beach, its officials, employees and agents, or successors thereof, harmless from and against any and all lawsuits, penalties, damages, settlements, judgments, decrees, legal costs, charges, removal, excavation, and replacement costs, any damages associated with removal and/or excavation, and other expenses or liabilities of every kind in connection with or arising from the installation, maintenance, repair, removal, or excavation of utility equipment, lines or structures of any kind whatsoever. Property owner(s) agree(s) and acknowledge(s) that should the City of Boynton Beach, or its successor have to remove any structures, driveways, pools, patios, walls, trees, vegetation, dirt or gravel in order to conduct necessary maintenance, repair, or installation of utilities on said property, the restoration costs associated therewith shall be the sole responsibility of Property Owner(s).

This Hold Harmless Agreement shall be recorded in the Public Records of Palm Beach County, Florida, and shall encumber the above-described property, the property owner(s) and his or her successors and assigns.

EASEMENT

THIS INDENTURE made this ____ day of _____, A.D., _____,

By _____,

a corporation existing under the laws of _____,

and having its principal place of business at _____,

first part, to the City of Boynton Beach, a political subdivision of the State of

Florida, second party:

(Wherever used herein, the terms, "first party" and "second party" shall include singular and plural, heirs, legal representatives and assigns of individuals and the successors and assigns of corporations, wherever the context so admits or requires)

WITNESSETH

Whereas, the first party is the owner of property situate in Palm Beach

County, Florida, and described as follows:

PCN _____

Legal Description:

and,

WHEREAS, the second party desires an easement for water and sewer utilities and/or other appropriate purposes incidental thereto, on, over and across said Property,

and,

WHEREAS, the first party is willing to grant such an easement,

NOW, THEREFORE, for and in consideration of the mutual covenants each to the other running and one dollar and other good and valuable considerations, the first party does hereby grant unto the party of the second

part, its successors and assigns, full and free right and authority to construct, maintain, repair, install and rebuild facilities for above stated purposes and does hereby grant a perpetual easement, on over and across the above described property for said purposes.

IN WITNESS WHEREOF, the first party has caused these presents to be duly executed in its name and its corporate seal to be hereto affixed, attested by its proper officers thereunto duly authorized, the day and year first above written.

Signed, sealed and delivered
In the presence of:

Signature

Print Name

BY _____
President

Signature

ATTEST: _____
Secretary

Print Name

(CORPORATE SEAL)

STATE OF _____

COUNTY OF _____

I HEREBY CERTIFY that on this day, before me, an officer duly authorized in the State and County aforesaid to take acknowledgments,

Personally appeared _____

_____ well known to me to be the _____ President and _____, respectively, of the Corporation named as first party in the foregoing Easement and that they severally acknowledged executing the same in the presence of two subscribing witnesses freely and voluntarily, under authority duly vested in them by said Corporation, and that the seal affixed thereto is the true Corporate seal of said Corporation.

WITNESS my hand and official seal in the Country and State last aforesaid this _____ day of _____ A.D., 200__.

Notary Public in and for the

State and County aforesaid.

My commission expires:

BILL OF SALE

KNOWN ALL MEN BY THESE PRESENTS:

That the _____, a corporation organized and existing under and by virtue of the laws of the State of Florida, having its principal place of business in the County of _____ in the State of Florida, hereinafter referred to as "SELLER", for and in consideration of the sum of _____ Dollars, in lawful money (and other good and valuable considerations unto it moving) to it paid by the City of _____, County of Palm Beach, and State of _____, hereinafter referred to as the "BUYER" receipt of which is hereby acknowledged by it, has granted, bargained, sold, transferred, set over and delivered unto the BUYER, its successors and assigns, all those certain goods and chattels, described as follows:

The water and sewer systems described on sheet(s) _____ of the plans by _____, project number _____.

TO HAVE AND TO HOLD the same unto the BUYER, its successors and assigns forever.

And the SELLER, for itself and its successors, hereby covenants to and with the BUYER, its successors and assigns that is the lawful owner of the said goods and chattels; that they are free from all liens and encumbrance; that it has good right to sell the same as aforesaid, and that it will warrant and defend the same against the lawful claims and demands of all persons whomsoever.

IN WITNESS WHEREOF, the SELLER has caused its corporate name to be hereunto subscribed and its corporate seal to be affixed by its officers hereunto duly authorized, this the _____ day of _____ A.D. 20_____.

Signed, sealed and delivered in our presence:

Signature

Print Name

Signature

Print Name

By _____
President

By _____
Vice President

(SEAL)

STATE OF FLORIDA:
COUNTY OF PALM BEACH:

BEFORE ME, an officer duly authorized by law to administer oaths and take
acknowledgements, personally appeared _____

corporation of Florida, and acknowledged they executed the foregoing Contract as the proper
officials of the _____ and the same is the act and deed
of the _____.

IN WITNESS OF THE FOREGOING, I have set my hand official seal at
_____ in the State and County aforesaid on _____.

(SEAL)

Notary Public
My Commission Expires:

This Instrument prepared by:

Address:

EXHIBIT “C”

THE CITY OF BOYNTON BEACH
UTILITIES DEPARTMENT
124 East Woolbright Road
Boynton Beach, Florida 33435

PRECONSTRUCTION MEETING PREREQUISITE CHECKLIST

No pre-construction meeting may be scheduled until all of these items are in hand and approved by the Department.

1. FDEP and PBCHD permits and approved plans.
2. Three (3) copies of the Department’s “Shop Specifications” (see Exhibit “D”) with selected items highlighted and acknowledged/approved by the Contractor and Design Engineer.
3. Three (3) copies of shop drawings for manholes and any other appurtenances not covered by the “Shop Specifications” requiring submittal approved by the Contractor and Design Engineer.
4. Three (3) copies of shop drawings for pump (lift) stations, valve vaults for pump stations, detector check vaults, etc. with approval stamp and signature of Contractor and Design Engineer.
5. One (1) copy of cost estimate (labor and materials) for potable water / reclaimed water / wastewater / stormwater facilities to be owned by the Department – Design Engineer’s seal not required.
6. Off-site easements, including legal description and survey sketch.
7. All other applicable permits, including but not limited to roadway right-of-way and canal right-of-way construction permits (FDOT, PBC, LWDD and/or the City, as applicable), railroad crossing permits, and dewatering permits.
8. Florida Power & Light transformer layout – if applicable (preliminary approval by FPL is acceptable).

9. A check in the amount of two (2%) percent of the total construction cost estimate for potable water / reclaimed water / wastewater / stormwater facilities to be owned by the Department, made payable to “City of Boynton Beach Utilities Department”, based on Design Engineer’s or Contractor’s cost estimate (\$100.00 minimum) plus a televising inspection fee in the amount of \$1.75 per lineal foot.

The Engineer-of-Record (EOR) shall notify all applicable other utilities and agencies of jurisdiction whose presence will be required at the meeting.

Preconstruction meetings will be scheduled at appropriate times at the Utilities Department current administration building, 124 East Woolbright Road, Boynton Beach, Florida 33435. Should you have any questions, please contact the undersigned at telephone number (561) 742-6400.

By: _____
Department Representative

EXHIBIT "D"

THE CITY OF BOYNTON BEACH
UTILITIES DEPARTMENT
124 East Woolbright Road
Boynton Beach, Florida 33435

"SHOP SPECIFICATIONS"

Project Name: _____

Concurrence of
Utilities Contractor: _____
Signature Date

Firm

Concurrence of
Engineer of Record: _____
Signature Date

Firm

By signature above, the Utilities Contractor for the above noted project agrees to adhere to the following product specifications, the Department's Design Handbook Construction Standards and Specifications (latest edition), and/or the approved Contract Documents as applicable. It is understood that the Department will reject construction not in accordance with this document.

PRODUCT AND SPECIFICATION BASIS

The following products and specifications have been found to be acceptable and/or desirable in their respective groups. Shop drawings need not be submitted to the Engineer and City if the Contractor uses products on this list. Any product that is not on this list is considered as a "substitution" and must be approved in advance by the Engineer and City in accordance with the Department's Design Handbook Construction Standards and Specifications (latest edition) and/or the approved Contract Documents as applicable. Shop drawings will also be required for all non-standard items including, but not limited to, all precast concrete structures, manholes, wet wells, grease traps, other castings, pumps and electrical panels. All materials to be made in the USA or be approved by the Utilities Director.

[HIGHLIGHT ITEMS OF CHOICE]

I. MAIN LINE CONSTRUCTION

- A. Pipe – All pipe must be properly labeled.

EXHIBIT “D”

1. Potable Water Main.

- a. Push on and mechanical joint DIP, Pressure Class 350 through 20”, Class 250 over 20”, Cement mortar lining AWWA C-151 and C-104. MJ pipe shall require ductile iron glands and Cor-Ten tee bolts. For underground potable water systems, all pipe and pipe fittings will be color coded or marked in accordance with subparagraph 62-555.320(21)(b) 3, F.A.C., using blue as the predominant color.
- b. Flanged DIP, Cement mortar lining ANSI/AWWA C-151/A21.50 for 150 psi, and C-104 flanges must be ductile iron.
- c. Push on PVC for potable water, AWWA C-900 or C-905, SDR-18, 150 psi, (NSF61), if approved at the Department’s discretion, based upon location of the installation. For underground potable water systems, all pipe and pipe fittings will be color coded or marked in accordance with Section 62-555 F.A.C., using blue as the predominant color. Underground plastic pipe shall be solid-wall blue pipe, will have a co-extruded blue external skin, or will be white or black pipe with blue stripes incorporated into, or applied to, the pipe wall.

Note: All domestic manufacturers’ pipe is acceptable – must be properly labeled (AWWA, SDR, PSI, NSF).

- d. A high range EMS marker is required at all fittings and valves.

2. Reclaimed Water

- a. Push on and mechanical joint DIP, Pressure Class 350 through 20”, Class 250 over 20”, Cement mortar lining AWWA C-151 and C-104. MJ pipe shall require ductile iron glands and Cor-Ten tee bolts. For underground reclaimed water systems, all pipe and pipe fittings will be color coded or marked in accordance with Section 62-610 F.A.C. using purple as the predominant color.
- b. Flanged DIP, Cement mortar lining ANSI/AWWA C-151/A21.50 for 150 psi, and C-104 flanges must be ductile iron.
- c. Push on PVC for potable water, AWWA C-900 or C-905, SDR-18, 150 psi, (NSF61), if approved at the Department’s discretion, based upon location of the installation. For underground reclaimed water systems, all pipe and pipe fittings installed under this project will be color coded or marked in accordance with subparagraph

EXHIBIT “D”

62-555.320(21)(b) 3, F.A.C., using purple as the predominant color. Underground plastic pipe shall be solid-wall purple pipe, will have a co-extruded blue external skin, or will be white or black pipe with purple stripes incorporated into, or applied to, the pipe wall.

Note: All domestic manufacturers’ pipe is acceptable – must be properly labeled (AWWA, SDR, PSI, NSF).

d. A high range EMS marker is required at all fittings and valves.

3. Sanitary Force Main.

a. Push on and mechanical joint DIP, Pressure Class 350 through 20”, Class 250 over 20”, vinyl based cement epoxy lining, AWWA C-151 and C-104. MJ pipe shall require ductile iron glands and Cor-Ten tee bolts.

b. Flange DIP, ceramic epoxy lined AWWA C-115 and C-104, flanges must be ductile iron. For underground sanitary force main systems, all pipe and pipe fittings will be color coded or in accordance with F.A.C. requirements, using green as the predominant color.

b. Underground plastic pipe shall be solid-wall green pipe, will have a co-extruded green external skin, or will be white or black pipe with green stripes incorporated into, or applied to, the pipe wall.

c. PVC Pressure Pipe for force main piping (AWWA C-900 or C-905, DR-18, 150 psi, NSF 61), if approved at the Department’s discretion, based upon the location of the installation.

d. Where force main will not remain full of liquid under all operating conditions, ceramic epoxy lined pipe and fittings will be required including all lift station piping. The lining must be installed according to pipe manufacturing specifications.

e. A high range EMS marker is required at all fittings and valves.

4. Gravity Sewer Main (Wastewater).

a. Pipe.

1) PVC – Use DR 18 AWWA C-900. Underground plastic pipe shall be solid-wall green pipe, will have a co-extruded

EXHIBIT “D”

- green external skin, or will be white or black pipe with green stripes incorporated into, or applied to, the pipe wall.
- 2) DIP – Pressure Class 350 through 20”, Class 250 over 20”; AWWA C-151 ceramic epoxy lined must be used in areas requiring special structural integrity. For cement epoxy liner, use “Protecto 401” or “Permite 9043, Type 2” (millage to be according to manufacturer’s specification), and shall meet AWWA C-210 as related to wastewater lines. Underground DIP pipe and pipe fittings will be color coded or marked in accordance with F.A.C. requirements, using green as the predominant color.
- b. Manhole Cover.
 - 1) U. S. Foundry Model #230-AB-M
 - 2) Approved equal.
5. Marking Tape for utility lines (detectable mylar style 6” wide imprinted with 2” high lettering; words shall occur every 3 feet).
- a. Water mains – Blue background tape with wording “CAUTION – POTABLE WATER MAIN BURIED BELOW”.
 - 1) MAGNATEC by Thor Enterprises
 - 2) T. Christy Enterprises
 - b. Force mains - Brown background tape with wording “CAUTION – FORCE MAIN BURIED BELOW”.
 - 1) MAGNATEC by Thor Enterprises
 - 2) T. Christy Enterprises
 - c. Reclaimed mains – Purple background tape with wording “CAUTION – RECLAIMED MAIN BURIED BELOW”.
- B. Valves and Fittings.
1. Resilient Wedge or Gate Valves (3” to 12”), (specified for all available sizes, ANSI/AWWA C-509, ANSI/AWWA C-550).
 - a. American Flow Control
 - b. Kennedy / Clow
 - c. Mueller
 2. Butterfly Valves (>12”), (AWWA C-504) [Potable and Reclaimed Water].

EXHIBIT “D”

- a. American Flow Control
 - b. Kennedy / Clow
 - c. Mueller Lineseal
 - b. Pratt
3. Side drive, horizontal bevel reduction gear Gate Valves, where specified (only for Force Mains with 14” diameter or larger, bronze rollers, tracks and scrapers; and AWWA C-500).
- a. M & H
 - b. Mueller
 - c. U. S. Pipe
 - d. American
 - e. Kennedy / Clow
 - f. Waterous
 - g. DeZurik
4. OS & Y Valves (Flanged – Above ground fire line use only).
- Valves shall be resilient wedge and equipped with bronze follower packing gland and bronze follower studs and nuts. (Cast iron and/or cadmium plated steel are not acceptable) AWWA C-509.
- a. M & H
 - b. American
 - c. U. S. Pipe
5. Tapping sleeve and valve (Potable Water, Reclaimed Water and Force Main Only).
- a. Tapping Sleeves
 - 1) Ductile iron – mechanical joint only.
 - a) M & H
 - b) American Darling
 - c) Mueller
 - d) Tyler
 - e) Clow
 - f) U. S. Pipe
 - 2) Stainless steel – for use on cast iron, ductile iron or cement asbestos pipe.
 - a) Ford FAST
 - b) JCM 432
 - c) Power Seal
 - d) Romac Series “SST”
 - e) Cascade SCT-SL
 - b. Tapping Valves (Resilient wedge – mechanical joint outlet only).

EXHIBIT "D"

- 1) M & H
 - 2) American Flow Control
 - 3) American
 - 4) Mueller
 - 5) Kennedy/Clow
 - 6) U. S. Pipe
6. Check Valves (Outside lever and weight only AWWA C-508, neoprene seat)
- a. Mueller
 - b. Kennedy / Clow
 - c. American Flow Control
 - d. Abco
7. Air Release Valves (Stainless steel fittings)
- a. Potable and Reclaimed Water Main 1" Inlet
 - 1) ARI D-020
 - 2) Val-Matic Model 325
 - 3) Crispin Model #PL10
 - 4) ARPO Model #200A
 - 5) Empire
 - b. Force Main 2" Inlet
 - 1) ARI D-020
 - 2) Approved equal
 - 3) ARI K-020
8. Flanged fittings, AWWA C-104, AWWA C-110, mechanical joint fitting to be compact ductile iron (Class 350 AWWA C-153) only. Cement lining ANSI/AWWA C-104/A21.4; Cast Iron or Ductile Iron, ANSI/AWWA C-100/A21.10) Glands for MJ fittings shall be ductile iron and tee bolts shall be Cor-Ten steel.
- a. Cement lined for potable and reclaimed water main use.
 - b. Vinyl based ceramic epoxy lined for force main use.
 - c. Full face neoprene gaskets shall be required on all flange fittings.
 - d. For aerial crossings, use TOR-U-SEAL gaskets or equivalent.
 - e. Flange bolts on flange connections inside lift station wet wells shall be 316 stainless steel.
 - f. Mechanical Joint and Flanged Fittings (epoxy lined, Cast Iron or Ductile Iron ANSI/AWWA C-111/A21.11; ANSI/AWWA C-110/A21.10).

EXHIBIT “D”

- g. Flange Adapters (cast iron or ductile iron only – flange x MJ fittings).
 - 1) Ford – Uniflange
 - 2) Ebba Iron (Mega-Flange)
 - 3) Smith Blair

- h. Follower Glands (Accessory Package), (ANSI/AWWA C-111/A21.11; ANSI/AWWA C-110/A21.10).
 - 1) Tyler
 - 2) U. S. Pipe
 - 3) Union Foundry
 - 4) Trinity Valley

- 9. Transition Couplings – Ductile iron body and glands only with ductile iron or all stainless steel bands, bolts & nuts and screws.
 - a. Meter pits or DIP / AC pipe transitions.
 - 1) Hymax
 - 2) Approved equal.

 - b. Couplings for use on existing facilities (VCP, etc.).
 - 1) Fernco
 - 2) Approved equal.

 - c. PVC Wastewater Pipe/Manhole Adapter.
 - 1) Harco (Type PVC-900, epoxy-crete coupling)
 - 2) Approved equal

 - d. PVC C-900 to SDR 35 Adapter (laterals only).
 - 1) Fernco
 - 2) Harco
 - 3) Approved equal

- 10. Fire Hydrants (AWWA C-502 “traffic type” break-away flange, no cut bolts; non-rising stem; dry barrel, 5¼ inch main valve opening; bronze to bronze seating). Paint red with Rustoleum Fire Hydrant paint or approval equal.
 - a. Mueller Super Centurion
 - b. American Darling B-84-B
 - c. Clow Medallion

EXHIBIT “D”

NOTE: One repair kit is required with every five (5) hydrants prior to water main acceptance.

11. Tie Rods – Tie back bolts, nuts, washers and all thread rods shall meet ASTM A-242 requirements ($\frac{3}{4}$ ” galvanized dipped, Cor-Ten steel or equivalent) and be painted in accordance with the Department’s specifications. Tie back bolts shall be Star Model SST 753 of Cor-Ten steel or approved equivalent. All tie rods shall be a minimum $\frac{3}{4}$ ” diameter; the use of rebar with welded thread is prohibited. Two (2) tie rods (with eye bolts) are required per joint for pipe sizes 4” through 10”. A minimum of four (4) tie rods (with eye bolts) are required per joint for pipe sizes 12” and larger.
12. Self Restraining Gaskets for push on DIP (in approved areas only).
 - a. U. S. Pipe – “Field-Lok”
 - b. American – “Fast Grip”
13. Restrained Joint Push-On Ductile Iron Pipe (straight runs of pipe only)
 - a. U.S. Pipe – “TR Flex”
 - b. American – “Flex Ring”
14. Restrained Mechanical Joint Fittings
 - a. Ebba Iron – “Megalug”
15. Permanent Sampling Station.
 - a. Eclipse #88 WC with plastic cover
 - b. Approved equal

II. SERVICE LINE CONSTRUCTION

- A. Pipe.
 1. Potable and Reclaimed Water Service Line.
 - a. Drisco pipe 3408 polyethylene tubing 1”, 1½” & 2”.
 - b. Type “K” copper tubing (soft roll) 1”, 1½” & 2”.
 2. Sanitary Sewer Service Lateral.
 - a. PVC - DR 18 AWWA C-900 PVC.
- B. Fittings.

EXHIBIT “D”

1. Potable and Reclaimed Water Service – Standard (service under paving requires shop drawing submittal on curb stop, service saddle and curb valve box, curb and ball corp. shall be same manufacturer).
 - a. Polyethylene tubing – “Pack-Joint” fittings, or equal with stainless steel inserts.
 - b. Type “K” copper tubing (must be color coded based on water type (blue for potable and purple for reclaimed))
 - 1) Cast brass solder joint fittings, or equal for above ground backflow prevention device installation.
 - 2) Both lead free solder and flux shall be used on all solder joints.
 - c. Service Saddles (stainless steel double strap saddle only, AWWA threads).
 - 1) Mueller
 - 2) Ford 202B
 - 3) Romac Style 202B
 - 4) JCM
 - 5) Rockwell (Smith Blair)
 - d. Ball corp. (AWWA Inlet threads) (transition to polyethylene or copper pipe shall be made) using a pack joint compression connection. [see next page]
 - 1) Ford Type FB1000
 - 2) Mueller Model #300
 - e. Curb Stops (T-top only, Ball Valve locking type) (locking wings-compression by yoke).
 - 1) Ford
 - 2) Mueller
 - f. Yokes (potable and reclaimed water) (tailpiece – yoke x IP).
 - 1) Ford
 - 2) Mueller
 - g. Ball Valves (FIP X FIP with key adapter, ¼ turn stop)
 - 1) Ford
 - 2) Mueller

EXHIBIT “D”

2. Sanitary Sewer Service.
 - a. DR 18 AWWA C-900 PVC.

III. BACKFLOW PREVENTION DEVICES

- A. Reduced Pressure Backflow Preventer with ball valves ¾” through 2” (as approved by USC/FCCCHR).
- B. Double Detector Check Valve with Bypass Valve, Check Valve and Meter Assembly (5/8” Sensus Meter required which must be purchased from the Department – meter to read in gallons). Must be approved by USC/FCCCHR.

IV. LIFT STATION REMOTE TELEMETRY UNIT (RTU)

Motorola ACE 3600 or latest version integration by DCR Engineering, Control Panel by DCR Engineering or approved equal..

V. LIFT STATION GENERATOR REQUIREMENTS

Baldor or Kohler meeting the latest EPA requirements.

VI. APPURTENANCES (water, reclaimed and/or wastewater facilities)

- A. Potable water meter boxes:
 1. For 5/8” x ¾”, ¾” & 1” meters, single service:
 - a. Box: Mid-States Plastics, MSBCF-1118-12 XL
Lid: Okiedokie (touch-read lids)
 - b. Box: CDR WB-03-1118-12
Lid: CDR WB-00-1118-2C (Touchread)
 2. For 1½” & 2” meters:
 - a. Box: Mid-States Plastics, MSBCF-1730-12
Lid: Okiedokie (touch-read lids)
 - b. Box: CDR WB-03-1730-12 (straight wall)
Lid: CDR WC-00-1730-2C (Touchread)
- B. Manhole Cover Riser Rings (non-expanding, maximum 4, existing structures only).
 1. U.S. Foundry

EXHIBIT "D"

- C. Paint Specification for Underground Concrete Structures (meter vaults, valve vaults, special structures, etc.) inside/outside two coats required:
1. Outside structure: 1st coat gray or red, 2nd coat black:
 - a. CARBOLINE (Koppers) Bitumastic 300M
 - b. Approved equal
- D. Interior Lining and Exterior Coating Specification for Manholes & Wetwells inside/outside 10-12 wet film thickness (two coats required):
1. Interior Lining:
 - a. Sewpercoat
 - b. Thor-Roc
 - c. Mainstay
 - d. Strong Seal
 - e. Refratta HAC 100
 2. Outside structure: 1st coat gray or red, 2nd coat black:
 - a. CARBOLINE (Koppers) Bitumastic 300M
 - b. Approved equal

VII. STORMWATER SYSTEM

A. Conduits

The materials used in the carrying pipe design shall be as called for on the design plans and the following specific specifications:

1. Reinforced Concrete Pipe (RCP): ASTM C-76-82b, ASTM C-443, FDOT Specifications, 2000, Section 941.
2. Corrugated Metal Pipe (CMP): AASHTO M-196, FDOT Specifications, 2000, Section 943 & 945.
3. Ductile Iron Pipe (DIP): ANSI/AWWA C-151/A21.51-86, C-110/A21.10-87, C-111/A21.11-85.
4. Polyvinyl Chloride Pipe (PVC): AWWA C-900-81, ASTM D-3034-85b, FDOT Specifications, 2000, Section 948.
5. Corrugated Polyethylene Pipe (CPEP): AASHTO MP-6, ASTM D-2412, or AASHTO M-294. M-252.

EXHIBIT "D"

B. Exfiltration Trench.

Slotted concrete pipe, perforated metal pipe or perforated PVC or CPEP pipe shall be used as specified on the plans as the distribution conduit within trench. Trench shall be lined on all sides with a plastic filter blanket (geotextile fabrics), complying with FDOT Specifications and FDOT Standard Drawing Index, latest edition.

C. Concrete flumes, inlet aprons, erosion control slope protection.

All non-structural concrete shall develop a minimum of 2,500 psi @ 28-day compressive strength. Class I concrete shall conform to FDOT Specifications, latest edition. Structural concrete shall be Class II (3,000 psi) or higher as called for on the design plans.

E. Ground Cover.

Sodding (original or replacement) shall be Floratam (in irrigated areas) and Argentine Bahia (in non-irrigated areas) conforming to the requirements of the FDOT Specifications, latest edition, unless other ground cover has been approved by other Departments within the City. No bare surface soil will be permitted which will cause erosion of detention/retention systems, drainage channels, overland swales or surface graded slopes to negate a surface water management plan approved for the development.

F. Pollution Control Device

12F or 18F Snout oil and debris stop by BMP, Inc. or approved equal shall be installed in all drainage control structures which outfall to a canal or other water body.

EXHIBIT “E”

GENERIC SPECIFICATIONS PAVING, DRAINAGE, CONDUIT AND RESTORATION

(Generic for Plan or Detail Sheets)

1. Subgrade – Subgrade shall be compacted to meet the density requirements as determined by AASHTO T-180-86 Specifications. Subgrade shall extend 12” beyond the proposed edge of pavement, and the total 12” shall be compacted to 98% of maximum density.
2. Base (Limerock) – Approved local limerock base material shall be compacted to not less than 98% maximum density as determined by AASHTO T-180-86 Specifications and as called for in the FDOT Specifications, 2010, Section 230.
3. Base (Shellrock) – Approved local shellrock base material shall be compacted to not less than 98% maximum density as determined by AASHTO T-180-86 Specifications and called for in the FDOT Specifications, 2010, Section 913A. Shellrock shall be placed and compacted in two (2) equal layers.
4. Prime Coat – Bituminous prime coat shall conform with the requirements of the FDOT Specifications, 2000, Section 300, and shall be applied at the rate of 0.25 gallons/square yard, unless a lower rate is approved by the engineer.
5. Tack Coat – Bituminous tack coat shall conform with the requirements of the FDOT Specifications, 2010, Section 300, and shall be applied at the rate of 0.08 gallons/square yard, unless a variation in rate is approved by the engineer.
6. Surface Course – Type SP asphaltic concrete or Type FC-5 asphaltic concrete surface course shall conform to the requirements of the FDOT Specifications, 2010, Section 334 and 337 respectively. The minimum compacted thickness is to be as noted on the plans.
7. Concrete – All non-structural concrete shall develop 2,500 psi (minimum) 28-day compressive strength. Class I concrete shall conform with the FDOT Specifications, 2010, Section 346. If structural concrete, development shall be 3,000 psi (minimum) 28-day compressive strength. This is considered as Class II concrete. Structural as used in this paragraph shall mean appurtenances such as flush concrete header curb, inlets, manholes, access boxes, and similar uses.
8. Heavy Structural Concrete – All heavy structural concrete shall develop 3,400 psi (minimum) 28-day compressive strength. Class III concrete shall conform with the FDOT Specifications, 2010, Section 346. For details on concrete type and reinforcing, refer to the structural plans for the use and requirements specified.

9. Concrete Walk – All concrete walks, new or replacement, shall be 4” thick except at vehicular crossings which shall require 6” (minimum) thickness reinforced with 6” x 6” x W1.4 x W1.4 W.W.M., or fiber mesh.
10. Concrete Curb – New or replacement concrete curb, curb and gutter, or separators shall be the type designated on the plans and shall be constructed in accordance with the requirements of the FDOT, Specifications, 2010, Section 520.
11. Inlets – All inlets shall be the type designated on the plans, and shall be constructed in accordance with the FDOT Specifications, 2010, Section 425. When percolation inlets are called for on the plans, they shall be the required FDOT Specifications type inlet modified to allow for either horizontal or vertical perforated CMP as shown on the inlet detail, backfilled with granular material (ballast rock) to the designed depth.
12. Corrugated Metal Pipe – The pipe shall conform to the requirements of AASHTO M-36 with bituminous coating, and with the FDOT Specifications, 2010, Section 943.
13. Corrugated Aluminum Pipe – The pipe shall conform with the requirements of AASHTO M-196 and with the FDOT Specifications, 2010, Section 945.
14. Installation of Corrugated Metal Pipe – All joints on storm sewer pipe shall be made up with either ½” neoprene or ¼” strip sealant gasketed material. All bands shall have the same corrugated design as the pipe. Width of the bands shall be as follows: 12” up to 48” diameter pipe, and 24” over 48” diameter pipe.
15. Reinforced Concrete Pipe – The pipe shall conform with the requirements of Table III of ASTM C-76-82b, and with the FDOT Specifications, 2010, Section 430-7. If slotted concrete pipe is used, the slots shall be a maximum of 3/8” wide, spaced 12” on centers staggered on opposite sides of the pipe. The length of the slots is dependent on the pipe diameter; refer to Exfiltration Trench Detail for this dimension.
16. Corrugated Polyethylene Pipe – The pipe shall be a double-wall conduit, smooth wall on the inside and have high density corrugated polyethylene annular exterior corrugations. Pipe fittings and accessories shall be of same material and weight/class as pipes, with adjoining method as indicated. All roof drains connections shall be made with a pre-manufactured welded tee fitting. All materials shall comply with AASHTO MP-6, ASTM D-2412, and/or AASHTO M-294, Type S, or M-252, and with FDOT Specifications, 2010, Section 948-2.. All pipe and fittings shall be “N-12, HC 42 or HDPE” as manufactured by Advance Drainage Systems, Inc. or approved equal.
17. Manholes – All manholes (and junction boxes) shall be the type designated on the plans, and shall be constructed in accordance with the FDOT Specifications, 2010, Section 425.
18. Exfiltration Trench – The exfiltration trench (or drainfield) may use either slotted concrete pipe, perforated metal pipe, or perforated HDPE pipe. Pipes that are slotted or

perforated shall terminate 12" inches from the end of the trench rock or connect to an additional inlet as required (see plan for configurations). Cover pipe ends with #10 galvanized or aluminum screen. The openings in the end screens shall be no larger than ½" square. Trench rock shall be ¾" washed ballast rock. The trench shall be lined on all sides with a plastic filter blanket (geotextile fabrics) and shall comply with the FDOT Specifications, 2010, Sections 514 and 985.

19. Utilities – Contractor shall be responsible for all underground utilities whether shown or not shown on the plans. Notify all utilities involved prior to construction.
20. Conduit or Casing Backfill – Requirements for pipe backfill crossing roads or parking areas shall be as defined in the FDOT Specifications, 2010, Section 125-8. Pipeline backfill shall be placed in 6" lifts and compacted to 100% of the Standard Proctor (AASHTO T-99-86 Specifications).
21. Clearances – The horizontal distance of 6 feet (minimum) shall be maintained between and from water, sewer or storm drainage lines. Conduits shall pass over all of the utility lines with a vertical clearance of 12" minimum.
22. Sodding – Sodding replacement shall be Floratam (in irrigated areas) and Argentine Bahia (in non-irrigated areas), and shall conform to the requirements of the FDOT Specifications, 2007, Section 575.
23. Retention Facility – Wet detention/retention facility utilized for storage of stormwater runoff in an open impoundment shall have side slopes no steeper than 4:1 (horizontal to vertical) extending to a depth of 2 feet below the water control elevation, side slopes no steeper than 2:1 from 2 feet below the control elevation to the bottom of the facility. A continuous berm at least 20 feet wide with a slope no steeper than 8:1 shall be graded from 2 feet above the control elevation. All areas above the control elevation for a minimum distance of 20 feet shall be either seeded and mulched or sodded to protect the new facility side slopes from erosion.
24. Guaranty – All material and equipment to be furnished and/or installed by the contractor under this contract shall be guaranteed for a period of one (1) year from the date of final acceptance thereof, against defective materials, design and workmanship. Upon receipt of notice from the owner of a failure of any part of the guaranteed equipment or materials during the guaranty period, the affected part, parts or materials shall be replaced promptly with new parts or materials by the contractor, at no expense to the owner. In the event the contractor fails to make the necessary replacement or repairs within seven (7) calendar days after notification by the owner, the owner may accomplish the work at the expense of the contractor.
25. Project Manual – When a Project Manual is assembled to become a part of the project documents, all technical specifications in CSI format pertinent to the tasks and bid items called for on the construction plans, shall be included into the Project Manual. The

Project Manual will take precedent when the specifications noted above are in conflict with the technical specifications included therein.

EXHIBIT "F"

THE CITY OF BOYNTON BEACH
UTILITIES DEPARTMENT
124 East Woolbright Road
Boynton Beach, Florida 33435

NOTICE OF ACCEPTANCE
WASTEWATER PUMP (LIFT) STATION

Development: _____

Developer: _____

Design Engineer: _____

Contractor: _____

Lift Station Street Address: _____
Assigned Number: _____

Date of Acceptance: _____ By: _____

To The Developer:

You are hereby notified that the above described pump (lift) station has been inspected and has been found to meet our construction standards. It has been accepted for operation and maintenance on the date indicated.

Developer should submit to the City of Boynton Beach Utilities Department (Department) a copy of the most recent FPL invoice and the electric meter number, said submittal preferably being on or before the date of the pump station start-up.

The Department will, within seven (7) working days of acceptance date (or the date of receipt of a copy of an FPL invoice from the Developer, whichever is later), notify FPL to transfer the power utility account to the Department. Therefore, the Department will be responsible for payment of power usage invoices commencing with the receipt of the first invoice from FPL by the Department. The Department will not be responsible for any FPL charges incurred by the Developer prior to the period covered by the initial FPL invoice issued to the Department.

The one-year warranty period for the pump station (or five years in the case of the pumps and motor assemblies) and its appurtenances shall commence on the Date of Acceptance. During said one-year period, Developer agrees to reimburse the Department for any repairs/replacements (on warranty items) performed by the Department under any emergency basis. Emergency is defined as any event occurring which would potentially endanger the safety or welfare of the public.

Notice of Acceptance of Wastewater Pump Station: _____

By: _____
Director of Utilities or Designee

The City of Boynton Beach



Utilities Department
124 E. Woolbright Road
Boynton Beach, Florida 33435
Office: (561) 742-6451
FAX: (561) 742-6298
Website: www.cbutilities.org

LIFTSTATION START UP

PROJECT:

DATE:

TIME:

CONTRACTOR REP.: _____

ENGINEERING REP.: _____

1. When punch list is completed, City will change the FPL & water accounts into the City's name.

CORRECTIONS REQUIRED:

Contractor

Engineer

Inspector



EXHIBIT G
WATER SYSTEM SHUTDOWN REQUEST FORM
 (Must be received by the Utility Department 14 working/business days in advance)

THIS SECTION IS TO BE COMPLETED BY THE CONTRACTOR					
Requested By : (Signature)			Accepted By : (Signature)		
	Contractor			CBB	
Company Name :			Project Name :		
Contractor is to deliver this form to the Utility Department Reception Desk				Date/Time Received :	
Contact			Mobile No. :		
Requested Shutdown Date :		Time :		Duration :	
Highlighted Project Drawing (s) attached : (Requests for shutdown will NOT be accepted without drawings)				Number of drawing pages attached :	
<u>Address (Nearest House or Business) :</u>					
<u>Lot No. :</u>			<u>Block :</u>		
<u>Name of Development and/or Neighborhood :</u>					
Distribution for "Heads Up" Only (w/o drawing): Arkansas Graham, Christopher Roschek, Steve Evans					
THIS SECTION TO BE COMPLETED BY THE CBB UTILITY LOCATION SUPERVISOR					
Boil Water Notice :	YES <input type="checkbox"/>	NO <input type="checkbox"/>	Houses Affected :	YES <input type="checkbox"/>	NO <input type="checkbox"/>
No. of Valves to be Shutdown :			Number of Houses :		
Businesses Affected :	Type	Address			
Special Conditions :					
Locates and Pre-Shutdown Completed :	Lab:		Date :		
After Locations has completed their pre-shutdown, redistribute this form to : Arkansas Graham, Christopher Roschek, Steve Evans					
Authorized Shutdown Date and Time					
Shutdown Authorized By (Lab) :		Shutdown Date :		Time :	
After the Lab has completed their pre-shutdown notifications, redistribute this form to : Arkansas Graham, Christopher Roschek, Steve Evans, Iain Gayle					